Emerging Sign Languages of the Americas

Sign Language Typology

Volume 9

Emerging Sign Languages of the Americas

Edited by
Olivier Le Guen, Josefina Safar and Marie Coppola

DE GRUYTER
MOUTON

ISHARA
PRESS

The electronic edition of this publication was made available in open access in October 2024.

ISBN 978-1-5015-1350-3
e-ISBN (PDF) 978-1-5015-0488-4
e-ISBN (EPUB) 978-1-5015-0484-6
ISSN 2192-5186
e-ISSN 2192-5194
e-ISSN 2192-5178
DOI https://doi.org/10.1515/9781501504884

Library of Congress Control Number: 2020946596

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at http://dnb.dnb.de.

Printing and binding: CPI books GmbH, Leck

www.degruyter.com

Contents

Part II: **Sociolinguistic sketches**

Acknowledgements

As authors and editors, we are very happy that this volume came out, and we are immensely grateful to all the people who made it possible.

First, we would like to thank the people who participated in the conference Primer Coloquio Internacional de Lenguas de Señas Emergentes en las Americas ("First International Colloquium on Emerging Sign Languages in the Americas") held in Mexico City in 2015. This meeting allowed for inspiring exchanges between researchers working on emerging sign languages in different countries and led to the compilation of this volume. Besides the presenters, we would also like to thank the interpreters for their hard work, the CIESAS (Centro de Investigación y Estudios Superiores en Antropología Social / Center for Research and Higher Studies in Social Anthropology) who hosted the conference, the UNAM (Universidad Autónoma de México / Autonomous University of Mexico) Posgrado and the Morelia ENES (Laboratorio Nacional de Materiales Orales/ Oral Material Nacional Laboratory) and the INALi (Instituto Nacional de Lenguas Indígenas / National Institute of Indigenous Languages) for their financial support. We also want to thank all the people who came to attend the conference, especially the members of the Mexican Deaf community, who came from many states of the Mexican republic.

We wish to thank all authors who contributed to the volume for their great collaboration, dedication and patience: John Haviland, Laura Horton, Emmanuella Martinod, Brigitte Garcia, Ivani Fusellier, Kristian Ali, Ben Braithwaite, Rodrigo Petatillo Chan, Rebeca Petatillo Balam and Rossy Kinil Canche. We would also like to take the opportunity to thank all the peers who reviewed each chapter carefully for their helpful suggestions greatly helped enhance the presentation of these findings. We are indebted to the editors of the Sign Language Typology series, especially to Ulrike Zeshan and her team, for their support with the editing process. We also thank Tiffani Brophy for her work compiling the language and subject indexes.

As it is fundamental to our academic work, all the authors would like to thank the deaf and hearing informants who contributed to their research, for they are the ones who allowed us, as researchers, to access the richness of their languages and to present some of it in this volume. We thank them for their time, their patience and generosity towards us. Moreover, we are grateful to deaf and hearing research assistants from some of the communities included in this volume for their invaluable support in documenting and understanding their languages.

https://doi.org/10.1515/9781501504884-203

Marie Coppola's work on this volume was supported by National Science Foundation EHR/Linguistics grant 1553589, Olivier Le Guen's work on this volume was, in part, supported by the CONACyT (Consejo Nacional de Ciencia y Tecnología // Mexican National Council for Science and Technology), grant number FC-2016-2893.

Olivier Le Guen, Marie Coppola and Josefina Safar

Introduction: How *Emerging Sign Languages in the Americas* contributes to the study of linguistics and (emerging) sign languages

In recent years, awareness of and research attention to "emerging sign languages" around the world has increased dramatically (Meir et al. 2010). This volume brings together the first set of works treating these new languages, linguistic communities, and sign systems in the Americas, including North America, Central America, South America, and the Caribbean.

One aim of this book is to provide an areal comparison between different sign languages that emerged and evolved in the same region. Few studies have looked at areal comparisons of historically unrelated sign languages (Nyst 2013; Tano and Nyst 2018) and, before this volume, none in the Americas. While emerging sign languages have been considered comparatively on a worldwide scale (de Vos and Pfau 2015), the Americas provide an interesting field for comparison.

We offer a few notes regarding the scope of this volume. First, we do not include institutionalized sign languages (such as Mexican Sign Language) in the category of 'emerging sign languages'. Second, while there are numerous settings all over the Americas where sign languages are created and used, very few have been described. Thus, the sample presented in this volume is far from exhaustive.

This volume is, in part, the result of a Colloquium on Emerging Sign Languages of the Americas, held in Mexico City on the 10th and 11th of September 2015. The main goal of the symposium was to bring together specialists (from Mexico, Sweden, the USA and France) who are investigating emerging sign languages of the Americas. We invited them to compare both the sociolinguistic situation of these emerging languages and their grammatical features. Another purpose of this meeting was to expose new audiences to this exciting field, including the local community of linguists and the Deaf signing community in Mexico. A large majority of the participants were indeed Deaf users of Mexican Sign Language, known locally as *Lengua de Señas Mexicana* (LSM). Many came from Mexico City, and some traveled all the way from Oaxaca (some 500 km away), to learn about signing systems that sometimes differ dramatically from their Deaf community sign language. All presentations were given in spoken Spanish, LSM, or American Sign Language (ASL), and interpreting was offered between these languages so that the presentations and discussions were accessible to all participants. The colloquium also featured two deaf presenters: Ernesto Escobedo from Mexico and Lynn Hou from the USA. A hearing bilingual-bimodal member of one of the

https://doi.org/10.1515/9781501504884-001

communities described in the conference, Rossy (Rita) Kinil Canché (at the time 16 years old), a user of the Yucatec Maya Sign Language from Nohkop, presented a paper on person reference in YMSL. Most of the contributors to this volume participated in the conference and we thank them for their trust and for publishing in this volume, as well as those who sent their contributions afterward.

In this introduction, we discuss first the notion of emerging sign language, and provide a short proposal for classifying sign languages considering various dimensions, linguistic and sociological. We also discuss some issues regarding variation and comparison. Finally, we provide an overview of the various contributions of this volume.

A typology of sign languages and the issues of variation and comparison

Sign languages around the world are not all similar; and for the purpose of this volume, we will propose a typology based on sociolinguistic criteria. To orient readers who may be new to the sign language literature, we begin by framing the context of emerging languages in light of more established sign languages, and by a number of dimensions that are part of a traditional sociolinguistic perspective, such as a signer's age, degree of institutionalization of the language, and geographic factors). Other factors that shape how languages emerge, and that are less rarely considered in traditional sociolinguistics of spoken languages or typology, are signers' degree of access to a linguistic community, the length of the language's history, the typical age of new signers entering the community, the ratio of deaf to hearing signers, and other factors influencing the rate of change in the language (Senghas, 2005; Nyst, 2012).

Along these dimensions, most emerging languages have shorter histories, that is, they have existed for shorter periods of time than "established" or "institutionalized" sign languages. These younger languages are also generally closer to their roots in the surrounding co-speech gestures, and are generally changing more rapidly than older, more established sign languages. Rate of change is difficult to measure and may not be uniform across all of the language's structures (e.g., lexicon, morphology, syntax, pragmatics).

The main types of sign languages that have been discussed in the literature include: alternate sign languages, homesign systems, village sign languages, Deaf community and institutional sign languages. This typology is based on earlier classifications proposed by Sandler et al. (2010), Padden (2010), Zeshan and De Vos (2012), Nyst (2013), and Bauer (2014), among others. Each type is presented in

more detail below. Note that not all of these emerging languages clearly fall into one type (Nyst 2012; Hou 2016; Safar 2019).

As mentioned earlier, it is difficult and problematic to use linguistic criteria alone to distinguish various "types" of sign languages as structures may arise in various sign languages and differences in linguistic features are not always correlated with either the sociologic composition of the group of signers or the degree of language complexity (Pfau and Zeshan 2016). Although some correlations do exist between the size and age of the community and linguistic structures, sociologic criteria alone do not predict language evolution as such (but see Meir et al. 2012). Furthermore, and this is particularly true of emerging sign languages, linguistic features tend to evolve rapidly (see Meir et al. 2012; Sandler, Meir, et al. 2011 for Al Sayyid Bedouin SL); thus, a typology that classifies sign languages according their sociolinguistic setting is useful to understand some dynamics of language use and their users. The criteria we take into account in this volume were first compiled by Senghas (2005) and include the following:

- The sociological context: geographic and social origin of the signers, type of interactional community (family, village), etc.
- The geographical context: rural or urban
- The size of the signing community
- The number of languages in contact
- The number of L2 signers (i.e. hearing people who use the sign language as a second language)
- The age of the language
- The context and domains of language use

Among the emerging sign languages considered in this volume are different types of homesign systems, including individual homesign systems in Nicaragua studied by Coppola and colleagues, as well as homesign systems used in a multigenerational setting, such as Zinacantán Family Homesign, described by Haviland, and "shared homesign systems" studied by Horton in Nebaj (Guatemala). Nicaraguan Sign Language (Coppola), some sign languages of the Caribbean (Braithwaite) and the sign languages on Marajó Island in Brazil (Martinod, Garcia and Fusellier) can be considered Deaf community sign languages. Finally, sign languages such as Yucatec Maya Sign Language (Safar and Petatillo Chan; Le Guen, Petatillo Balam and Kinil Canché) and some sign languages in the Caribbean (Braithwaite) fall into the category of village sign languages. Note that our volume also includes the first description of an emerging sign language in the tactile modality (Braithwaite).

Even if the typology presented below is useful for a first categorization, sign language communities vary extensively in these features, and are not always well

demarcated. An important question that is also addressed in some chapters is: What defines a "linguistic community" in the case of emerging sign languages? Put differently, what criteria are useful to categorize various kinds of emerging sign language communities and to what ends? (see also Safar 2019)

To summarize, and of course keeping in mind the issues raised already about the difficulty of discrete classifications (and which will be elaborated further here), we propose that emerging sign languages display the following characteristics: (1) They are languages with a relatively short duration of existence (usually no more than 2 or 3 three generations, i.e., linked to the presence of deaf signers). (2) They have a relatively small (initial) number of primary users, even as small as one in the case of an individual homesign system. (3) They are not institutionalized languages, i.e., no external institution is deciding on the evolution of the language. (4) Because of their state of emergence, these signs languages may exhibit high rates of change that are not observed in "established" languages that have been in existence for hundreds of years and used by a large community. (5) In many cases, especially for "shared sign languages" (Nyst 2012), the number of hearing signers is higher than deaf signers, meaning that the gestural practices that were/are used as a background for the sign language are still visible. In what follows, we describe briefly each language type.

Established and institutionalized sign languages. Established sign languages are linguistic systems that have been in use for a long time and have achieved stability among a variety of users. Within established sign languages, we distinguish a subtype of institutionalized sign languages, sometimes called "national" "sign languages. These are the most known and well-described sign languages in the world. These sign languages are institutionalized in the sense that the language is regulated not only by the users themselves but also through the existence of external institutions and through the presence of elements that somehow escape users, such as grammars and dictionaries (although not all institutionalized this sign languages have extensive grammars or dictionaries). These languages can be learned and taught formally in schools, even though this is not the case for all national sign languages all over the world and the degree of formalization can vary greatly. Typically, they are recognized by law as official languages of their respective countries (even though these laws are often not respected) (see DeMeulder (2015) for an overview of different types of legal recognition of sign languages worldwide). Although many institutional sign languages originated from previously institutionalized languages, i.e., the French Sign Language or Spanish Sign Language (Pfau, Steinbach, and Woll 2012), they can also show some influence from the village or Deaf community sign languages constituting the linguistic background of early signers. This was for instance, the case for Martha's Vineyard Sign Language, which influenced some dialects of

ASL (Lucas et al. 2001). Many of these sign languages are also influenced by the surrounding spoken and written languages. For instance, mouthing (i.e. silently performing a movement with the mouth similar to the pronunciation of the word or the first syllable of the word) is common in institutionalized sign languages like ASL or Mexican Sign Language (Padden and Gunsauls, 2003). It is more rare, but sometimes also present in some village sign languages (Nyst 2012). Fingerspelling (i.e. the spelling of a written word from the surrounding written language using a manual alphabet) is common in institutionalized sign languages and implies that signers are competent in the written language to some degree (see for instance, Hendriks and Dufoe 2014 on Mexican Sign Language).

Deaf community sign languages.[1] These sign languages represent a special type in the sense that they constitute the stage before a sign language becomes institutionalized. The main difference from the institutionalized sign languages considered above is that deaf people from various backgrounds are grouped together in a newly-formed signing community, generally a Deaf school or a Deaf club. Because of the diversity of backgrounds, Sandler et al. (2005) propose that Deaf community sign languages may undergo a rapid structural linguistic development since signers have to build a common ground in a relatively short time. Other researchers (e.g., Senghas and Coppola, 2001; Senghas, 2003) argue that children acquiring the language leads to an observed increase in linguistic complexity. Among the documented languages of this type around the world, we can mention Nicaraguan Sign Language (Senghas, Kita and Özyürek 2004; Senghas 1995), Israeli Sign Language (Meir and Sandler, 2008), Mauritian Sign Language (Adone, 2007; Gébert et al. 2006), sign languages in Marajó Island in Brazil (Martinod, Garcia and Fusellier, this volume) and several sign languages of the Caribbean (Braithwaite, this volume).

Linguistically, Deaf community sign languages often exhibit grammatical features close to the ones used in institutional sign languages even at a very young stage of development, especially in the way signing space is used (Meir and Sandler 2008; Senghas 2003), and some of them also show specific characteristics like the emergence of a fixed word order and a shift of use of the signing space across generations of signers (Adone and Bauer 2009; Gébert et al. 2006; Senghas et al. 1997; Senghas 2003).

1 Padden (2010) uses this term to refer to what we call "institutional sign languages" here.

Village Sign Languages. This type of language is so named because it typically arises in the context of a village (Zeshan 2010; Meir et al. 2010) with an unusually high incidence of (typically genetic) deafness, although it is also used to refer to sign languages in use across a larger region (e.g. Inuit Sign Language, Schuit (2012) or an island (e.g. KonchriSain, Cumberbatch 2012). For this reason, other authors used the alternative labels "rural sign languages" (e.g. Zeshan and Vos 2012) or "indigenous sign languages" (Nonaka 2009). Basically, such languages are created in the presence of relatively few deaf persons and are used by a number of hearing bilinguals in a speech community that includes the immediate family members of the deaf individuals as well as multiple families and generations. Because these languages are used by deaf and hearing community members alike, they have also been labelled "shared sign languages" (Kisch 2008; Nyst 2012). Rural signing communities are often characterized by a high degree of homogeneity between deaf and hearing people in terms of occupation and education (Nonaka 2012a: 279) and a substantial extent of shared cultural knowledge and routines (Kisch 2008). The village signing communities documented across the world include: Adamorobe Sign Language in Ghana (Nyst 2007), Alipur Sign Language in India (Panda 2012), Al-Sayyid Bedouin Sign Language in Israel (Kisch 2012; Meir et al. 2012; Sandler, Aronoff, et al. 2011), Algerian Jewish (or Ghardaia) Sign Language in Israel and France (Lanesman and Meir, 2012), Ban Khor Sign Language in Thailand (Nonaka, 2007; Nonaka, 2012), Kata Kolok in Bali (de Vos, 2012a; Marsaja 2008), KonchriSain in Jamaica (Cumberbatch, 2012), Inuit Sign Language in Canada (Schuit, 2012), Mardin Sign Language in Turkey (Dikyuva, 2012) and the already extinct Martha's Vineyard Sign Language in the USA (Groce, 1985). Finally, Yucatec Maya Sign Language (YMSL) is a village sign language from the Americas treated in multiple chapters in this volume. Note that in the case of village/shared sign languages, not all languages date back only a few generations. For instance, Adamorobe Sign Language (Nyst 2007) is reported to be over 200 years old.

Homesign systems: This type of signed communication typically appears in families where a single deaf child is born and receives no or very limited (signed) linguistic input from the caregivers or others. In such a context, the child, along with the other members of the family, create a signed system of communication. According to Frishberg's (1987) classic analysis, homesigns present some defining features: (a) they do not have a consistent meaning-symbol relationship, (b) they are not passed on from generation to generation, (c) they are not shared by one large group of signers and, (d) they are not considered the same over a community of signers.

The growing body of studies on homesigns show that, at least in the US, child homesigners receive limited systematic gestural input from their parents (Goldin-

Meadow 2003; Goldin-Meadow and Mylander 1984). One reason might be that there are very few quotable gestures and no systematic use of iconic gestures among English speakers in the US (McNeill 1992). This, however, is not the case in many other cultural contexts, where the gestural repertoire is much more elaborate (as is the case among many settings presented in this volume). In order to distinguish between settings where isolated deaf signers are socialized in an oralist education setting without any signed input (for instance in the US) and rural settings without access to any previously established sign language but the presence of rich gestural communication, Nyst (2012) proposes the distinction between "oralist" and "rural" homesign. Several chapters in this volume come to somehow challenge what we knew so far about homesign systems from Frishberg's (1987) analysis. An interesting case of a homesign system in Mesoamerica is Zinacantán Family Homesign used in Chiapas, Mexico, where a whole family created an elaborate signed language to communicate even though there are only three deaf individuals (Haviland 2011; Haviland 2013a; Haviland 2013b; Haviland 2015, this volume). It is important to note that not all homesign settings are the same in terms of interactional features and linguistic complexity: Horton (this volume), in her chapter on child homesign systems, introduces the term "shared homesign" (as opposed to "individual homesign") to describe signed communication used by multiple deaf individuals within a family, sometimes intergenerationally. Coppola (this volume) compares the degree of lexical conventionalization within individual adult homesigners and their communication partners in Nicaragua with that of signers of the first cohort of Nicaraguan Sign Language.

Alternate sign languages:[2] This type of signed language is mainly used by hearing people and has not emerged because of the presence of deaf people. Instead, these systems emerge as the result of the impossibility of or the prohibition of using spoken language in certain contexts. For instance, the Sawmill Sign Language appeared among sawmill workers in British Columbia because of the surrounding noise and the physical distance between workers (Meissner and Philpott 1975). Interestingly, its use extended to other types of communication, which were not purely work-related. Some monastic sign languages developed among certain orders (Anglo-Saxon, Augustan, Cistercian and Trappist) as a consequence of the prohibition of spoken language according to the vow of silence of the San Benedict rule (Rijnberk 1954). A similar example, situated in another part of the world, is found among Aboriginal people of Australia who developed signed languages because of the prohibition of spoken communication during periods of mourning and certain activities like hunting

2 The term "alternate sign language" was first proposed by Kendon (1988).

or fishing (Bauer, 2012; Kendon, 1989). In North America, Plains Indian Sign Language or Keresan Pueblo Indian Sign Language were principally developed as a *lingua franca* because of the communication difficulties among tribes speaking different languages (Davis, 2010, p. 15). Plains Indian Sign Language was widely used all the way from what is now Texas to Canada. The alternate sign languages studied by Kendon (1989) in central Australia showed a strong influence from the surrounding spoken languages. The extent and manner of influence of spoken languages on alternate sign languages elsewhere appears to be quite variable, however, depending as it does upon such factors as the grammatical (morpho-syntactic) structure of these spoken languages and whether or not the alternate sign language is used among people speaking different languages, as was the case in North America (de Vos and Pfau 2015; Kendon 1989 chap. 13; Pfau 2012).[3]

Variability in interaction patterns. In some cases of emerging sign languages such as YMSL, which have developed in geographically proximate villages or small towns, signers do not always interact among each other. The same occurs in Chatino sign language used in Oaxaca, Mexico (Hou 2016; Hou 2018; Mesh 2017). Although they do live in the same village, signers (conforming to cultural norms in the surrounding communities) primarily communicate with members of their own family, hence the linguistic community is very different from what could be expected in institutionalized or Deaf community sign languages. To some extent the same happens in Chicán where YMSL is in use. Other authors (Zeshan et al. 2013; Escobedo Delgado 2012) have proposed the label "Chicán Sign Language" but this term is based only on geographical limits. A closer analysis of the ways signers interact in this village reveals important intracommunity variation (Le Guen 2012, Safar and Petatillo Chan, this volume; Safar et al. 2018) that calls into question the degree of homogeneity of the language across the community of Chicán. More surprisingly, the analysis of several kinds of data shows that linguistic structures used by signers from certain "interactional groups" (Le Guen 2012) in Chicán resemble structures used by signers in Nohkop, with whom they never had direct contact, more than the signing of other "interactional groups" of their own village (for instance strategies of number expression, Safar et al. 2018). To analyze similarities and variation in emerging sign languages, it is important to understand the sociocultural context of these communities: In Yucatan, for instance, patterns of interaction are more linked to kinship rather than hearing status (Le Guen 2012; Safar 2019).

Table 1 (inspired by Senghas (2005: 464)) summarizes and provides an overview of the characteristics of the sign languages examined in this volume.

3 We would like to thank Adam Kendon for this comment.

Table 1: Summary of some of the sociolinguistic conditions under which signed communication systems emerge. BB refers to Bilingual Bimodal.

Situation (name)	Number of people	number of generations	number of years	Learner's age at first exposure	Input to current learners	Hearing status of interlocutors	Context for transmission to new generations
homesign system (individual)	1	1	individual lifespan	n/a	co-speech gesture	hearing	no deaf learners
Zinacantec family homesign system	3 deaf (dozen hearing)	2	individual lifespan	birth	co-speech gesture, older homesigners	hearing and deaf (BB)	family home
Nebaj shared homesign systems	7 adults, 12 children	1 or 2	individual lifespan	birth	1st generation signing	Hearing and deaf	family home, school
YMSL (Chicán)	17 deaf (300 BB)	3	84	birth	2nd generation signing	deaf and hearing (BB)	mutigenerational family home, rural indigenous
YMSL (Nohkop)	4 deaf (30 BB)	1	26	birth	younger siblings signing	deaf and hearing (BB)	family homes, rural indigenous
Marajó Island sign language	30 deaf	1	individual lifespan	birth	co-speech gesture	deaf and hearing (BB)	family home, school
Providence Island Sign Language	17	several	individual lifespan	birth	co-speech gesture	deaf and hearing (BB)	family home, school
Bay Islands Sign Language	11	3	100	birth	2nd generation	deaf-blind, deaf, hearing	family home
Nicaraguan Sign Language	50 in the first cohort, 1500 to date	2 (biological generations)	42	5 (school age)	fluency of language models varies by context	deaf, some hearing	school and urban communities

Advances in studies about emerging sign languages

The study of emerging sign languages is relevant for various reasons and at various levels. A first reason, many times invoked, is that emerging sign languages give us clues to *understanding language creation,* from a broad perspective (the origin of human language), from a modality-specific perspective (the origins of sign languages) but also from a more sociocultural and local viewpoint. How human language emerged is a question that has been debated for many centuries, yet there are many different theories and still no definitive answer. One main reason is that we do not have any records of how the first humans started to communicate. A fascinating aspect of emerging sign languages is that they provide us with some observations about the emergence of human languages, especially since comparable cases cannot be investigated for spoken languages (see Meir et al. (2010) for a discussion of how emerging sign languages represent "natural laboratories" to explore the question of language emergence). What is particularly interesting and different from spoken languages, is that these young sign languages do not directly inherit features from previously existing languages (unlike pidgins or creoles). That is, they are not derived from prior signed languages and neither are they signed versions of the surrounding spoken languages. In the absence of an already established sign language in these communities, deaf signers, along with their deaf and hearing interlocutors have to basically "invent" a new system of communication. Although the conditions of emergence of the first human languages greatly differ, observing the evolution process of young sign languages can nevertheless give us some ideas regarding the human capacity to create language.

Crucially – and this is another outcome of emerging sign language studies and one of the important contributions of this volume – because sign languages can emerge in a variety of different (geographical, cultural, etc.) settings, the documentation of emerging sign languages not only gives us clues as to how far the *human propensity for developing language* goes, but also about the *importance of the surrounding sociolinguistic context*. On the one hand, results from recent studies point to the idea that a natural human language, and specifically a sign language, should have a basic linguistic structure (see for instance Sandler 2017). On the other hand, as evident from the existing body of studies on emerging sign languages as well as the chapters of this volume, not all emerging sign languages exhibit the same linguistic structures. For instance, while Al-Sayyid Bedouin Sign Language (ABSL) took three generations to develop reported speech (Sandler 2017: 74), this feature is present even among the first generation of signers of

Yucatec Maya Sign Language (YMSL) of Nohkop, a language that has existed for no more than 22 years. Although some skeletal structure might emerge "naturally" as the result of the capacities of human cognition and the will to communicate propositional content (see Levinson 2006), the surrounding context as well as the sociological constitution of the signers' community might have a crucial influence on the development of the language itself (Meir et al. 2012; Safar 2019; Nyst 2007).

From an ontogenetic perspective, we still know relatively little about how deaf children create language with reduced linguistic input, when they are not exposed to a sign language and cannot hear the surrounding spoken language. A number of studies have shown that child homesign systems exhibit structure at multiple linguistic levels: lexical, morphological, morphophonological, and syntactic (see Goldin-Meadow 2003; Volterra and Erting 1990; Bates and Volterra 1984; Coppola and Brentari 2014). Considering emerging sign languages informs our understanding of how deaf children and their interlocutors create new linguistic systems (Goldin-Meadow et al. 2009; Benazzo 2009; Senghas and Coppola 2001; Morford and Goldin-Meadow 1997). We do not know very much about how complex such homesign systems can become with maturation, that is, when homesigns are used by a deaf individual into adulthood (see Carrigan and Coppola 2017; Morford 1996; Coppola and Newport 2005; Coppola, Spaepen and Goldin-Meadow 2013). One contribution of this volume on this issue, in particular, Horton's and Haviland's chapters, is to expand the types of homesign systems studied and include those with multiple deaf individuals who interact intergenerationally.

Another crucial contribution of the study of emerging sign languages is that some of their features *challenge assumptions regarding previously studied sign languages and enrich language typology in general* (de Vos and Pfau 2015; Zeshan and de Vos 2012). Although they constitute linguistic systems equally functional to spoken ones, sign languages are too rarely included in linguistic typologies in spite of the fact that they often show unique linguistic features (with notable exceptions such as Velupillai 2012), that are not present in spoken languages (see Sandler and Lillo-Martin 2006). For instance, one feature that is omnipresent in the visual modality and highly constrained in the oral one is simultaneity.[4] While a feature like simultaneity is available for any signed language, it is not maximally exploited in every sign language. Another example is classifier constructions that were previously assumed to be universal in sign languages (Emmorey 2003; Pfau, Steinbach and Woll 2012a: 158), but are, in fact, not present in some shared

4 In simultaneity in spoken languages, see the discussion on ideophones and expressive morphology in Dingemanse (2011).

or village sign languages, as demonstrated by Nyst (2007). Many emerging sign languages also show atypical features rarely or never described before for spoken languages and/or institutional sign languages, such as the absence of third person pronouns (de Vos, 2012a) or the use of typologically unusual counting systems (Zeshan et al. 2013; Safar et al. 2018). Within a typology of sign languages themselves, emerging sign languages have developed new and unprecedented ways of making use of the signing space. At the syntactic level, directionality in the signing space for verbal agreement is not obligatory for certain verbs in Kata Kolok– which is very different from the type of spatial agreement found in many institutionalized sign languages (de Vos, 2012a).

The authors of this volume aim to examine the visual behavior of the surrounding communities in which the (emerging) sign languages arise, at the same time considering the sign language's linguistic properties, and to find out which criteria support and/or constrain the form of the emerging sign language. Such an approach does not impose a division among types of sign languages (e.g. institutionalized vs. emerging, urban vs. rural), or on modalities (spoken vs. signed) and allows us to examine the development of linguistic structures in the sign languages. One important observation that drives this approach is that deaf communities and their sign languages usually share, in many domains, similar cultural conceptions as the surrounding hearing communities. Even if we can talk about "Deaf cultures" in the case of institutionalized and community sign languages (Padden and Humphries 2006), in many emerging sign languages (especially village sign languages and rural homesigns), deaf and hearing people closely resemble each other in terms of values, lifestyles, and conceptions of the world. Indeed, they may be more similar to each other than, say, deaf people from the USA and Bali. Such a claim goes much beyond sociological or identity features, but turns out to have deep repercussions in certain domains that are fundamental to human language and that are deeply shaped by cultural conceptions, such as space and time (Levinson 2003; Kendon 1993; Le Guen 2012; Bender and Beller 2014). Deaf people, even in large deaf communities, are not isolated from the surrounding hearing communities they live in, and their sign languages often reflect observable conventions of general visual communication used among hearing people, especially in the expression of space and time.

While the use of space has been a crucial concern of sign language linguistics (Meir and Sandler 2008), the local conception of space and the identification of a preferred frame of reference has not (at least before the comparison with emerging sign languages from places other than Europe or the USA) been investigated. This simple fact is revealing in itself. The metaphorical use of signing space for narrative construction, referent tracking, person reference and verbal inflection in sign languages has long been taken as a universal linguistic feature for a

visual language (see Meir and Sandler 2008 for a discussion on this point). The investigation of emerging sign languages has revealed that this is not necessarily so (De Vos 2012; Bauer 2014), and that languages can have complex linguistic systems and yet lack this particular use of space (in which arbitrary pieces of space are used to refer to entities in the world, the so-called R-Loci). Such recent findings raise the question of why this is the case. Research suggests a relationship between the Frames of Reference (FoR)[5] (Levinson 2003) used by a culture or language (i.e., egocentric or geocentric) and other features of the language (Brown and Levinson 2000; Levinson 1996; Li and Gleitman 2002). Le Guen (2011a) notes a correlation between the preferred FoR and pointing strategies in spoken as well as signed languages. The basic idea is that the more an egocentric FoR is used, the more metaphorical pointing (i.e., an arbitrary relation between a piece of air and a referent) will be allowed. On the other hand, in settings where a geocentric FoR is preferred, the "morality of pointing" (McNeill 2003) will be restricted to real places and spaces, consequently limiting the relevance of metaphorical pointing, and consequently, the use of the signing space to establish relations between events and entities in the world. This hypothesis has been supported by recent studies that looked at the grammatical use of space in emerging sign languages (de Vos 2012; de Vos in prep.; Nyst 2007; Bauer 2014), although in many cases the preference for a specific FoR in the surrounding spoken language has not been sufficiently described.

In sum, the preferred FoR of the hearing communities and the local conception of space has some influence on the grammatical use of the signing space in sign languages and determines, to some extent, linguistic strategies for verbal inflection, pointing strategies, etc.

A similar argument can be made for the expression of time. As with space, the local conception of time is directly inscribed into the emerging sign language. In many cultures and languages around the world, space has been taken as a base to metaphorically express time (Bender and Beller 2014; Bender et al. 2012; Boroditsky 2000; Boroditsky and Gaby 2010; Majid, Gaby and Boroditsky 2013). In most Indo-European languages, time is conceived of and expressed as a line, the past located behind the ego and the future in the front. Such a metaphor is

5 A FoR allows one to locate distant entities (i.e., different from the body of the speaker/signer) either egocentrically, on the basis of one's own (projected) point of view (e.g. my house is on the left side from the road looking towards the sea), or geocentrically, based on external features of the environment (e.g., my house is on the North of the road, or on the side of road where the mountain is). A third FoR exists, the intrinsic FoR, which allows one to locate entities among themselves as long as one has an intrinsic orientation, e.g. my house is located in front of the church entrance.

also produced visually in speakers' gestures (Cooperrider, Núñez and Sweetser 2014; Calbris 1990; Casasanto and Jasmin 2012). In order to talk about time, many sign languages productively use this timeline (see Pfau, Steinbach and Woll 2012b): the space in front of the signer refers to the future, and the space behind the signer expresses the past. Alternatively, many sign languages also make use of another timeline extending in front of the body from the signer's left to the signer's right side. Sign languages that emerged in cultures with a different representation of time also inherited the local conception of representing time metaphorically (Meir and Sandler 2008; Kendon 1993). This is the case in Kata Kolok (de Vos, 2012a), Yucatec Maya Sign Language (Le Guen, 2012b) and Warlpiri alternate sign language (Kendon 1993), which only distinguish the now and the not-now (and not between past and future). This fact forced the respective sign languages to elaborate different strategies to linguistically distinguish the past and the future.

The metaphorical spatial representation of time can also be reversed: In Urubu Ka'apor Sign Language (Ferreira-Brito 1984), the space in front is used to express the past and the space behind a signer expresses the future. Although there is no known documentation of Tupi-Guarani speakers' gestures, this conception of time is not unique and has also been documented in the gestures of Aymara speakers in the Andes (Núñez and Sweetser 2006). We can therefore assume that the front-back localization of future and past in Urubu Ka'apor Sign Language may have its origins in hearing people's linguistic and gestural habits. In sum, the way time will be visually expressed in an emerging sign language has to do directly with the usage of space for the conception of time in the surrounding gesturing culture.

Finally, most sign language research has focused only on deaf signers, based on the reality of urban Deaf communities in institutional settings, where deaf signers constitute the vast majority of the signing community. In contrast, the great majority of signers in village/shared sign languages are hearing speakers of the surrounding spoken language, i.e. *bimodal-bilingual signers* (Emmorey et al. 2008). Too often researchers have only directed their attention to deaf signers, led by the assumption that they are the rightful and native users of the language. In the context of some village sign languages however, the situation is very different since hearing people, who often represent the majority of signers, play a very distinct role within the signing community. Recent studies show that bimodal-bilingual people (mainly the ones closely related to deaf people) also play a decisive role in the creation and development of the language (Bauer 2014; Nyst 2013; though see Carrigan and Coppola 2017). Although they play a crucial role in language use, maintenance and evolution, they are often ignored in studies analyzing the creation of emerging sign languages. If we can agree that

deaf signers have not been exposed to an already established visual, i.e. signed, linguistic system, bimodal-bilinguals do have a linguistic system to draw from, i.e. their spoken language(s). Because in "shared signing communities" (Kisch 2008; Nyst 2012) deaf and hearing people are in close interaction, the latter can also transmit linguistic structures, metaphors, etc. to the deaf signers. In the study of emerging sign languages precise studies and empirical data are still missing to understand to what extent bimodal-bilinguals contribute to the emergence and evolution of sign languages.

While many studies have been looking at the linguistic particularities of these emerging languages (de Vos and Pfau 2015; Zeshan and Vos 2012), the majority examined the surrounding context of emergence almost exclusively from a sociolinguistic perspective and in lesser proportion in terms of their linguistic structures (but see for instance Padden et al. 2009). Very few studies are concerned with the impact of multimodal communication among the surrounding hearing population on the development of the emerging sign language. This volume focuses on this question, among others. The lack of studies on this matter is due to several reasons. Documenting a language is a hard task in itself and focusing on the language description can be challenging enough. Also, sign linguists, especially those with experience studying institutionalized sign languages in the US or Europe, might also have a bias towards ignoring gestures and not properly taking into account visual communication of hearing people in their analyses (see Nyst, Sylla and Magassouba 2012). In urban, institutionalized sign language settings, deaf people are often segregated from the surrounding society and for a long time, sign languages were not considered to be "proper languages" and rather only denoted as "gesticulation" in a derogatory way (until the work of Stokoe 1960; see also Petitto 2014). A strict separation was made between sign languages as full linguistic systems and gestures as non-linguistic/unsystematic (see e.g. Kendon 2008; Branson and Miller 2007; Goldin-Meadow and Brentari 2017), following McNeill's perspective, in which gestures are primary considered as "spontaneous creations of individual speakers, unique and personal. (...). They are free and reveal idiosyncratic imagery of thought" (McNeill 1992: 1). As a consequence, a great number of studies look at gestures from a psychological standpoint, and tend to consider them mainly as reflections of the mind and not as integrated in a linguistic message (see Cooperrider 2017 for a review). New studies show that many gestures do follow specific rules and can be considered part of the linguistic system, especially in rural settings e.g. in Mesoamerica or Asia, where they are used very systematically and to a greater extent that in many

WEIRD[6] cultures (Floyd 2016; Le Guen 2011b; Enfield 2009). Several chapters of this volume directly deal with this issue.

Another related factor that led to overlooking the role of the visible behavior of hearing people in the development of emerging sign languages is the perceived limited influence of gestures on institutionalized sign languages. In the study of institutionalized sign languages, gestures are mainly seen as remote etymological features of current signs, and the focus has been on how gestures (taken as non-linguistic features) got grammaticalized (Wilcox 2005; Wilcox 2009; Pfau and Zeshan 2016). Some recent work has considered gestures in the study of institutionalized sign languages, although many focused mainly on cognitive aspects, iconicity and language acquisition (Baus, Carreiras and Emmorey 2013; Perniss, Thompson and Vigliocco 2010). The influence of the linguistic and sociolinguistic context of emergence of these new sign languages needs to be accounted for (a point already made by Russo and Volterra 2005).

Content of this volume

This volume is constituted by seven chapters, all original contributions by a total of thirteen authors. Additional to these chapters, following the line of Zeshan and DeVos (2012), authors have also provided short sociolinguistic sketches (seven in total) of the various languages they examine.

Haviland in his chapter entitled *Signs, interaction, coordination, and gaze: interactive foundations of "Z"—an emerging (sign) language from Chiapas, Mexico* looks at turn exchanges in a first-generation sign language, the Zinacantec Family Homesign in Chiapas (Mexico), and how it greatly depends on manipulating mutual attention through gaze. The family is composed of three deaf signers and their direct kin, all fluent in sign language. Although they represent a microcommunity, deaf and hearing signers have developed a sophisticated form of visual communication.

Haviland nicely shows how gaze plays a central role in how signers orchestrate interpersonal attention and manage synchrony and timing in their signing. While gaze is used also among speakers for turn taking, Haviland demonstrates how it is recruited by deaf signers to fulfill several functions: first, to index things and parts of the discourse (similar to spoken languages); second, how it is used

6 WEIRD = Western, Educated, and from Industrialized, Rich, and Democratic countries (Henrich, Heine and Norenzayan, 2010)

as a metalinguistic tool to put emphasis or question a sign as a linguistic sign; third, how it serves as a metapragmatic device used to address someone (or, on the contrary, by not looking to avoid interaction); and fourth, (although it could be taken as a subcategory of the third function), how gazing to nowhere allows syntactic breaks exhibiting hesitation or imagining a situation outside the here-now.

Haviland analyses in great depth several examples of natural interactions, looking at how gaze structures interactions (in the form of turn taking) but can, at the same time, convey meaning and display pragmatic features and intentionality in being a speech act on its own.

Although Haviland does not describe eye gaze in the surrounding Tsotsil culture, it is obvious that it is not as elaborate as in Z. His chapter clearly shows that, in some cases, a whole conversation can be performed and efficient without (almost any) manual signing. Haviland's analysis also shows that eye gaze is useful and, can allow various types of communicative interactions such as secret conversations, prompting, expressing displeasure, shaming and even expressing avoidance of interaction.

Horton's chapter *Representational strategies in shared homesign systems from Nebaj, Guatemala*, proposes an original approach to emerging sign languages as she examines several homesign systems in the same village and the individual evolution of signers over time. Her approach allows for an analysis of the correspondence between the communicative ecology in which child homesigners are embedded and the consistencies in patterns of referential strategies (in particular indexical and iconic) in their lexicon.

Horton's study examines various referential strategies that child homesigners mobilize in their emergent lexicons. Horton discusses the issue of categorization of emerging sign languages taking into account the specificities of her community of study and proposes an innovative framework to understand the homesign communicative ecologies. She differentiates three types of ecology, namely (1) individual homesigners in a hearing family, (2) homesigners in family ecologies, in which interactions happen with other deaf homesigners, and members of their families, and (3) the peer communicative ecology, where a homesigner may have few homesign interactions in the family environment, but also exchanges with other deaf homesigners in a community setting such as school or work.

Previous research on child homesign systems showed significant individual variation across the child homesign lexicons, but also significant internal consistency for each system, in terms of referential strategy – the relative prevalence of indexical (deictic) and iconic forms. In order to determine whether communicative ecology affects the form of lexicon, Horton ran a study with participants being given a book with photos of familiar animals, foods, vehicles,

clothing, tools, people and places they had to describe. While they distinguish animal referents, using hand-as-body-part iconicity they tend to use enactment signs for all three remaining referent types. On the other hand, family and homesigners in peer communicative ecology show evidence for iconicity for all referent types. Although, to some extent, communicative ecology may be associated with the use of particular referential strategies, it rather appears that the age of the homesigner is crucial, specifically pointing is preferred among younger homesigners. Horton also finds that many homesigners incorporate signs into their lexicon that resemble conventional gestures used by hearing speakers, and that the distribution of these signs varied across and within groups and by referent type. One conclusion of Horton's study is that increased interaction with another homesigner may support the emergence of patterned iconicity common to many sign languages.

Safar and Petatillo Chan in their chapter entitled *Strategies of noun-verb distinction in Yucatec Maya Sign Languages* explore the validity of a postulate widely used in linguistics and psychology that states there is a "universal distinction" between verbs and nouns. To test this hypothesis, they use YMSLs, emerging sign languages from Mexico. Their data were collected in four Yucatec Maya communities with a high incidence of deafness in the peninsula of Yucatán that have never been in contact. They also use, as a comparison group, hearing non-signing gesturers in a Yucatec Maya village without any deaf inhabitants.

Their study looks at two strategies for expressing a noun-verb distinction that have been described in previous research, namely the use of Size-and-Shape specifiers (SASSes) as nominal markers (Tkachman and Sandler 2013) and consistent differences in iconic patterns for nouns and verbs (Padden et al. 2013; Padden et al. 2015). They ask three main questions: (a) do Yucatec Maya Sign Languages use SASSes and patterned iconicity to mark a noun-verb distinction? (b) if it is indeed the case, in what way do these strategies differ from their gestural precursors? and finally (c) which patterns of variation can be found between villages and among individual signers? In order to answer these questions, Safar and Petatillo Chan conducted three studies. The first analyses the use of SASSes in YMSL signs for objects. The second looks at the distribution of iconic strategies (instrument vs. handling handshapes) for the depiction of tools in YMSLs and in silent gestures produced by hearing Yucatec Maya. The last study examines differences in the use of these strategies for describing tools and actions associated with these tools.

Results from study 1 demonstrate that the use of SASSes to distinguish objects from actions is not obligatory in YMSLs, not all objects are marked with SASSes and there is variation in preference of use between signers. Even if the final position is preferred (as in other emerging sign languages), it is not compulsory

and other positions also occur with considerable frequency. In the various villages using YMSL, the use of SASSes is both semantically driven (as shown in Al-Sayyid Bedouin Sign Language), but also signer-driven. Interestingly, hearing Yucatec Mayas, when asked to describe the same set of photo stimuli in silent gestures, used almost identical handshapes for the same objects as YMSL signers. Results from study 2 demonstrate that the preference towards either an instrument or a handling strategy is not as pronounced as what Padden et al. (2013) show: the handling/instrument-split in Yucatec Maya gesture vs. YMSLs is much less striking than in the gesture/sign comparison among American and Bedouin participants. The last study indicates that in YMSL, no evidence for a distinction of objects and actions by means of an instrument/handling opposition could be found among Yucatec Maya participants. Unlike the US-American gesturers and signers in Padden et al.'s (2015) study, Yucatec Maya gesturers and YMSL signers do not alternate their iconic strategy in order to systematically distinguish objects from actions. Safar and Petatillo Chan conclude that there is not one solid grammatical strategy to mark the distinction between nouns and verbs in YMSL. This actually resonates with what Lois and Vapnarsky (2006) have shown for Yucatecan languages.

Another conclusion from Safar and Petatillo Chan's chapter, that goes in line with the qualitative analysis in Le Guen et al.'s chapter, are the striking analogies between signing communities that have never been in contact, providing more evidence that similarities in YMSLs from different villages go beyond the lexicon and that they also resemble each other in more profound formational principles.

Le Guen *et al.* in their chapter entitled *Yucatec Maya multimodal interaction as the basis for Yucatec Maya Sign Language* aim at demonstrating that the numerous non-verbal strategies used in everyday interactions among the Yucatec Mayas provide a rich background against which Yucatec Maya Sign Language develops. Their chapter, using qualitative examples, presents two main ideas. The first is that Yucatec Maya multimodal communication is not only rich in iconic and quotable gestures, but the visual modality often comes to complement speech as the main mean of communication of propositional content. As a result, the emerging sign languages created in different villages in Yucatan, end up looking similar at the lexical as well as syntactic levels because they take as a basis the systematic features of Yucatec Maya multimodal communication.

The theoretical postulate used by Le Guen et al. allow them to provide an explanation for the similarities between emerging sign languages that have never been in contact but emerged in a similar cultural and sociolinguistic context. If correct, their proposal allows to predict similarities and differences between the languages used in different villages and, indeed, they show that signers create signs based on their shared cultural knowledge and using similar gestural

strategies. Furthermore, they also provide an explanation for why the Yucatec Maya Sign Language can be considered a unified language and, at the same time, legitimize the unique label Yucatec Maya Sign Language (YMSL).

In their chapter, they use the notion of "composite utterances" (developed by Enfield 2009) to explain how the distribution of information is done between the two modalities (oral and visual) among Yucatec Maya speakers. Then, they go on showing how some gestures are transformed into signs (quotable, iconic gestures and SASSs), but also explain how gestural habits are recruited for the construction of the YMSL, in particular through the use of character perspective. They finally examine linguistic calques and transfer of cultural concepts and other communicative habits.

In the discussion, Le Guen et al. provide some reflections on the paths of grammaticalization and lexicalization from gesture to sign language considering various ways in which co-speech gestures can be used to form signs in YMSL. They also consider several features of the Yucatec Maya multimodal communication that can help but, in some cases, also limit, the creation of YMSL and some innovations of YMSL.

Martinod *et al.* in their chapter entitled *A typological perspective on the meaningful handshapes in the emerging sign languages on Marajó Island (Brazil)* consider a group of different homesigners in order to run a cross-linguistic comparison of the meaningful handshape component of sign language units, using several emerging sign languages (Marajó Island SL, homesigns from the center of Brazil (Fusellier-Souza 2004) and Kata Kolok from Bali) and but also institutionalized sign languages (LSF, TID, NGT, BSL and IU). Interestingly, as in Horton's chapter, the social composition of the signing community is crucial for this study. In Marajó Island (located northeast of Brazil in the delta of the Amazon and the Rio Tocantins), while deaf people are slowly becoming a single community (though the creation of an association and the formation of a Deaf community), their signing originated from various homesign systems and other communication forms and languages that have come into contact with each other. In terms of emergence, it is also a situation somehow comparable to what Braithwaite (this volume) describes for Caribbean sign languages.

As Martinod et al. point out, handshape is one of the parametric components of sign language units and thus can be considered as a phonological or a morphemic element. As a morphemic element, it can either represent an entity by its shape or from the way the entity is handled (following Padden et al. 2013). Martinod et al. follow the so-called "Semiological Model" proposed by Cuxac (1999, 2000) that considers on the one hand that all sign languages of the world share a significant structural core (i.e., have at their core, the common human

experience) and, on the other hand, that all sign language units, whether lexical or non-conventional, are composed of morphemic meaningful elements.

They look at three possible hypotheses to examine whether cultural differences or the size of the signing community are correlated with the number of classifier types in the sign languages: (a) there is a high variance across sign languages, and limited usage of classifiers in sign languages of small communities, (b) handling classifiers exhibit low variance across sign languages and (c) size-and-shape specifiers exhibit the possibility of atypical use linked to the coverbal gestures of the surrounding culture. The data from Marajó Island SL consists of elicited productions based on stimuli as well as semi-structured and spontaneous conversations.

Their results show that both representational (i.e., "instrument" following the terminology used by Padden et al. (2013) and Safar and Petatillo Chan, this volume) and handling representations were attested in all of the examined sign languages. Overall, their data confirms the preference of some sign languages for handling handshapes or entity handshapes in specific contexts, as in Padden et al. (2013), see also Safar and Petatillo Chan's and Horton's chapters.

Their theoretical model supports the hypothesis of intrinsic similarities between emerging sign languages such as the Marajó sign languages and national established sign languages, validating at the same time their cross-linguistic study.

Braithwaite, in his chapter entitled *Emerging Sign Languages in the Caribbean*, discusses the various (possible) reasons that led to high incidences of deafness in the Caribbean region over specific periods. The Caribbean is defined as encompassing the islands of the Greater and Lesser Antilles, 'the Guianas' (Guyana, Suriname and French Guiana), and the coastlands surrounding the Caribbean Sea, including various island groups with political connections to the mainland, but historical, cultural and linguistic connections to the Antilles, such as San Andres and Providence of Colombia, the Bay Islands of Honduras, and the Corn Islands of Nicaragua.

Examining origins of deafness, it is noteworthy that one main factor of vulnerability has been the isolation of populations in this area, that exposed inhabitants to deafness due to either genetic endogamy (in some cases rooted in social factors), illnesses or various types of poisonings. Increase of population due to immigration and travels of the inhabitants to other countries have helped to significantly reduce causes of deafness.

Braithwaite's chapter displays different paths of evolution of the various sign languages of the area. First, we note various attitudes towards sign language and deafness, some ambiguous or even negative (as in Providence) while in other places deaf people are more included into the wider society (Jamaican Country

Sign, South Rupununi Sign Language), and even deafblind people (Bay Islands Sign Language). Many local emerging sign languages had to face contact with institutionalized (national) sign languages, and, in some cases, ended up being replaced by them, especially among younger generations, like in the case of Old Caymanian Sign Language or Jamaican Country Sign (KonchriSain), which were both replaced by either ASL or a variety of Jamaican Sign Language. In contrast, for South Rupununi Sign Language, classified as a shared sign language, deaf people are integrated in the community (resembling other cases described in this volume such as Nebaj shared homesigns and Yucatec Maya Sign Language). Bay Islands Sign Language provides an original instance of deafness combined with blindness, giving rise to a tactile sign language. This language is used by deaf and deaf-blind people, their family members and friends. Braithwaite's chapter provides the first documentation of an emerging tactile sign language.

Braithwaite debates over the relation between these various Caribbean sign languages. While they exhibit many similarities (especially at the lexical level), it remains unclear if these resemblances are due to contact, parallel creations, shared cultural background (i.e., gestural behaviors among hearing people) or iconicity – or a combination of these factors.

Besides emerging sign languages, the Caribbean also encompasses a number of institutionalized sign languages, that developed mainly through schooling and formal education, under the influence of French Sign Language, ASL and Signing Exact English, Sign Language of the Netherlands and British Sign Language, depending on the colonial country the islands belonged to. Interestingly for this volume, all these institutionalized sign languages were also, at some point, "emerging institutionalized sign languages" like Haitian Sign Language (LSH), Jamaican Sign Language and Trinidad and Tobago Sign Language (TTSL).

Coppola's chapter entitled *Gestures, homesign, sign language: Cultural and social factors driving lexical conventionalization* uses emerging sign languages as a window into the origins of lexical items and their conventionalization. She describes two studies examining an emerging community sign language, Nicaraguan Sign Language (NSL), and gestures and homesign systems also used in Nicaragua. The first study examines the processes of adoption and adaptation of conventional gestures used by hearing Nicaraguan Spanish speakers into NSL. She finds that, despite their lack of contact with Deaf signers who use NSL, hearing gesturers in Nicaragua very often produced the same forms observed in NSL signs. In many cases, the gestures and signs share very similar forms and meanings. However, when they entered the lexicon of the sign language, Coppola notices that certain signs changed either in their shape or meaning. It seems that the path from gesture to language is mediated by homesigners and there is a clear

tendency toward arbitrariness and processes of grammaticalization that operate on non-linguistic elements (i.e., iconic gestures).

Her second study looks at the role of social interaction in conventionalization of the lexicon. Specifically, she compares the process of conventionalizing lexical forms in two types of language emergence situations in which groups of people communicate on a regular basis and over an extended period of time: early members of the Nicaraguan Deaf community and deaf homesigners and their hearing communication partners. She finds that the rate of conventionalization is correlated with the social network and communicative settings. Both groups differ in a striking way. While NSL signers evolve in a "richly-connected" network where all members use NSL to communicate with each other, the homesigners only have a one-to-one communication with multiple partners, which situate them in a "sparsely-connected" network, where they are the only person who uses the homesign system as their primary language. She concludes that the configuration of the network influences the process of conventionalization of lexical signs.

It should be mentioned also that an additional benefit for NSL signers lies in the fact that they are in a context of formal education, whereas the homesigners are not. As other studies have shown, formal education has been associated with greater standardization of language forms.

Her findings are validated through a computational study that provides additional insight into the factors driving the robustness and rate of lexical conventionalization.

Main issues raised in this volume

Several issues are raised in this volume across the various chapters. While looking at the processes of emergence of different sign languages of the Americas, many parallels can be found between the individual chapters.

The first issue raised in this volume, and maybe the most original in current research on emerging sign languages, relates to the influence of the surrounding sociolinguistic context in the process of emergence of these new created languages. How much do the surrounding culture, language and local ideologies regarding language and deafness play a role in the emergence of a new sign language?

One central topic relates to the communicative network in which deaf signers are embedded that appears to have crucial outcomes on the development of the language (in particular on the process of sign conventionalization) as shown in the chapters by Horton, Braithwaite, Martinod et al. and Coppola. Horton's study

clearly indicates how increased interaction with other homesigners supports the emergence of patterned iconicity.

A second related issue has to do with the degree of linguistic input already present in the surrounding culture that helps the emergence of a new sign language. Safar and Petatillo Chan as well as Le Guen et al. point out the importance of the influence of the communicative multimodal environment in the case of YMSL. Coppola, looking at the lexicon in NSL and homesign systems, also shows the influence of lexical quotable gestures used among the surrounding Spanish-speaking population. On this point, Braithwaite reminds us that sign languages did not emerge *ex nihilo* and that the language used by the hearing people (spoken, gestured, and written) may also play a prominent role in the schools where new signed languages have emerged.

Several chapters also mention the complexity of emerging sign languages almost from their very origin. Haviland's chapter is especially revealing on this issue, demonstrating the complex use of eye gaze in many types of communicative events. However, as mentioned above, as the communicative network increases, more complexity is allowed, mainly through conventionalization of linguistic structures.

While this is not a central theme in the chapters of this volume, but discussed in the sociolinguistic sketches, it is interesting to note that deafness is not always regarded the same way in every community. While some indigenous communities accept deafness and find ways around it to successfully communicate (Safar and Le Guen, Horton, Braithwaite), others do not value it as much (like the Tsotsil, see Haviland's sketch). The same goes for more institutionalized settings, as Braithwaite shows on the various communities of the Caribbean.

As already pointed out many years ago (Johnson 1991), in many of the cultural settings explored in this volume, deafness does not represent a marker of identity. Social networks (e.g., kinship affiliation) are often more prominent than hearing status in this respect, especially in indigenous communities.

Finally, at the typological level, the various emerging sign languages examined in this volume come to challenge existing typologies of sign languages (even the one we proposed above). Signers' networks and communities do not always nicely fit all the criteria used to define a homesign system vs. a village sign language or an institutionalized sign language. Horton shows how various homesigners can also gather in other places besides school and form a larger network. Safar and Petatillo and Le Guen et al. show that, although YMSL(s) can be categorized as village sign language(s), the sign languages of some communities are indeed closer to homesigns in terms of their sociologic composition, but display similar characteristics at the linguistic level. Braithwaite's chapter exhibits how even institutionalized sign languages can be emergent, built on a sedimentation of

homesign systems and older established sign languages, similar to Martha's Vineyard sign language (which was a mix of the local sign language, French sign language and ASL).

As far as how the field of emerging sign languages can move forward, we encourage authors to follow this kind of compilation in building comparative research and analysisthat can help further describe the sociolinguistic factors that help to give rise to new visual forms of communication. What is now needed are more hypotheses regarding the factors that relate to the emergence of linguistic complexity, on the emergence of a language itself, but also its changes over time and generations. It is crucial in further studies to take into account sociological factors, the environment of the signers, deaf and bilingual, the local ideology and the larger global context (schooling, the access to the internet, new technologies, etc.).

We hope that this volume will provide new insights to the discipline of sign language research and specifically on emerging sign languages of the Americas and other parts of the world and that it will also encourage more comprehensive research towards a better understanding of the phenomena that contribute to the emergence of these new systems of communication.

References

Adone, Dany. 2007. From gesture to Mauritian Sign Language. University of Cologne, Germany.

Adone, Dany & Anastasia Bauer. 2009. Argument structure in a young sign language. Cologne, Germany: University of Cologne.

Bates, Elizabeth & Virginia Volterra. 1984. On the invention of language: An alternative view. *Monographs of the Society for Research in Child Development* 49(3–4). 130–142.

Bauer, Anastasia. 2012. *The use of signing space in a shared sign language of Australia*. Cologne, Germany: University of Cologne dissertation.

Bauer, Anastasia. 2014. *The use of signing space in a shared sign language of Australia*. Berlin: De Gruyter Mouton & Ishara Press.

Baus, Cristina, Manuel Carreiras & Karen Emmorey. 2013. When does iconicity in sign language matter? *Language and Cognitive Processes* 28(3). 261–271.

Benazzo, Sandra. 2009. Acquérir une langue/construire un système communicatif: le développement de la temporalité en L2 et dans les Homesigns. In Sandra Benazzo (ed.), *Acquisition et interaction en langue étrangère* (Au croisement de différents types d'acquisition: pourquoi et comment comparer?) (Aile… Lia 1). 195–226. Association Encrages. https://journals.openedition.org/aile/4521

Bender, Andrea & Sieghard Beller. 2014. Mapping spatial frames of reference onto time: A review of theoretical accounts and empirical findings. *Cognition* 132(3). 342–382.

Bender, Andrea, Annelie Rothe-Wulf, Lisa Hüther & Sieghard Beller. 2012. Moving forward in space and time: how strong is the conceptual link between spatial and temporal frames of reference? *Frontiers in Cultural Psychology* 3. 486.

Boroditsky, Lera. 2000. Metaphoric structuring: Understanding time through spatial metaphors. *Cognition* 75(1). 1–28.

Boroditsky, Lera & Alice Gaby. 2010. Remembrances of times east. Absolute spatial representations of time in an Australian Aboriginal community. *Psychological Science* 21(11). 1635–1639.

Branson, Jan & Don Miller. 2007. Beyond 'Language': Linguistic imperialism, sign languages and linguistic anthropology. In Sinfree Makoni & Alastair Pennycook (eds.), *Disinventing and reconstituting languages*, 116–134. Clevedon: Multilingual Matters.

Brown, Penelope & Stephen C. Levinson. 2000. Frames of spatial reference and their acquisition in Tenejapan Tzeltal. In Larry Nucci, Geoffrey B. Saxe & Elliot Turiel (eds.), *Culture, thought and development*, 167–197. Mahwah, NJ: Lawrence Erlbaum.

Calbris, Geneviève. 1990. *The semiotics of French gestures*. Bloomington, IN: Indiana University Press.

Carrigan, Emily M. & Marie Coppola. 2017. Successful communication does not drive language development: Evidence from adult homesign. *Cognition* 158. 10–27.

Casasanto, Daniel & Kyle Jasmin. 2012. The hands of time: Temporal gestures in English speakers. *Cognitive Linguistics* 23(4). 643–674.

Cooperrider, Kensy. 2017. Foreground gesture, background gesture. *Gesture* 16(2). 176–202.

Cooperrider, Kensy, Rafael E. Núñez & Eve Sweetser. 2014. The conceptualization of time in gesture. In Cornelia Müller, Alan J. Cienki, Ellen Fricke, Silva H. Ladewig, David McNeill & Jana Bressem (eds.), *Body – language – communication: An international handbook on multimodality in human interaction*, 1781–1788. Berlin, Boston: De Gruyter Mouton.

Coppola, Marie & Diane Brentari. 2014. From iconic handshapes to grammatical contrasts: Longitudinal evidence from a child homesigner. *Frontiers in Psychology 5*. 830.

Coppola, Marie & Elissa L. Newport. 2005. Grammatical subjects in home sign: Abstract linguistic structure in adult primary gesture systems without linguistic input. *Proceedings of the National Academy of Sciences* 102(52). 19249–19253.

Coppola, Marie, Elizabet Spaepen & Susan Goldin-Meadow. 2013. Communicating about quantity without a language model: number devices in homesign grammar. *Cognitive Psychology* 67(1–2). 1–25.

Cumberbatch, Keren. 2012. Sociolinguistic sketch of Konchri Sain. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 387–388. Berlin: Mouton de Gruyter & Ishara Press.

Cuxac, Christian. 1999. The expression of spatial relations and the spatialization of semantic relations in French Sign Language. In Catherine Fuchs & Stéphane Robert (eds.), *Language diversity and cognitive representations* [Human Cognitive Processing 3], 123–142.

Cuxac, Christian. 2000. Compositionnalité sublexicale morphémique-iconique en langue des signes française. *Recherches linguistiques de Vincennes* 29. 55–72.

Davis, Jeffrey E. 2010. *Hand Talk: Sign language among American Indian Nations*. Cambridge: Cambridge University Press.

DeMeulder, Maartje. 2015. The legal recognition of sign languages. *Sign Language Studies* 15(4). 498–506.

deVos, Connie. 2012. *Sign-Spatiality in Kata Kolok: How a village sign language of Bali inscribes its signing space*. Nijmegen, The Netherlands: Max Planck Institute for Psycholinguistics dissertation.
deVos, Connie & Roland Pfau. 2015. Sign language typology: The contribution of rural sign languages. *Annual Review of Linguistics* 1. 265–288.
Dikyuva, Hasan. 2012. Mardin Sign Language: Signing in a "deaf family." In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 395–400. Berlin: Mouton de Gruyter & Ishara Press.
Dingemanse, Mark. 2011. *The meaning and use of ideophones in Siwu.* Nijmegen, The Netherlands: Max Planck Institute for Psycholinguistics and Radboud University dissertation.
Emmorey, Karen (ed.). 2003. *Perspectives on classifier constructions in sign languages*. Mahwah, N.J.: Lawrence Erlbaum Associates.
Emmorey, Karen, Helsa B. Borinstein, Robin Thompson & Tamar H. Gollan. 2008. Bimodal bilingualism. *Bilingualism* 11(1). 43.
Enfield, Nick J. 2009. *The anatomy of meaning speech, gesture, and composite utterances*. Cambridge, UK: Cambridge University Press.
Escobedo Delgado, Cesar Ernesto. 2012. Chican Sign Language: A sociolinguistic sketch. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 377–380. Berlin: Mouton de Gruyter & Ishara Press.
Ferreira-Brito, Lucinda. 1984. Similarities and differences in two Brazilian sign languages. *Sign Language Studies* 42. 45–56.
Floyd, Simeon. 2016. Modally hybrid grammar? Celestial pointing for time-of-day reference in Nheengatú. *Language* 92(1). 31–64.
Frishberg, Nancy. 1987. Home sign. In J. Van Cleve (ed.), *Gallaudet encyclopedia of deaf people and deafness*, vol. 3, 128–131. New York: McGraw Hill.
Fusellier-Souza, Ivani. 2004. *Sémiogenèse des langues des signes: étude de langues des signes primaires (LSP) pratiquées par des sourds brésiliens*. Paris 8 dissertation.
Gébert, Alain, Dany Adone, Cécile Croze, Christian Horn & Tim Riebe. 2006. *A dictionary and grammar of Mauritian Sign Language*. Paris: Editions Le Printemps.
Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language* (Essays in Developmental Psychology Series). New York: Psychology Press.
Goldin-Meadow, Susan & Diane Brentari. 2017. Gesture, sign, and language: The coming of age of sign language and gesture studies. *Behavioral and Brain Sciences* 40. 1–59.
Goldin-Meadow, Susan, Deidre Gentner, Asli Özyürek & Ozge Gurcanli. 2013. Spatial language supports spatial cognition: Evidence from deaf homesigners. *Cognition* 127(3). 318–330.
Goldin-Meadow, Susan & Carolyn Mylander. 1984. Gestural communication in deaf children: The effects and non-effects of parental input on early language development. *Monographs of the Society for Research in Child Development, No. 207* 49(3).
Groce, Nora Ellen. 1985. *Everyone here spoke sign language: Hereditary deafness on Martha's Vineyard*. Cambridge, MA: Harvard University Press.
Haviland, John B. 2011. Nouns, verbs, and constituents in an emerging 'Tzotzil' sign language. In Rodrigo Gutiérrez-Bravo, Line Mikkelsen & Eric Potsdam (eds.), *Representing language: Essays in honor of Judith Aissen*, 157–171. University of Santa Cruz: Language Research Center.

Haviland, John B. 2013a. (Mis)understanding and Obtuseness: "Ethnolinguistic borders" in a miniscule speech community. *Journal of Linguistic Anthropology* 23(3).
Haviland, John B. 2013b. The emerging grammar of nouns in a first generation sign language: Specification, iconicity, and syntax. *Gesture* 13(3). 309–353.
Haviland, John B. 2015. Hey! *Topics in Cognitive Science* 7(1). 124–149.
Hendriks, Bernadet & Shelley Dufoe. 2014. Non-native or native vocabulary in Mexican Sign Language. *Sign Language & Linguistics* 17(1). 20–55.
Henrich, Joseph, Steven J. Heine & Ara Norenzayan. 2010. The weirdest people in the world? *Behavioral and Brain Sciences* 33(2–3). 61–83.
Hou, Lynn Yong-Shi. 2016. *"Making hands": Family sign languages in the San Juan Quiahije community*. Austin, Texas: The University of Texas at Austin dissertation.
Hou, Lynn Yong-Shi. 2018. Iconic patterns in San Juan Quiahije Chatino Sign Language. *Sign Language Studies* 18(4). 570–611.
Johnson, Robert, E. 1991. Sign language, culture & community in a traditional Yucatec Maya village. *Sign Language Studies 73*(1) 461–474.
Kendon, Adam. 1988. How gestures can become like words. In F. Poyatos (ed.), *Crosscultural perspectives in nonverbal communication*, 131–141. Toronto: C. J. Hogrefe.
Kendon, Adam. 1989. *Sign languages of Aboriginal Australia: Cultural, semiotic and communicative perspectives*. Cambridge: Cambridge University Press.
Kendon, Adam. 1993. Space, time and gesture. *Degrès* (74). 3–16.
Kendon, Adam. 2008. Some reflections on the relationship between 'gesture' and 'sign.' *Gesture* 8(3). 348–366.
Kisch, Shifra. 2008. The social construction of deafness in a Bedouin community in the Negev. *Medical Anthropology* 27(3). 283–313.
Kisch, Shifra. 2012. Demarcating generations of signers in the dynamic sociolinguistic landscape of a shared sign-language: The case of the Al-Sayyid Bedouin. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 87–125. Berlin: Mouton de Gruyter & Ishara Press.
Lanesman, Sara & Irit Meir. 2012. The survival of Algerian Jewish Sign Language alongside Israeli Sign Language in Israel. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 153–180. Berlin: Mouton de Gruyter & Ishara Press.
Le Guen, Olivier. 2011a. Modes of pointing to existing spaces and the use of frames of reference. *Gesture* 11(3). 271–307.
Le Guen, Olivier. 2011b. Speech and gesture in spatial language and cognition among the Yucatec Mayas. *Cognitive Science* 35(5). 905–938.
Le Guen, Olivier. 2012. An exploration in the domain of time: from Yucatec Maya time gestures to Yucatec Maya Sign Language time signs. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 209–250. Berlin: Mouton de Gruyter & Ishara Press.
Levinson, Stephen C. 1996. Frames of reference and Molyneaux's question: Cross-linguistic evidence. In Paul Bloom, Mary A. Peterson, Lynn Nadel & Merrill Garrett (eds.), *Language and Space*, 109–169. Cambridge: MIT Press.
Levinson, Stephen C. 2003. *Space in language and cognition : explorations in cognitive diversity* (Language, Culture and Cognition 5). Cambridge: Cambridge University Press.

Levinson, Stephen C. 2006. On the human "interaction engine." In Nick J. Enfield & Stephen C. Levinson (eds.), *Roots of human sociality: Culture, cognition and interaction*, 39–69. Oxford: Berg.

Li, Peggy & Lila Gleitman. 2002. Turning the tables: language and spatial reasoning. *Cognition* (83). 265–294.

Lois, Ximena & Valentina Vapnarsky. 2006. Root indeterminacy and polyvalence in Yukatekan Mayan languages. In Ximena Lois & Valentina Vapnarsky (eds.), *Lexical categories and root classes in Amerindian languages*, 69–116. Frankfurt: Peter Lang Verlag.

Lucas, Ceil, Robert Bayley, Clayton Valli & Mary Rose. 2001. *The sociolinguistic variation in American Sign Language*. Washington, DC: Gallaudet University Press.

Majid, Asifa, Alice Gaby & Lera Boroditsky. 2013. Time in terms of space. *Frontiers in Psychology* 4.

Marsaja, I. Gede. 2008. *Desa kolok: a deaf village and its sign language in Bali, Indonesia*. Nijmegen: Ishara Press.

McNeill, David. 1992. *Hand and Mind*. Chicago: University of Chicago Press.

McNeill, David. 2003. Pointing and morality in Chicago. In Sotaro Kita (ed.), *Pointing: Where language, culture and cognition meet*, 293–306. Mahwah, NJ: Erlbaum.

Meir, Irit, Assaf Israel, Wendy Sandler, Carol A. Padden & Mark Aronoff. 2012. Community structure and language structure. *Linguistic Variation* 12(2). 247–291.

Meir, Irit & Wendy Sandler. 2008. *A language in space: The story of Israeli Sign Language*. New York: Erlbaum.

Meir, Irit, Wendy Sandler, Carol A. Padden & Mark Aronoff. 2010. Emerging sign languages. In Marc Marschark, Patricia Elizabeth Spencer & Peter E. Nathan (eds.), *The Oxford Handbook of Deaf Studies, Language, and Education, Volume 2*, 267–280. Oxford: Oxford University Press.

Meissner, Martin, Stuart B. Philpott & Diana Philpott. 1975. The sign language of sawmill workers in British Columbia. *Sign Language Studies* 9. 291–308.

Mesh, Kate. 2017. *Points of Comparison: What indicating gestures tell us about the origins of signs in San Juan Quiahije Chatino Sign Language*. Austin, Texas: University of Texas dissertation.

Morford, Jill P. 1996. Insights to language from the study of gesture: A review of research on the gestural communication of non-signing deaf people. *Language & Communication* 16(2). 165–178.

Morford, Jill P. & Susan Goldin-Meadow. 1997. From here and now to there and then: the development of displaced reference in homesign and English. *Child Development* 68(3). 420–435.

Nonaka, Angela M. 2007. *Emergence of an indigenous sign language and a speech/sign community in Ban Khor, Thailand.* Los Angeles, CA: University of California dissertation.

Nonaka, Angela M. 2012. Language ecological change in Ban Khor, Thailand: An ethnographic case study of village sign language endangerment. *Sign languages in village communities: Anthropological and linguistic insights.* 277–312. Berlin: Mouton de Gruyter & Ishara Press.

Nonaka, Angela M. 2009. Estimating size, scope, and membership of the speech/sign communities of undocumented indigenous/village sign languages: The Ban Khor case study. *Language and Communication* 29(3). 210–229.

Nonaka, Angela M. 2012a. Language ecological change in Ban Khor, Thailand: An ethnography case study of village sign language endangerment. In Ulrike Zeshan & Connie de Vos

(eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 277–312. Berlin: Mouton de Gruyter & Ishara Press.

Núñez, Rafael E. & Eve Sweetser. 2006. With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construals of time. *Cognitive Science* 30(3). 401–450.

Nyst, Victoria Anna Sophie. 2007. *A descriptive analysis of Adamorobe sign language (Ghana)*. Amsterdam: University of Amsterdam dissertation.

Nyst, Victoria Anna Sophie. 2012. Shared sign languages. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 552–574. Berlin: Mouton De Gruyter.

Nyst, Victoria Anna Sophie. 2013. Towards a new model of sign language affiliation. Paper presented at Theoretical Issues in Sign Language Research 11, University College London, 10 July.

Nyst, Victoria Anna Sophie, Kara Sylla & Moustapha Magassouba. 2012. Deaf signers in Doentza, a rural area in Mali. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 251–276. Berlin: Mouton de Gruyter & Ishara Press.

Padden, Carol A. 2010. *Sign Language Geography*. In Gaurav Mathur & Donna Jo Napoli (eds.), *Deaf around the world: The impact of language*, 19–37.Oxford: Oxford University Press.

Padden, Carol A. & Darline Clark Gunsauls. 2003. How the alphabet came to be used in a sign language. *Sign Language Studies* 4(1). 10–33.

Padden, Carol A. & Tom L. Humphries. 2006. *Inside Deaf culture*. Cambridge: Harvard University Press.

Padden, Carol A., Irit Meir, Wendy Sandler & Mark Aronoff. 2009. Against all expectations: Encoding subjects and objects in a new language. In Donna B. Gerdts, John C. Moore & Maria Polinsky (eds.), *Hypothesis A/Hypothesis B: Linguistic explorations in honor of David M. Perlmutter*, 383–400. Cambridge, MA.: MIT Press.

Padden, Carol, So One Hwang, Ryan Lepic & Sharon Seegers. 2015. Tools for language: Patterned iconicity in sign language nouns and verbs. *Topics in Cognitive Science* 7(1). 81–94.

Padden, Carol, Irit Meir, So-One Hwang, Ryan Lepic, Sharon Seegers & Tory Sampson. 2013. Patterned iconicity in sign language lexicons. *Gesture* 13(3). 287–305.

Panda, Sibaji. 2012. Alipur Sign Language: A sociolinguistic and cultural profile. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 353–360. Berlin: Mouton de Gruyter & Ishara Press.

Perniss, Pamela M., Robin L. Thompson & Gabriella Vigliocco. 2010. Iconicity as a general property of language: Evidence from spoken and signed languages. *Frontiers in Language Sciences* 1(227).

Petitto, Laura-Ann. 2014. Are signed languages "real" languages? Evidence from American Sign Language and Langue des Signes Quebecoise. *Signpost (International Quarterly of the Sign Linguistics Association)* 7(3). 1–10.

Pfau, Roland. 2012. Manual communication systems: evolution and variation. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign Language: An international handbook*, 513–551. Berlin, Boston: Mouton De Gruyter.

Pfau, Roland, Markus Steinbach & Bencie Woll (eds.). 2012a. *Sign Language: An international handbook.* Berlin, Boston: Mouton De Gruyter.

Pfau, Roland, Markus Steinbach & Bencie Woll. 2012b. Tense, aspect, and modality. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign Language: An international handbook*, 186–204. Berlin, Boston: Mouton De Gruyter.

Pfau, Roland & Ulrike Zeshan. 2016. Positive signs. How sign language typology benefits deaf communities and linguistic theory. *Linguistic Typology* 20(3). 547–559.

Russo, Tommaso & Virginia Volterra. 2005. Comment on "Children creating core properties of language: Evidence from an emerging sign language in Nicaragua." *Science* 309(5731). 56–56.

Safar, Josefina. 2019. Translanguaging in Yucatec Maya signing communities. *Applied Linguistics Review* 10(1), 31–53.

Safar, Josefina, Olivier Le Guen, Geli Collí Collí & Merli Collí Hau. 2018. Numeral variation in Yucatec Maya Sign Languages. *Sign Language Studies* 18(4). 488–516.

Sandler, Wendy. 2017. What comes first in language emergence? In Nick J. Enfield (ed.), *Dependencies in language: On the causal ontology of linguistic systems* (Studies in Diversity Linguistics 14), 63–84. Berlin: Language Science Press.

Sandler, Wendy, Mark Aronoff, Irit Meir & Carol A. Padden. 2011. The gradual emergence of phonological form in a new language. *Natural Language & Linguistic Theory* 29(2). 503–543.

Sandler, Wendy & Diane Lillo-Martin. 2006. *Sign Language and Linguistic Universals*. Cambridge: Cambridge University Press.

Sandler, Wendy, Irit Meir, Svetlana Dachkovsky, Carol A. Padden & Mark Aronoff. 2011. The emergence of complexity in prosody and syntax. *Lingua. International review of general linguistics. Revue internationale de linguistique generale* 121(13). 2014–2033.

Sandler, Wendy, Irit Meir, Carol Padden & Mark Aronoff. 2005. The emergence of grammar: Systematic structure in a new language. *Proceedings of the National Academy of Sciences* 102(7). 2661–2665.

Schuit, Joke. 2012. Signing in the Arctic: External influences on Inuit Sign Language. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: anthropological and linguistic insights*, 181–208. Berlin: Mouton de Gruyter & Ishara Press.

Senghas, Ann. 1995. *Children's contribution to the birth of Nicaraguan Sign Language*. Cambridge, MA: Massachusetts Institute of Technology dissertation.

Senghas, Ann. 2003. Intergenerational influence and ontogenetic development in the emergence of spatial grammar in Nicaraguan Sign Language. *Cognitive Development* 18. 511–531.

Senghas, Ann. 2005. Language emergence: Clues from a new Bedouin sign language. *Current Biology* 15(12). R463–R465.

Senghas, Ann & Marie Coppola. 2001. Children creating language: How Nicaraguan Sign Language acquired a spatial grammar. *Psychological Science* 12(4). 323–328.

Senghas, Ann, Marie Coppola, Elissa L. Newport & Ted R. Supalla. 1997. Argument structure in Nicaraguan Sign Language: The emergence of grammatical devices. In Elizabeth Hughes, Mary Hughes & Annabel Greenhill (eds.), *Proceedings of the 21st Boston University Conference on Language Development*. Somerville, MA: Cascadilla Press.

Senghas, Ann, Sotaro Kita & Asli Özyürek. 2004. Children creating core properties of language: evidence from an emerging sign language in Nicaragua. *Science* 305(5691). 1779–1782.

Stokoe, William C. 1960. Sign language structure: An outline of the visual communication systems of the American Deaf. *Studies in linguistics: Occasional papers. Buffalo: Dept. of Anthropology and Linguistics, University of Buffalo* (8).

Tano Angoua, Jean-Jacques & Victoria Anna Sophie Nyst. 2018. Tracing the emergence of size and shape specifiers: Body-part SASS signs in a young and an old village sign language. *Sign Language Studies* 18(4). 517–545.

Tkachman, Oksana & Wendy Sandler. 2013. The noun–verb distinction in two young sign-languages. *Gesture* 13(3). 253–286.

Van Rijnberk, Gerard. 1954. *Le Langage par Signes chez les moines*. North-Holland Publishing Company.

Velupillai, Viveka. 2012. *An introduction to linguistic typology*. Amsterdam; Philadelphia: John Benjamins.

Volterra, Virginia & Carol J. Erting (eds.). 1990. *From gesture to language in hearing and Deaf children* (Springer Series in Language and Communication). Berlin Heidelberg: Springer-Verlag.

Wilcox, Sherman. 2005. Routes from gesture to language. *Revista da abralin* 4(1). 11–45.

Wilcox, Sherman. 2009. Symbol and symptom. Routes from gesture to signed language. *Annual Review of Cognitive Linguistics* 7. 89–110.

Zeshan, Ulrike. 2010. Village sign languages: A commentary. In Gaurav Mathur & Donna Jo Napoli (eds.), *Deaf around the world: The impact of language*, 221–230. Oxford: Oxford University Press.

Zeshan, Ulrike, Cesar Ernesto Escobedo Delgado, Hasan Dikyuva, Sibaji Panda & Connie de Vos. 2013. Cardinal numerals in rural sign languages: Approaching cross-modal typology. *Linguistic Typology* 17(3). 357–396.

Zeshan, Ulrike & Connie de Vos (eds.). 2012. *Sign languages in village communities: Anthropological and linguistic insights*. Berlin: Mouton de Gruyter & Ishara Press.

Part I: **Emerging sign languages of the Americas. Descriptions and analysis**

John Haviland

Signs, interaction, coordination, and gaze: Interactive foundations of "Z"—an emerging (sign) language from Chiapas, Mexico

This chapter[1] develops the theme of coordinated (inter)action as a defining setting for the quintessential linguistic discursive form called "conversation." Turn exchanges in a first-generation sign language—dubbed "Z" (for Zinacantec Family Homesign)—depend on manipulating mutual attention, often through gaze, whose uses are multiple in this young language community. Gaze plays a central role in how signers orchestrate interpersonal attention and manage synchrony and timing in their signing.

To anticipate my overall conclusions, I adapt Jakobson's (1957) classic distinction between narrated events (E^n) and speech events (E^s) to distinguish in Z signing between narrated spaces (within which narrated entities can be gazed at and otherwise manipulated, if sometimes only virtually) and speech-event spaces (in which, minimally, speech act participants are available to be looked at, sometimes touched, and variously indexed). Managing gaze as a multifunctional semiotic vehicle is thus complicated by the need to distinguish conceptually, and perhaps also formally, between different spaces and targets for gaze within them. Such complications may be especially pressing and perhaps qualitatively different in signed as opposed to spoken languages. I shall link apparent emerging conversational structures in the young Z sign language to processes of visual attention and mutual monitoring.

1 Material in this chapter was first presented as part of the *Primer Coloquio Internacional sobre las lenguas de señas emergentes de las Américas*, organized by Olivier Le Guen, Josefina Safar, and Lorena Pool Balam at CIESAS-DF, in Mexico City, 10 September 2015; at the U.C. Berkeley Linguistic Anthropology Workshop, Nov. 13, 2015; as part of a plenary presentation at the "Language Adapts to Interaction" workshop, organized by Sean Roberts and Gregory Mills at EVOLANG, New Orleans, LA. 21 March 2016, and at CoEDL at the Australian National University in Canberra, 20 October 2017. I thank participants at all these events, the editors of this volume, and especially one critical review from an anonymous reviewer, for crucial comments and suggestions.

https://doi.org/10.1515/9781501504884-002

1 Coordinated action and joint attention

A primary motivation for emerging linguistic structure (in Z, if not elsewhere) is the need to coordinate action interactively. This perspective combines a slight twist on Du Bois' (1985: 363) aphorism that "grammars code best what speakers do most," with the assumption that what speakers (and interactants) actually "do most" is produce what Herb Clark (1996) calls "joint action." Accordingly, the "structure" of Z results directly from what the Z signers most use their newly invented language for and how, to achieve their ends, they interactively coordinate signing and other inter-related kinds of action. What structural properties of the emerging sign language allow them to accomplish this coordination? How do signers orchestrate mutual attention, and how do they manage synchrony and timing, especially in multi-person sign exchanges?

Attention is, of course, as much a social as a cognitive phenomenon; the very notion of "mutual (or joint) attention" — that is, attention somehow shared or distributed across individuals, however conceived—makes this plain. Moreover, organizing mutual attention in multiparty interaction implies as well organizing inattention (Goffman 1977) and exclusion, a point to which I return.

How gaze and visual attention are organized in Tzotzil interaction in general (and, as a consequence, in Z signing, too) suggests that aspects of the turn-taking machinery required for signed interaction may already be in place in non-linguistic interaction independent (or alongside) of speaking or signing. Adult Zinacantec daily life is filled with episodes of collaborative action among multiple participants who need not (and sometimes cannot) speak or sign to one another. Work, for instance, is often sequentially organized in ways strongly reminiscent of conversational turn-taking, involving alternating but carefully synchronized shifts in attention and coordinated action. To take one simple example, when two men alternate blows with wooden mallets to a net bag containing recently harvested corncobs, they collaborate in threshing the corn by "taking turns" in a finely coordinated synchrony, monitoring their partners visually and rhythmically synchronizing their individual movements (see Figure 1).

Of course, much more complex examples of coordinated alternations of action—both highly symmetric, as in the corn threshing case, or extremely asymmetric and regimented—are to be found in many daily routines of work and interaction (see Clark 1996), as well as in more specialized activities such as musical performances (Haviland 2011a), farming, or domestic tasks like cooking, cleaning, or washing. Sometimes such alternations can even involve the actions of only a single individual, as when a Zinacantec musician tunes an instrument—for example a guitar—taking the pitch from a nearby harp. He first plucks a harp string to get the needed pitch, then plucks the corresponding guitar string

while manipulating a stiff wooden tuning peg, repeating the sequence until he is satisfied with the instruments, and engaging his visual, aural, and tactile attention in slightly different, alternating ways.

Notably, there is clear evidence, in such contexts, that synchrony and appropriate timing of mutual activity are facilitated by gaze: the musician gazes from a particular harp string to another on his guitar; one man quickly checks the blow of his partner's threshing mallet by glancing at it swiftly to gauge correctly his own stroke (see again Figure 1); a woman checks her neighbor's placement of a tortilla on the griddle before placing her own; and so forth.

Figure 1: A Zinacantec man and boy threshing corn.

1.1 Turns and gaze

Probably the best studied case of structured alternation between actions the of multiple participants is conversational turn-taking, for which there have been at least two different analytical paradigms. One is based on "signals" and "rules" which regulate turn-exchanges (Yngve 1970; Duncan 1972, 1973, 1974). A later paradigm finds in conversational turn-taking an emergent expression of simple principles of interactive organization, providing the foundation for the cross-disciplinary field known as Conversation Analysis. The "simplest systematics" (Sacks, Schegloff, and Jefferson 1977) proposed suggests general mechanisms

underlying spoken conversation, taken as a primordial site for human interaction writ large.

A recent burgeoning of comparative empirical studies highlights apparent commonalities in the turn-taking exhibited by speakers of quite different languages (see Stivers et al. 2009, Levinson and Torreira 2015, Levinson 2016, and the papers collected in Holler et al. 2016), especially in one specific respect: the exact timing of turn transitions between questions—defined functionally as effective "requests" for "information"—and answers, implicated in that functional definition as "responses" to such requests. Such studies suggest that human cognitive processing abilities involved in processing and producing conversation, shared across languages and communicative traditions, result in very similar precise timing at certain turn transitions. Such studies do not, however, offer a general account of turn-taking cross-linguistically. Indeed, some of the same researchers have argued for striking variation between at least apparent superficial patterns of turn alternations between different languages (Brown 1998, Brown and Levinson 2005). They have also linked specific features of conversational turn-taking both to conversational ecologies (culturally preferred bodily arrangements for interlocutors, to take just one example; see Rossano et al. 2009) and to specific structural features of the languages themselves. For example, writing about Tzeltal, a close cousin to the Tzotzil language which surrounds the tiny sign community where Z has emerged, Penelope Brown writes:

> Tzeltal conversational interaction is characterized by a large amount of "dialogic repetition" involving a particular addition to default turn-taking rules that has the property of highlighting new information (and therefore often verb roots) across adjacent turns at talk (Brown 1998: 199).

Similarly, my own work on turn-taking in Tzotzil (Haviland 1996, 1997b, 2005, 2007, 2009, 2010, 2017) emphasizes a variety of stance-taking and evidential mechanisms which affect both the rate and the timing of turn-transitions, producing different "genres" of Tzotzil conversation (and flavoring or modulating phases within them) with quite different apparent patterns of turn distribution (as well as turn-overlap, interruption, and so forth).

Consider, for instance, two opposing poles of turn organization in spoken Zinacantec Tzotzil discourse. (a) Disputes in Zinacantan are generally mediated by a *jmeltzanej-k'op* or "dispute settler" whose job is to find a solution to fights about everything from deadly assault to a runaway spouse or a transgressed cornfield boundary. At one "conversational" extreme is the inevitable phase in every Zinacantec public litigation when representatives of opposing sides are allowed by such a dispute settler to engage in a shouting match, an unconstrained free-

for-all (Haviland 1997b). (b) At the other extreme is what I have called Zinacantec "small talk" (Haviland 2002b), the highly stylized and characteristically empty phatic exchange of turns, between exactly two Zinacantec acquaintances in a casual encounter.

In the former, many speakers may declaim simultaneously, completely overlapping one another for sometimes lengthy sequences of multiple, heated turns. Although they may be organized in teams (in the sense that several speakers may simultaneously represent the interests of one party, and several those of the other party), within a "team" so understood some turns may be aggressively directed at the opponents, others collaboratively at fellow team-members. The result is a verbal cacophony which an experienced dispute settler will usually allow to run its course before trying to impose a more regimented turn structure. At the latter extreme, in small talk, two speakers will alternate largely non-overlapping turns at talk, building on one another with highly repetitive, short utterances. In the former case, it is hard to represent graphically the volume and nature of turn exchanges—many speakers, all talking at once without let up. For the small talk case, Figure 2 diagrams the amount of alternating talk in a short characteristic example, representing as a single turn a stretch of uninterrupted speech by one speaker, and using the number of syllables uttered per turn as a rough measure of speech volume. It should be evident that turns are generally short, and more or less evenly distributed between the two conversationalists. (B, the older man, averages about 6 syllables per turn, whereas his younger ritual kinsman A averages about 4.2.)

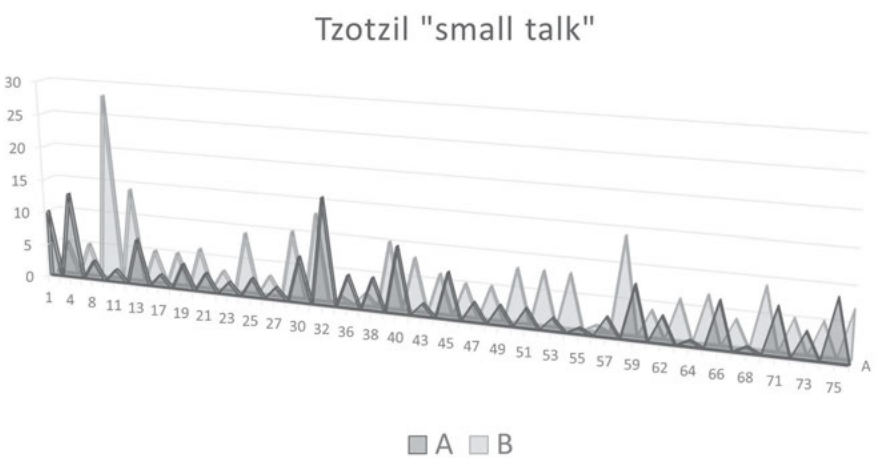


Figure 2: Turn exchanges in Tzotzil "small talk" for two speakers, A and B (x-axis = turn number; y-axis = number of syllables per turn).

Such a simple quantitative mechanism illustrates the interplay between turn-taking patterns and what may be seen as different speech genres (Bakhtin 1986). In a conversation between the same two men on another occasion, B is telling A about the history of their village. Now the distribution of turns is markedly different, as shown in Figure 3. B breaks his story up into turns that average 21 syllables each, a few much longer, some also considerably shorter. They are interspersed with A's responses, offered in chunks that average just under 2 syllables each. This is the typical pattern of Tzotzil narrative, even in multi-party conversation, in which one participant may tell a story or give news, with a designated responsive interlocutor providing back channel (Yngve 1970).

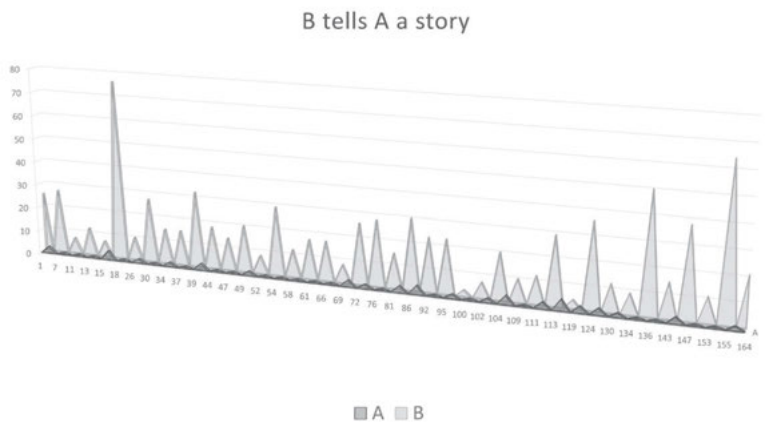


Figure 3: B narrates an episode in the history of the village to A (x-axis = turn number; y-axis = number of syllables per turn).

Contrast the phases of different kinds of talk that, by these simple measures, distinguish segments of a much longer conversation between the same senior man, B, and a dispute settler A, whom B has gone to visit in order to complain about a land dispute with his in-laws. A sequence of almost 2000 turns from this dyadic conversation is represented in Figure 4.

The sheer volume of talk and its distribution between the two interlocutors suggests how the interaction unfolded through different turn-organizations. The first 30–40 turns were devoted to the empty exchange of pleasantries characterizes what was called "small talk" above. Then B launches into a long and impassioned explanation of his grievances, with quite long turns and largely noncommittal monosyllabic replies from the dispute settler A (from about turn 50 through turn 800). A breaks into B's monologue with a series of substantive questions (turns 800–850 roughly), and then A himself delivers a long monologue

of about 300 turns (with B providing backchannel) outlining his own view of the situation. The next 500 turns or so represent a back and forth exchange of questions and answers via longish turns, with the bulk of the floor occupied by B. There follows a further sequence of about 300 turns in which B again returns to his complaints, after which A delivers his opinion and advice on the matter. (See Haviland [2017] for a fuller account of this interaction.) Even without considering the detailed mechanics of turn transitions in Zinacantec Tzotzil, there can clearly be quantifiably different patterns of turn organization, tailored, one presumes, to Zinacantec standards of appropriate ways to talk.

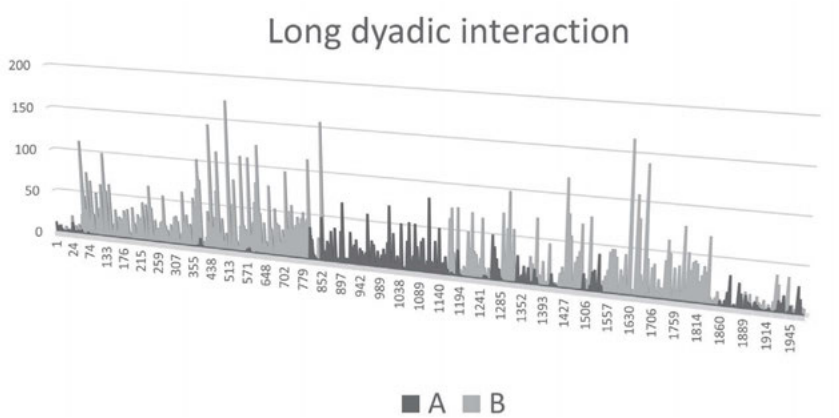


Figure 4: A multi-part conversation between two Zinacantecs, A and B (x axis = turn number; y axis = number of syllables per turn).

How might gaze be involved in the complex mechanisms of turn alternation in spoken conversation? The eyes are not only instruments of vision, but also powerful, plurifunctional, expressive articulators. Gaze is an important indexical signaling device in its own right, at least in part a result of the morphology of the human eye whose "white sclera … has almost certainly evolved to enhance gaze detection" (Levinson and Holler 2014: 3, citing Kobayashi and Koshima 2001). Gaze direction itself frequently alters the gaze of others. Since interlocutors are usually able, if not invited, to follow one another's gazing eyes, gaze can thus be used to point, to refer, and otherwise to direct attention. That is, interactively, gaze is a potent device for manipulating the attention of interlocutors. Catching someone else gazing with your own gaze is—in some corners of North American life, at least—a familiar device for forcing gaze aversion.

Authors have also considered the role of both mutual and asymmetric gaze between interlocutors in opening and closing verbal channels or

otherwise orchestrating turns at talk. Well-known studies of eye gaze in spoken conversation (for example, Kendon 1967, Kendon and Cook 1969, Goodwin 1981, Rossano, Brown, and Levinson 2013, and Streeck 2014) emphasize the interactive expressivity, complexity, and delicacy of gaze in the sequencing of spoken turns. Gaze can explicitly mark both addressivity by speakers—addressee selection and interactive exclusion—and recipiency by hearers, allowing hearers to signal both attention and disattention, deliberate, unintended, or otherwise pragmatically marked.

Recent studies of such matters (Rossano, Brown, and Levinson 2009, Rossano 2013) have questioned earlier claims, using both statistical and selective micro-interactional data to conclude that the link between turns at talk and gaze behavior is non-mechanical and variable. Rossano, Brown, and Levinson (2009), basing their observations on a selective corpus of "questions," defined functionally as described above for the turn-taking studies, maintain that there can be significant differences between languages and communicative traditions in how regularly speakers gaze at one another or are "relatively gaze aversive" (Rossano, Brown, and Levinson (2009: 231), as is said to be the case for speakers of Tzeltal, Tzotzil's close cousin.

No careful studies of gaze in spoken Tzotzil conversation exist, to my knowledge, although even cursory attention to Zinacantecs when they talk would cast doubt on whether the label "relatively gaze aversive" can fairly apply to Tzotzil conversation. I have examined in some detail the videotape of the tiny "small talk" conversation described above (see again Figure 2). The two men are standing in a house courtyard, conversing while taking a short break from working in different fields. They certainly cannot be said to avoid looking at one another. Indeed, in this one conversation, by my own rough count at least, one of the men looks at his conversational partner in 69% of the spoken turns, and both men gaze at one another mutually in 38% of their turns. At the start of each new turn at talk, the speaker is gazing at his addressee just under 56% of the time; and similarly, the addressee gazes at the speaker 56% of the time. More revealing than these raw percentages is the fact that gaze is not evenly distributed over turns, even in this maximally phatic and minimally informative socializing, as can be seen graphically in Figure 5.

The two speakers are relatively close ritual kinsmen who have been out of touch for some years and who come together in this brief interaction somewhat by accident. Clear from Figure 5 is an evolving pattern of gaze: both men start off their encounter locked in close mutual visual attention to one another, which begins to give way as the main speaker moves his gaze elsewhere. There follows a phase in which both speakers are visually engaged with other aspects of their immediate environs or looking effectively nowhere (for example, when both men

look down at the ground, between turns 35 and 45). After this phase they begin again to monitor one another directly, partly—or so it seems to me—in preparation for closing the interaction. Rossano (2013) argues that gaze behavior is "mainly organized in relation to sequences of talk and the development of courses of action or ongoing interactional projects," and, without offering more details, I assume such an analysis applies here as well. However, it should be clear, even from this crude summary, that Tzotzil interactants are neither wedded to nor aversive to gaze in conversation, and that the relationship between turns at talk and mutual gaze seems neither mechanical nor predetermined.

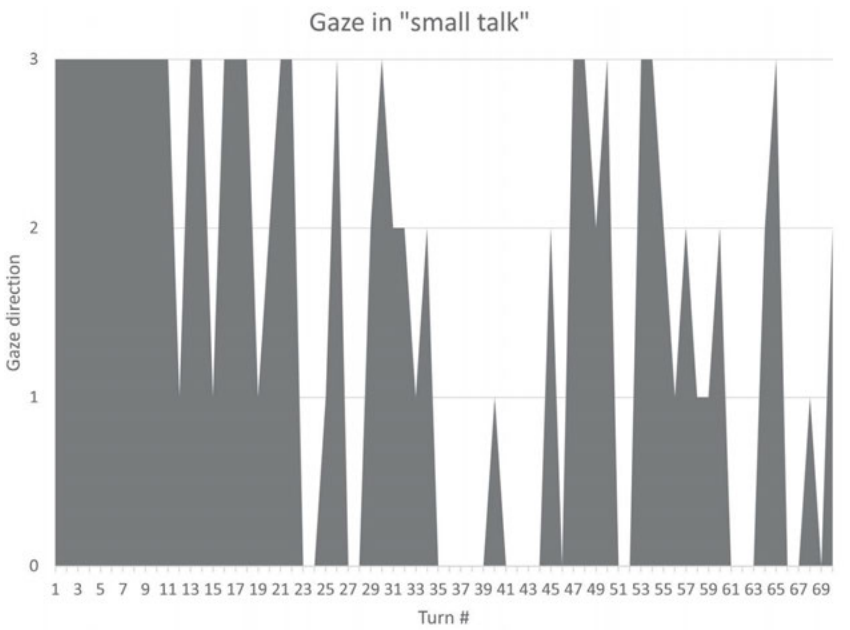


Figure 5: Gaze patterning in Tzotzil "small talk" (x-axis = turn number y-axis = gaze at turn inception, where 3 = mutual gaze between speaker and addressee; 2 = speaker gazes at unreciprocating addressee; 1 = addressee gazes at unreciprocating speaker; 0 = neither party gazes at the other).

1.2 Turntaking and gaze in sign language

The organization of turn-taking in sign language is considerably less studied than in spoken language, in part, perhaps, because the ballistic dynamics of signed

utterances are markedly different from the acoustic dynamics of spoken turns, which have (relatively) clear beginnings and ends. One perspective on the timing of signed turns can be found in the research of Coates and Sutton-Spence (2001) who argue that informal signed conversation between friends is characterized by two "key features": "overlapping talk and joint construction of utterances" (Coates and Sutton-Spence 2001: 518). They challenge claims (1) "that signers will only sign if they are sure their addresses(s) can see them" and (2) "that addressees maintain their gaze on the (solo) signer" (Coates and Sutton-Spence 2001: 519), citing instances in which "signers sign even when there is clear evidence that no-one is attending to them" (Coates and Sutton-Spence 2001: 520) and postulating a kind of Gricean principle of collaboration for signed conversation:

> Participants will assume, all other things being equal, that they are all attending to each other at all times, even though at any given time the gaze has to be directed at one signer rather than another (Coates and Sutton-Spence 2001: 525).

By contrast, in a groundbreaking study, McCleary and de Arantes Leite (2013) dispute such characterization of turn-timing in signed conversation, largely by applying analysis of the dynamics of speakers gestures (Kendon 1972, 1980, 2004, especially as reformulated by Kita, van Gijn, and van der Hulst 1998) to the ballistics of sign movement.[2] In much the same spirit, but taking further inspiration from the recent cross-linguistic studies of turn-taking mentioned above, De Vos, Torreira, and Levinson (2015) perform similar parsing tricks to achieve comparability between signed and spoken turns. For example, they suggest that the timing of signs should focus not on preparatory movements or retractions,[3] but instead on what Kendon calls the "strokes" of a signed phrase. These are the parts of signers' movements that contain "propositional content as expressed by the movements of the hands" (De Vos, Torreira, and Levinson 2015: 3). The authors thus propose to analyze the timing of signed turns as defined by "stroke-to-stroke turn boundaries" (De Vos, Torreira, and Levinson 2015: 11). These authors, following the paradigm of similarly focused previous studies, also restrict their attention to a corpus of largely dyadic functionally and sequentially defined set of "question/answer" sequences (which they suggest defines a kind of "baseline" for permissible overlaps or gaps between turns). They find that the

2 For an independent application of Kendon's gestural scheme to Z signing see Haviland 2011, 2014.

3 In Kendon's formulation, a gesture phrase has a central "stroke" which is characteristically preceded by a preparatory movement, during which the hands move to an appropriate position to perform the stroke, and then followed by a retraction or return to a neutral "rest" position.

stroke-to-stroke turn-timing results for sign-languages correspond very neatly with those of the cross-linguistic corpus of spoken conversation their colleagues have examined (see Stivers et al. 2009).

We know that the eyes, in sign as in speech, can be effective referential indicators, part of the inventory of several readily available pointing devices.[4] For a visual medium like sign—evolved for and by deaf interactants who have little or no access to acoustic signals—directed gaze takes on additional importance in interaction, as the primary means by which people access one another's signing in the first place (see Emmorey et al. 2009, Thompson et al. 2006), and also by which they can display deliberate non-recipiency (for example, by looking away from a signer). In one of the earliest studies on gaze in sign language, Baker (1977: 223) refers directly to Kendon's research on gaze in speech, to make the deceptively obvious (although, as mentioned, controversial) claim that:

> [s]igned conversation differs uniquely from oral conversation in that a speaker cannot initiate a turn until the desired addressee looks at the potential speaker, i.e., an interactant cannot "say" something (and be "heard") if the other interactant is not looking. This single constraint makes eye gaze one of the most powerful regulators in Sign since it determines when an interactant can speak (Baker 1977: 221).

With respect to turn-transitions, Baker explicitly argues that a signer's gaze at an addressee is linked to turn endings ("to check on addressee decoding" [Baker 1977: 223]); and correspondingly that an addressee's gaze at signer at turn end may be a "speaker shift regulator" whereas not gazing at the speaker may be a speaker "continuation regulator" (Baker 1977: 227),[5] a theme taken up by several researchers who consider how turn transitions are centrally managed via gaze in multiparty signed interactions (Van Herreweghe 2002, Mather 1996).

Gaze is also linked in the literature to various aspects of sign-grammar, such as agreement marking (Baker and Padden 1978, Thompson, Emmorey, and Kluender 2006). It has also been associated pragmatically with repair initiation, as in the so-called "freeze look" of Argentinian Sign Language (Manrique and Enfield 2015).[6] Moreover, as Engberg-Pedersen (2015) has argued, the eyes are versatile and multi-faceted sign-articulators, serving not only to regulate turns

4 Compare Enfield (2001), Cooperrider, Slotta, and Nuñez (2018).

5 Baker also connects gaze in sign language to a number of what she calls "sociolinguistic conventions" of deaf etiquette—about where and when to gaze, or about how to signal to a signer that another interactant wants his or her attention.

6 Compare the "prolonged gaze" described by Levinson (2015) as a conventionalized repair-initiator in spoken Yélî Dnye, the language of Rossel Island.

and check mutual understanding between signers and addressees, but also as important semiotic vehicles for both establishing and shifting between multiple possible "perspectives" in sign formation. She summarizes different perspectival uses of gaze as follows:

> When signers have eye contact with their addressee(s), they take on their role as sender or narrator [. . .]. Through eye contact with the addressee, they can keep track of the current speech situation and check the addressees understanding. Signers also take on the role of sender/narrator when they use their gaze for reference tracking, i.e., looking briefly in the direction of a referent's locus. This happens often in the beginning of a sentence when the topic changes to a new referent. Configurational or locational gaze is seen when signers describe a complex static configuration or the relationship between two or more referents by representing them in space; it is as if they direct addressees' gaze to the representation itself. The final type of gaze that indicates the sender/narrator is signers' looking away in no particular direction at a major syntactic break or when they hesitate (Engberg-Pedersen 2015: 418).

Note that prolonged mutual gaze between signing interlocutors also enables use of other expressive visible palettes, notably interlocutors' faces, which are centrally integrated into the multiple simultaneous articulations of sign.

2 "Z"

One of the few contexts in which to observe naturally emerging new human languages is in communities whose deaf members are sufficiently numerous and multi-generational to fuel the rise and development of spontaneous communication systems based on a visible modality. This study deals with one such case, a first generation sign language which I call Zinacantec Family Homesign or "Z" for short, described in more detail in the sociolinguistic sketch that accompanies this volume. Crucially, in the Z language community there are only three deaf signers—Jane, Frank, and Will, all siblings—along with three other fluent hearing signers: another sibling, Terry; a niece, Rita; and Jane's young son Vic.

Such a tiny first-generation sign language has a special place in recent work on emerging sign languages, bridging, as it does, the "resilient" language-like features of what are conventionally called "homesigns" (Goldin-Meadow et al. 1978, Goldin-Meadow et al. 1994, Goldin-Meadow 2003, 2012, Fusellier-Souza, 2004, 2006, Coppola and Newport 2005, Coppola et al. 2013, among others)—creations of individual deaf children (who sometimes carry these homesigns to adulthood) in interaction with their hearing families—and the kinds of grammars

characteristic of both young and established sign language communities (see Kegl et al. 1999, Senghas and Coppola 2001, Zeshan and DeVos 2012; Nonaka 2004, 2009; Sandler et al. 2005; Meir et al. 2007; Nyst 2007; and deVos 2012, among others).

Z is of particular interest in the context of the introductory discussion above of turn-taking and gaze in sign languages. Given the frequent, if disputed, claims that signed utterances *depend* in crucial ways on reciprocal gaze between interactants, and given the claims in the literature about "gaze aversion" in a language closely related to the surrounding matrix language, Tzotzil, which envelops the tiny Z signing community, an emerging sign language like Z has compelling interest for discerning interactive mechanisms that may motivate conversational structure. Moreover, as hopefully will be clear from the empirical data I present, gaze seems to be of central importance in the patterns of Z conversational interaction, if not in more syntactic features of phrase and argument structure. I concentrate here on this particular embodied aspect of Z signing, without dismissing the potential relevance of other features of utterance "composition" (Enfield 2009).

The youngest Z signer, Vic, was 10 months and 19 days old and actively beginning to acquire Z signs when I started to work in earnest with the Z family. By then, one could already see Vic's developing communicative routines. For example, in my earliest films of interaction among the Z signers it appeared that Vic already used pointing gestures to indicate his desires, something familiar from classic studies of language acquisition and socialization (e.g., Werner and Kaplan 1963; Carter 1975; Bates 1976, 1983; Bates, Thai, and Whitesell 1989; Acredolo and Goodwyn 1988; Dobrich and Scarborough 1984, Lock 1980, 1993, Lock, Young, Service, and Chandler 1990), including work with Tzotzil-speaking infants (Haviland 2000; de León 1998).

Strikingly, Vic's early pointing gestures, as well as his gaze direction, were also routinely interpreted by his caregivers as volitional conversational turns (Lock 1980). The best evidence for such an interpretation is how adults reacted to and, indeed, manipulated Vic's gestures. In an early film the deaf signers were having a meal while I spoke with their father. Vic was asleep at the beginning of the film, but he eventually woke up, and his mother Jane brought him into the room where the rest of us sat. The ensuing sequence of events illustrates how Jane appears to teach Vic about the appropriateness (or lack thereof) of a communicative social act.

First, let me explain the "transcriptions" or diagrams which illustrate the rest of this chapter. The video recordings on which the analysis is based, and thus the transcripts, allow a maximum timing granularity of 30 frames per second. The video stills are labelled with individual letters (a, b, c etc.) and they are linked to a timeline, with hashmarks (variably graduated, sometimes representing

individual frames, sometimes 10ths, 15ths, 20ths or even 100ths of a second). On the timelines, corresponding letters indicate the precise time of each video still. Two other kinds of annotations may also be linked spatially to the timelines. The first are short representations of the ballistic phases of unfolding individual signs (Kendon 1972, 1980, 2004; Kita, van Gijn, and van der Hulst 1998; Haviland 2011, 2014; McCleary and de Arantes Leite 2013; De Vos, Torreira, and Levinson 2015), written below the timeline and synchronized with it. These annotations mark a preparatory motion (shown, following Kendon 2004: 114 ff., with a string of tildes [~~~]); a main stroke (shown with a string of asterisks [****], punctuated by slashes [/] to indicate distinct phases of movement within the main stroke, sometimes repetitions, and also "holds"—which Kendon represents with underscored asterisks but which I represent in these diagrams simply with a sequence of underscores [____]); and, where relevant, a retraction to some sort of rest position (shown, again following Kendon, with a sequence of full stops and dashes [.-.-.-]).[7] The ballistic notations for individual putative signed phrases are enclosed in square brackets. Individual signs are often glossed, below the ballistic indications, using the convention of capitalized English words as "sign labels"[8] for putative signed units, occasionally with additional clarifying notes following a semicolon or, for relevant aspects of the sign form, in square brackets. Certain putative grammatical elements also appear in sign glosses, written in italicized capital letters: indexical signs (abbreviated *IX*, and often accompanied by an explanatory '=' followed by a putative referent), "size and shape specifiers" (abbreviated *SASS*, and sometimes followed by ':' and descriptive notes); and various apparent negative formatives (abbreviated *NEG*). A second sort of annotation appears in "gaze lines," which use a modified form of the gaze annotation introduced in Goodwin (1981). Full stops (...) along the gaze timeline show when an individual appears on the corresponding video to be moving his or her gaze towards a particular target; the focus of the target itself is written

7 Recent work by Austin German (2018) demonstrates that separate ballistic analyses of Z signs must be applied to simultaneous articulators, most importantly the signer's two hands which can move independently, but I have not attempted to apply this insight to the examples diagrammed in this chapter.

8 The "sign labels," of course, have the almost fatal defect of being categorically and denotationally indeterminate, especially when they reflect purported "referents"—in the case, for example, of apparently referential points and gaze. Thus the perennial ontological problems that Quine (1960) pointed out hypothetically over half a century ago as applying to "*radical* translation, i.e., translation of the language of a hitherto untouched people" (2013[1960]: 25) plague my analysis of Z, a new language-in-the-making which, while not exactly "untouched," is still not immune to the issues Quine raises.

on the timeline starting at the point where that person's gaze[9] appears to reach it. A sequence of underscores (___) show that a person's gaze continues to be focused on this target for the timespan indicated. Strings of commas (,,,,) indicate when gaze is being withdrawn from a locus (and not clearly moving to a new one, or perhaps returning to some neutral, unmarked position). Such diagrams are clearly a deficient (and far less legible) alternative to scrutinizing actual signing (or video recordings of it), but they at least provide detail sufficient to enable certain discoveries, especially about synchronicity. The individual timelines plus their annotations thus represent a kind of miniature musical score linking the individual still frames to concurrently unfolding sequences of action.

As Vic appeared on camera, strapped to his mother's back, his uncle Will was drinking from a soft drink bottle (see Figure 6). Will looked up and appeared to engage his young nephew's gaze (a), holding it for about half a second before beginning to turn away (b). Within less than a tenth of a second, Vic's extended index finger came up (c), and he appeared to "request" some of the soft drink by pointing at his uncle's bottle (d) for almost a full second before retracting his arm (e).

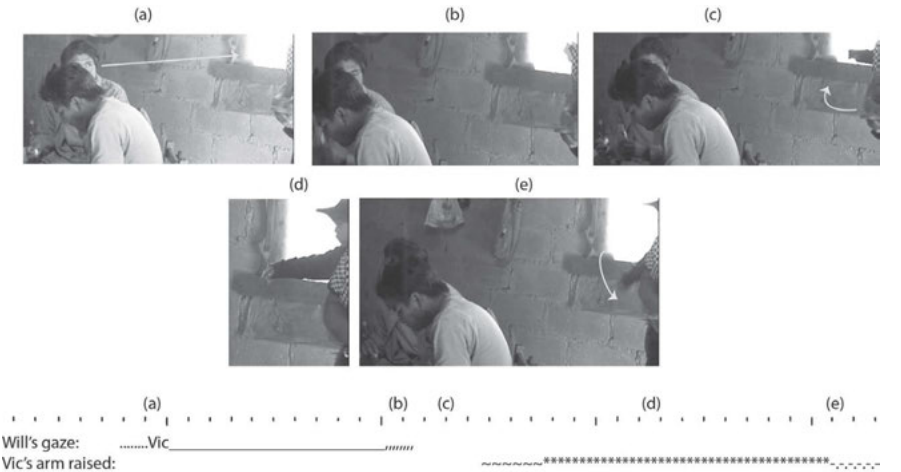


Figure 6: Will gazes at young Vic, just offscreen on his mother's back, and as Will looks away, Vic appears to point at Will's drink. (Timeline graduated in 20ths of a second.)

9 As those who have paid close attention to gaze behavior will recognize, there is often a clear, and potentially significant, difference between where the *eyes* appear to be directed (which is what my annotations in this chapter try to capture) and where the *face or head* is apparently turned. I have not tried to differentiate such subtleties here, although they are probably relevant to Z signing as well as elsewhere.

Notable here is what one might call a proto-turn-taking system. Vic's engagement with Will seemed to begin with Will's prolonged gaze at the infant, which lasted half a second. When Will's gaze was withdrawn, within less than a tenth of a second (and perhaps responding to Will's lack of attention) Vic started to raise his arm, forming what appeared to be a pointing gesture. He continued to hold the outstretched arm for almost a second before dropping it.

Only half a second later, however, the child appeared to point again (see Figure 7). As Will started to put the top back on his bottle, Vic once more stretched his arm forward in a point (a), and then also leaned his body forward more insistently (b). Whether in response to Will's refusal to share his bottle, his disattention to the child, or for her own reasons, after letting him point for about a second, Vic's mother Jane seemed to "shush" the child by reaching up (c), grabbing his hand (d), and pulling it forcibly down (e).

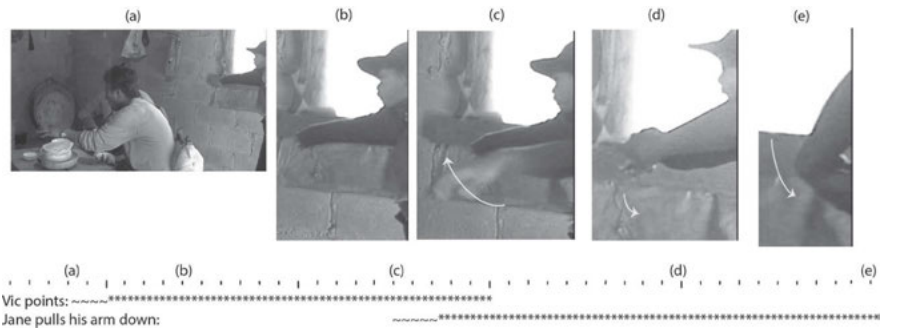


Figure 7: Jane pulls Vic's pointing arm down, effectively "shushing" him. (Timeline in 20ths of a second.)

Note that although it ended in suppression, Vic's communicative intention was nonetheless both recognized and incorporated into a clear sequence of interlocked turns or moves, involving mutual (if asymmetric) attention and communicative action between Vic, his uncle Will, and his mother Jane. (See Figure 8.) Schematically, there is (1) initial engagement, via mutual gaze, between Will and Vic (a), broken when Will looks away (b). Then (2) Vic makes a first request of Will, which the latter refuses by continuing to look away (c-d). Next (3) Vic repeats his request, more insistently (e-f). Finally, (4) Jane shushes the infant (g-h).

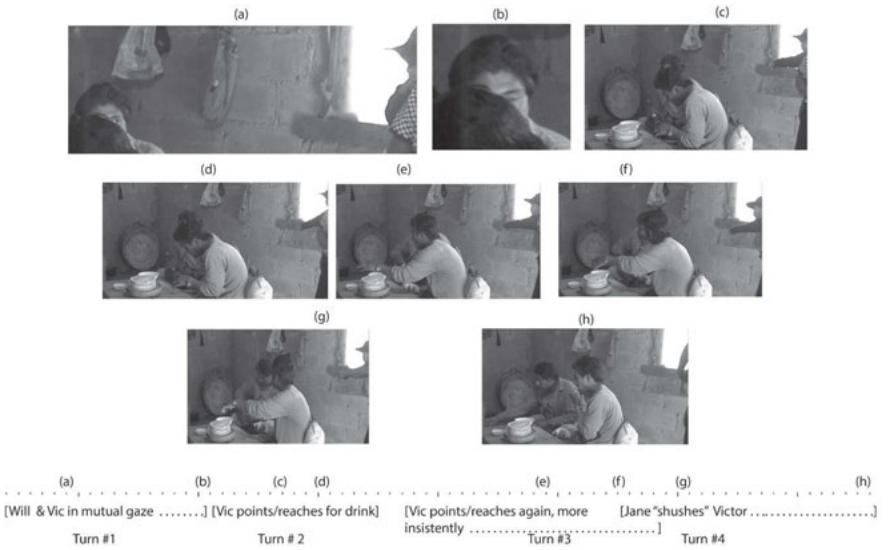


Figure 8: Vic points and Jane shushes him, full sequence. (Timeline graduated in 10ths of a second.)

One month later, just a week before his first birthday, Vic's gestural routines were more elaborate, apparently responsive to the conversational surround, and clearly interpreted by adults as deliberate signing (see Haviland 2000). At one point during our first elicitation session, Terry—the hearing sibling of the deaf signers and herself a fluent signer—was helping me explain to her brothers a pilot elicitation task I was about to inflict upon them. Vic was strapped to her back, asleep, but he woke up as the session proceeded. Vic watched with intense interest as his aunt Terry instructed Frank, seated next to her, to describe what he saw on a computer screen to his brother Will, who was seated facing him (see Figure 9).

After watching this performance Vic himself suddenly began to sign (see Figure 10), in a sequence that started with his gazing at the computer screen (a). He then raised his eyes to Frank (b), staring at him with a small smile for more than a second, then glanced back at the at the screen (c), while raising his arm in what looked like a pointing gesture at Will and turning his gaze back to Terry, his apparent addressee (d).

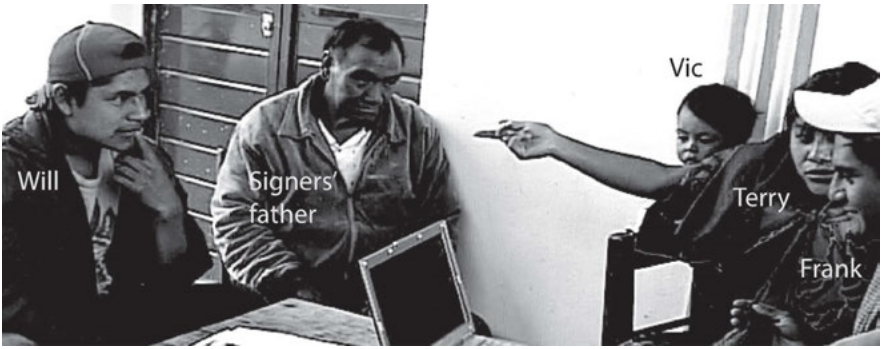


Figure 9: Terry, with Vic on her back watching, tells Frank to sign what is on the computer screen to Will, at whom she points.

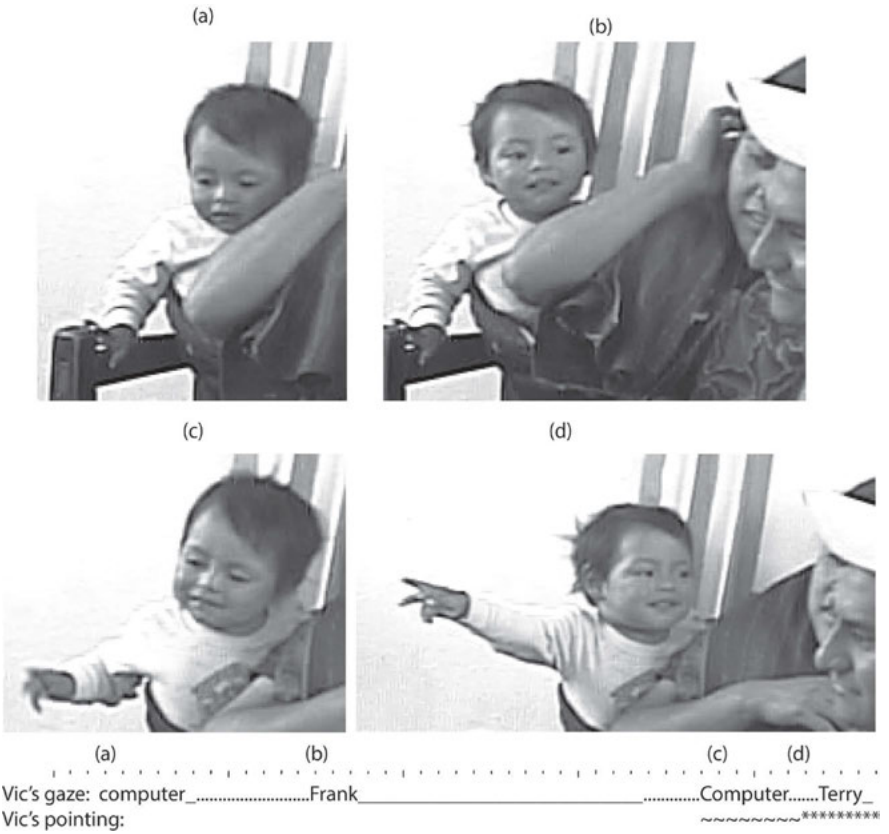


Figure 10: Vic "repeats" his Aunt Terry's immediately prior utterance. (Timeline graduated in 20ths of a second.)

The details of the interactive exchange that follows show that quite delicate mechanisms for managing turns and turn-transitions were seemingly already part of Vic's communicative repertoire at this very early age. (See Figure 11.) After mimicking Terry's instruction to Frank and Will, Vic waited for Terry to acknowledge his own performance, staring at her with an inquisitive face and head tilt as he continued to point with his outstretched finger (a). Terry, in the meantime, appeared to check both of her previous addressees by gazing first at Frank (a) and then at Will (b).

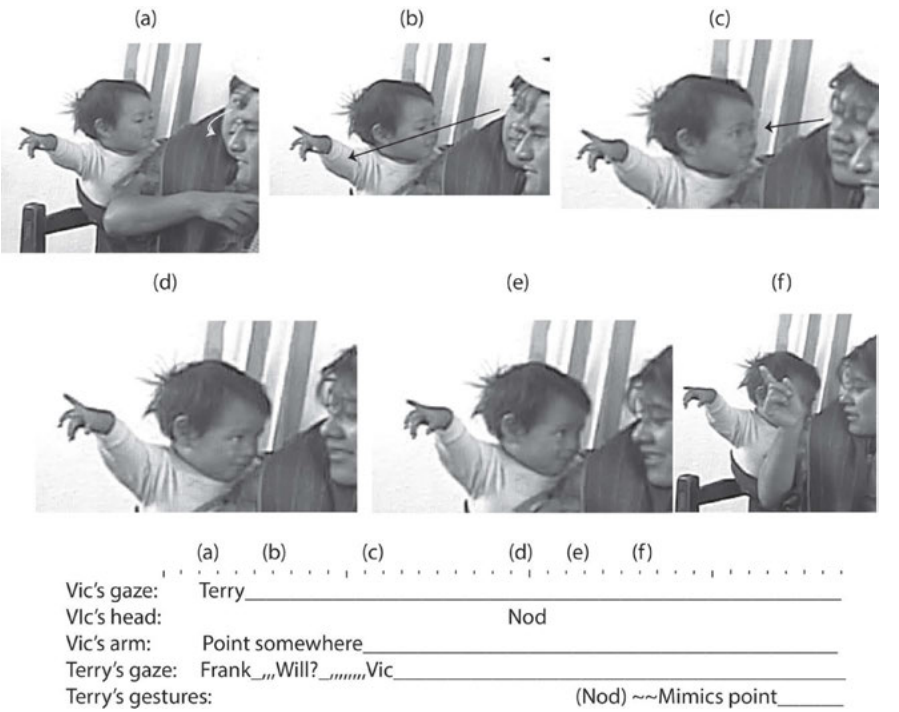


Figure 11: Vic nods at Terry and points, and Terry reciprocates. (Timeline graduated in 10^{ths} of a second.)

It is interesting to juxtapose what happened next in the interaction with the spoken Tzotzil conversation that had preceded this first eliciting session in my Z research. The deaf siblings' late mother had expressed her concern that young Vic would—like his mother and uncles—never learn to speak Tzotzil, and that he should not be encouraged in his acquisition of Z signing, at this tender age. When Terry finally gazed down at Vic, they exchanged nods ([d] and [e]), and Terry evidently repeated Vic's pointing gesture, opening her mouth slightly (f). (It is

not clear what Terry thought Vic was pointing at, or what, indeed, she herself was indicating.) After this collaboratively constructed exchange of signed or gestured turns, Terry also directly addressed Vic in Tzotzil with a metalinguistic command, "No, child, don't learn to do that!" She followed with a remark to her mother: "Look! He's learning [to sign]!" The mother's scolding response—"Why do you show him? He'll only keep trying to learn [to sign]"—elucidates the ambivalence the family felt at the time about whether it was desirable for Vic to sign at all.

2.1 Z turn taking: Gaze and mutual attention

The infant Vic during the first year of his life thus seemingly used pointing as part of his early utterances, both to indicate his apparent interest in objects (e.g., his uncle's soft drink) or to repeat his caregiver's references to co-present others. If reference is a process by which one interlocutor induces another to pick an entity of interest out of a contextual surround, then—ignoring many complexities (e.g., Lock et al. 1990, Haviland 2000, Liszkowski 2006, Liszkowski et al. 2012)—we can take indexical manipulation of an interlocutor's attention to be an essential and quite early element of initial putative attempts to refer. Reference can be achieved indexically via some sort of indication, whether by inducing an interlocutor to redirect his or her attention—for example by "pointing"—or by bringing something into focus within the interlocutor's existing span of attention (by highlighting it, or by moving it there—what Clark [2003] calls "placing"). Under appropriate circumstances, one can refer to an entity simply by directing one's gaze at it.

I shall in the remainder of this chapter exhibit possible origins of conversational structure in the emerging Z sign language by linking such structures to visual processes of mutual monitoring and attention in the interactions. Consider another extract from the first film I took as part of my extended study of Z in 2008 when I filmed the signers during a meal. After many years of reluctance, I had finally asked the signers' father, an old friend, about my trying to work with his deaf children on their language. As he and I talked, my video camera standing on a tripod was trained on the three deaf siblings finishing a meal. With traditional Zinacantec hospitality, Jane had suggested that they buy a soft drink to share with me, and in the segment of the film to be discussed she was serving the soda, Zinacantec style, in a shared cup, passed from person to person. I was almost totally oblivious to what Jane and her brothers were doing and saying. Indeed, the signers were in part indulging in a variety of "secret speech"—a form of highly undemonstrative signing which family members say the deaf signers use with each other when they want to avoid "eavesdropping." (Terry calls it

"*chk'opoj ta sat no'ox*, talking with the face alone.") It was only several years after I began work on Z that I returned to this sequence, since originally it had hardly looked like comprehensible "conversation" to me at all. The hearing sister Terry, a fluent signer, who was not present on the day of the filming, gave me her Tzotzil interpretation of their short conversation. She explained that Jane criticized her brother Will for taking too long to drink, since others were waiting for the cup; that Frank then told Will that Jane was impatient with him and that he should drink up fast; and that Will then mocked his sister's impatience.

I was initially baffled about how Terry had extracted her glosses from the signers' behavior. As I hope to show here, however, close inspection of the video reveals how the interaction unfolds.

Figure 12: The soda pouring scene.[10]

At the start of the scene, Jane (on the left in Figure 12) is holding the bottle of soft drink, watching her father and me (off screen to the left). She has already served her brother Will, who is holding his cup, and she is waiting for him to finish his share so she can retrieve the cup and serve the rest of us. In the lapse of just over half a second, she performs a quick visual dance (see Figure 13), glancing first at Will (a), then at the cup in his hand (b), and then at her older brother Frank

10 All figures and examples from the Z corpus marked with a camera symbol are available as supplementary video files in the eBook version of the volume at https://www.degruyter.com/view/title/523378.

(c), who is dipping his finger in the salt bowl as he eats. As she appears to watch Frank touching the salt (d), she reaches down to touch Will on the leg apparently to try, unsuccessfully in the event, to get his attention. That is, Jane surveys the situation, noting several relevant facts (that Will is still drinking the soda in his cup, and not apparently aware of her agenda) without really managing to engage an interlocutor's attention, and then she tries a direct conventionalized tactile "Hey!" sign or turn initiator (Haviland 2015) in an unsuccessful attempt to initiate a signed exchange with Will.

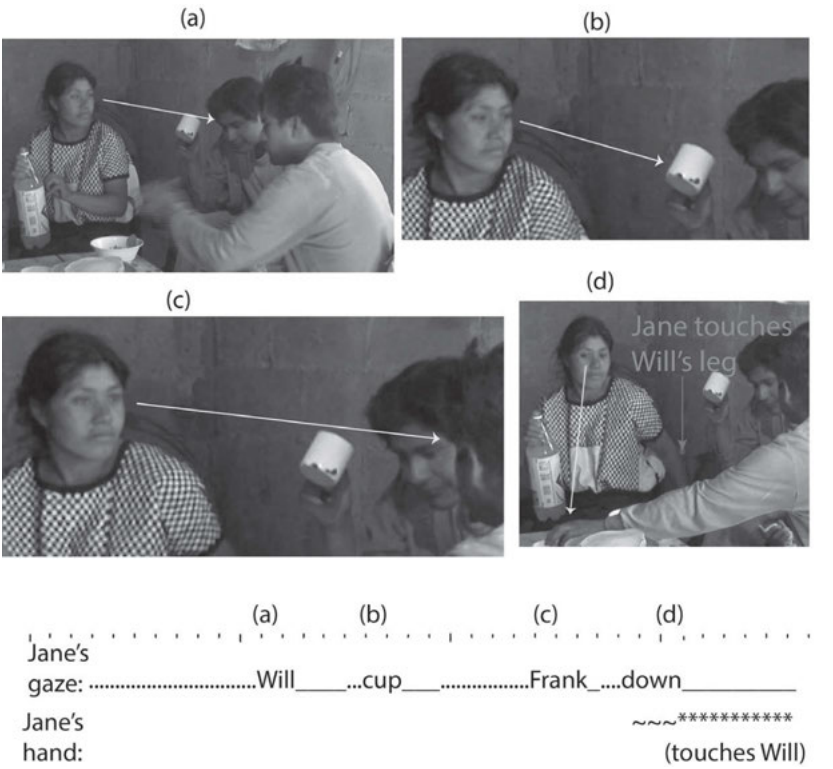


Figure 13: Jane glances at Will, his cup, Frank, and at Frank's hand while trying to get Will's attention with a poke. (Timeline shows individual frames at 1/30th of a second.)

Instead, as shown in Figure 14, after another quick glance at the cup (a), Jane goes on to stare fixedly at Frank (b). Once she has attracted his attention, apparently just by fixing her gaze on him (smiling slightly and pursing her lips when he begins to attend to her—see [c]), for the next 2 seconds she engages in a tiny expressive routine with her hands and eyes. She taps on the bottle three times and smiles at Frank (d), then glances down at the table (where I think she wants the cup to be placed so she can pour more soda into it—see [e]), and then very swiftly at the cup in Will's hand (f). She then fixes her eyes on me—the guest—for about half a second, with a little nod (g), before returning her smiling eyes to Frank (h). An approximate rough gloss for the entire sequence, which is punctuated by gazes at her interlocutor, would be something like, "I need to serve this soda to our guest over there (and I need Will to give me back the cup to do so)." Note that most of the communicative work—both to organize turns and within her single longest turn—is performed by gaze. First she initiates a turn via prolonged gaze eventually reciprocated by Frank. Then she performs a quick chain of references, without intervening pauses: first deictic taps on the bottle, then a series of referential gazes: (1) to pick out a locus for serving the soda, (2) the needed receptacle, and (3) the desired recipient, before returning a smiling gaze to her interlocutor.

Still holding Frank's attention, Jane now launches a more specific complaint about Will (Figure 15), performed first with a sidelong glance at the cup in Will's hand as her smile fades (a), then a pouting face along with a dismissive complaining rapid toss of the hand meaning 'drink' (b-d), followed by a more elaborated version of the same sign for 'drink' accompanied by an accusatory glance at Will (e-g). Terry glossed the entire sequence as, "Will is taking too long to drink."

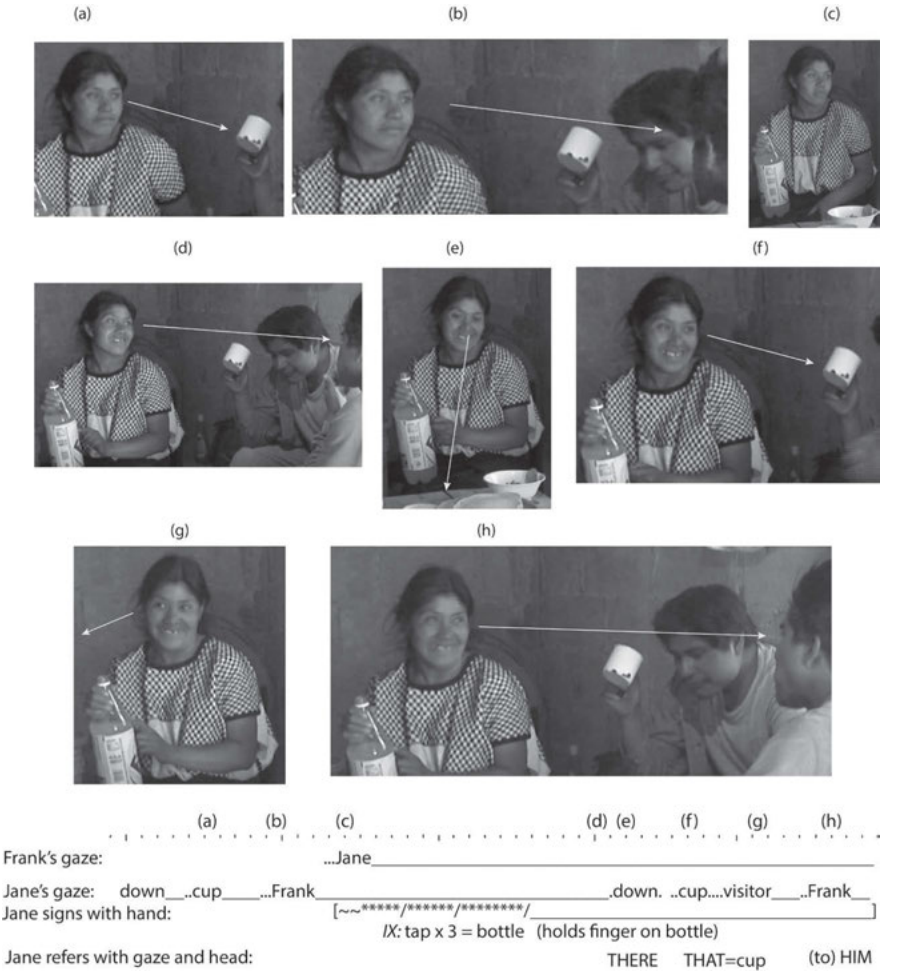


Figure 14: Jane to Frank: "I need to serve soft drink to our guest here..." (Timeline graduated in 20ths of a second. Timing for Frank's gaze is approximate, as his eyes are not visible on the video.)

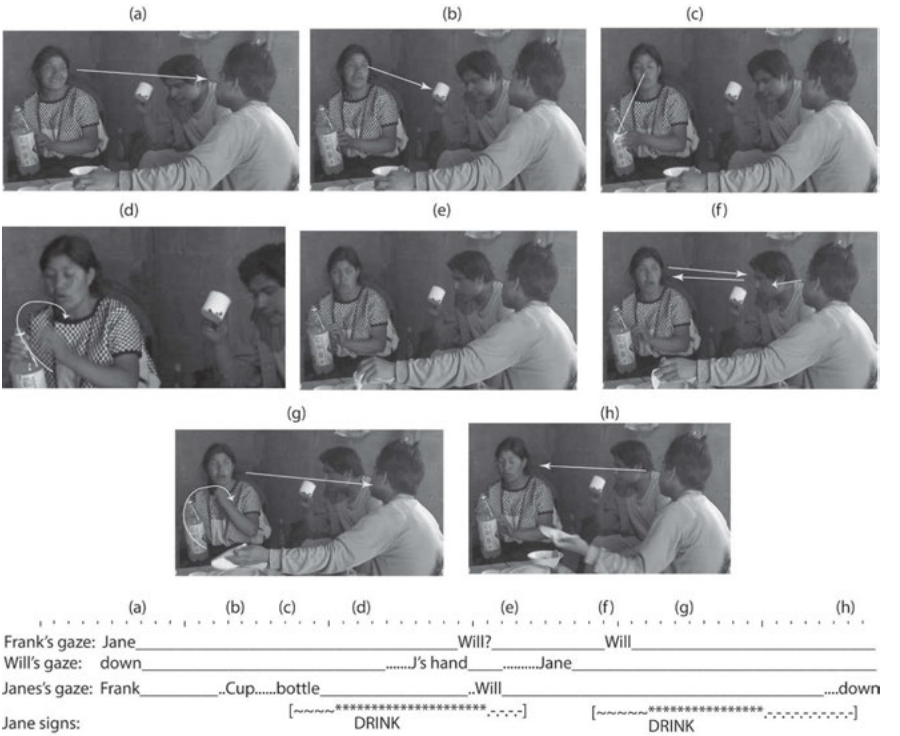


Figure 15: Jane to Frank: "Will is taking too long to drink." (Timeline graduated in frames.)

Figure 15 also makes apparent several other features related to the discussion above about signed turns. In this diagram, manually signed phrases are subdivided into a preparatory movement, a main stroke, and a retraction or dissolution of the sign, to allow close inspection of the timing of movements. The diagram also allows the reader to calibrate such signed elements with changes in gaze. For example, precisely at the moment (e) after Jane finishes the stroke of the somewhat dismissive reduced hand toss glossed as "drink" she also starts to turn her gaze to Will, who in turn appears to have noticed her signing hand and then to move his gaze up to her face. Although it is somewhat unclear on the video, Frank also appears at that same point to turn his gaze from Jane to Will himself, as if to anticipate or perhaps to invite some reaction from Will to Jane's criticism. Jane goes on to repeat directly to Will her pouting gripe that he is drinking his soda too slowly.

Now consider Figure 16. When Jane finishes her complaint, she seems to lower her eyes to avoid further reciprocal gaze with her brother Will (a). Will also then drops his eyes and displays a thinking face—looking into a kind of empty

or “nowhere” space (b)—as if he is trying to work out why she is aiming such displeasure at him. He then turns to look at his brother Frank (c-d) and asks him (with an interrogative frown) what it’s all about (e).

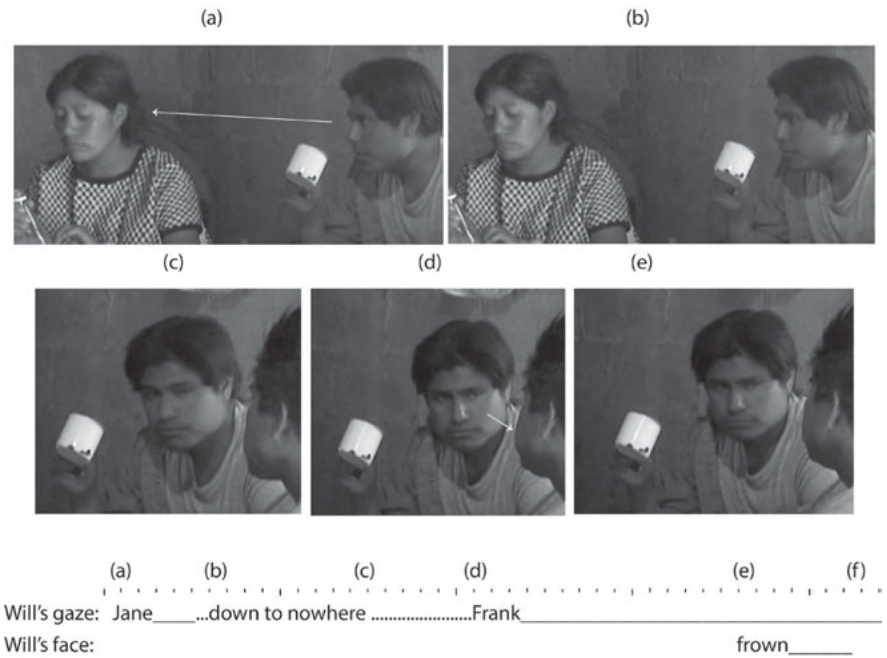


Figure 16: Will stares at nothing, trying to understand why Jane is annoyed with him, and turns to ask Frank about it. (Timeline graduated in 20ths of a second.)

With a manual sign (Figure 17 a-c) Frank tells the frowning Will that Jane wants him to hurry up and drink to return the cup. Will, still apparently confused, stares fixedly at Jane (d). To elaborate further Frank touches Will’s arm (e) to get his attention back (f).

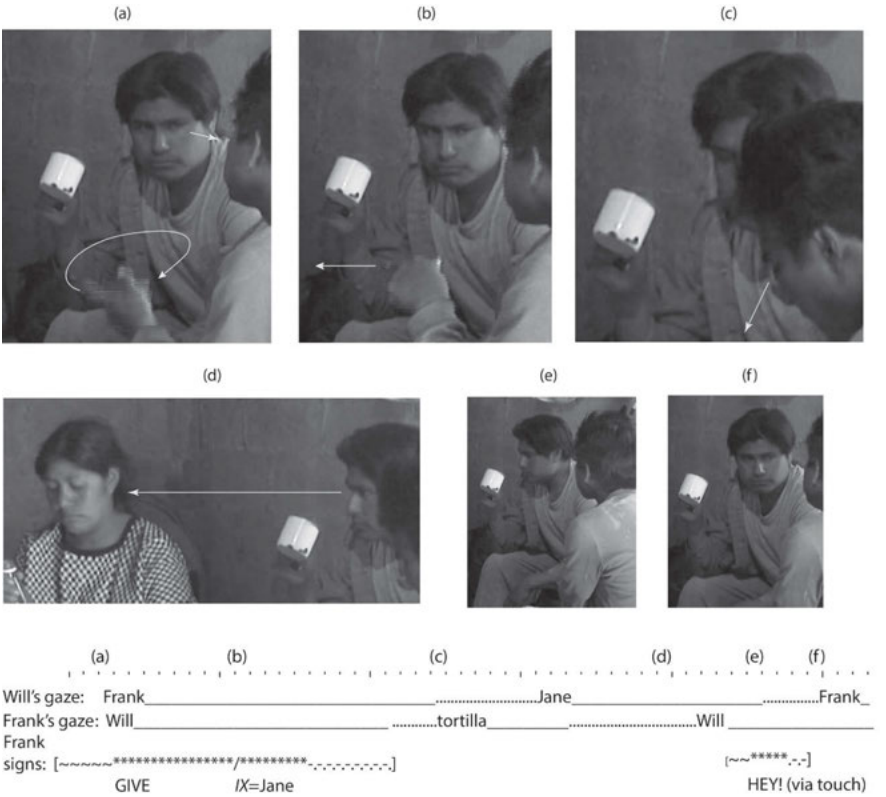


Figure 17: Frank signing to Will, "She wants you to drink up." (Timeline graduated in 20ths of a second.)

After he returns his attention to his brother, Will stares at Frank's signing hand (Figure 18 a). Frank signs that Jane wants Will to give her back the cup immediately so she can serve the others (b). Jane watches the end of Frank's explanation (c-d), still with an accusatory expression and a tentative gaze at Will (e). For his part, given Frank's explanation, Will seems momentarily to consider what to do, staring into space again for about 1 second (Figure 18 e).

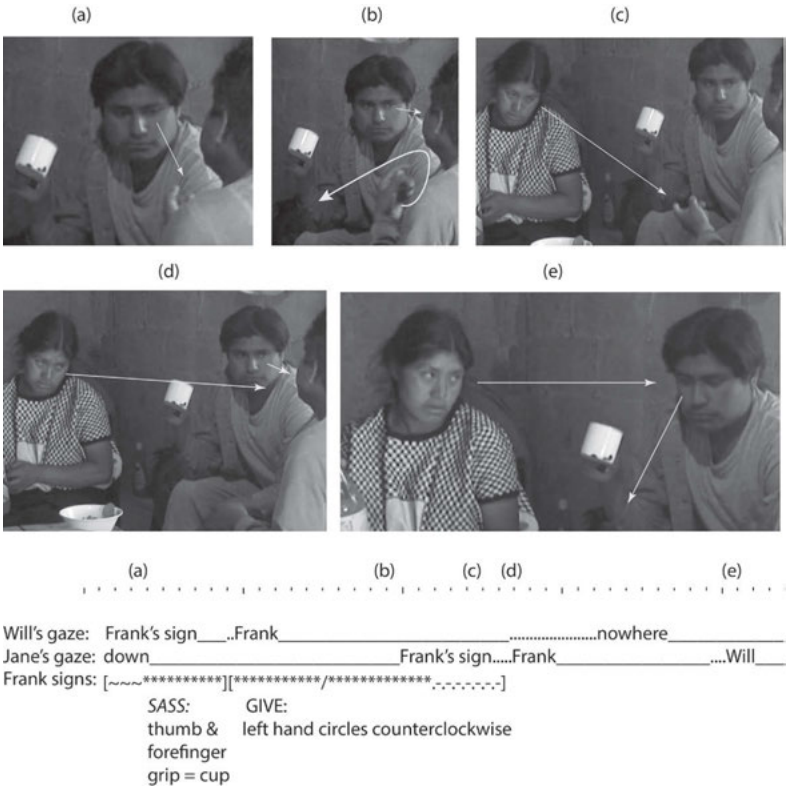


Figure 18: Frank explains a 2nd time that Jane wants his cup immediately, and Frank takes this information in. (Timeline graduated in 20ths of a second.)

Finally, brother and sister meet each other's gazes (Figure 19 a-b). Somewhat grudgingly (taking almost two seconds to do it), and with a faint derisive grin growing on his face, Will places his cup quite deliberately on the table in front of Jane, fixing his eyes on her the whole time (c-e). With a full pout Jane looks down (f) and begins to refill the cup with soda to serve her other guests.

As shown in Figure 20, taking his hand from the cup, Will turns back to Frank (a) to launch the final, evaluative coda to the whole short interaction. Frank meets his gaze (b), and Will leans back in his chair with a broad smile and an exaggerated shrug (c) while pointing at Jane (d). Terry glossed this as: *vi x`elan tzpas le`e* (roughly: "look how ridiculously she behaves!"). He finishes his remark (joking with Frank as Jane, glancing up at him, tries hard not to break into a smile herself [e-f]) by pounding several times on his right knee with a clenched fist (f-g), i.e., "I should hit her."

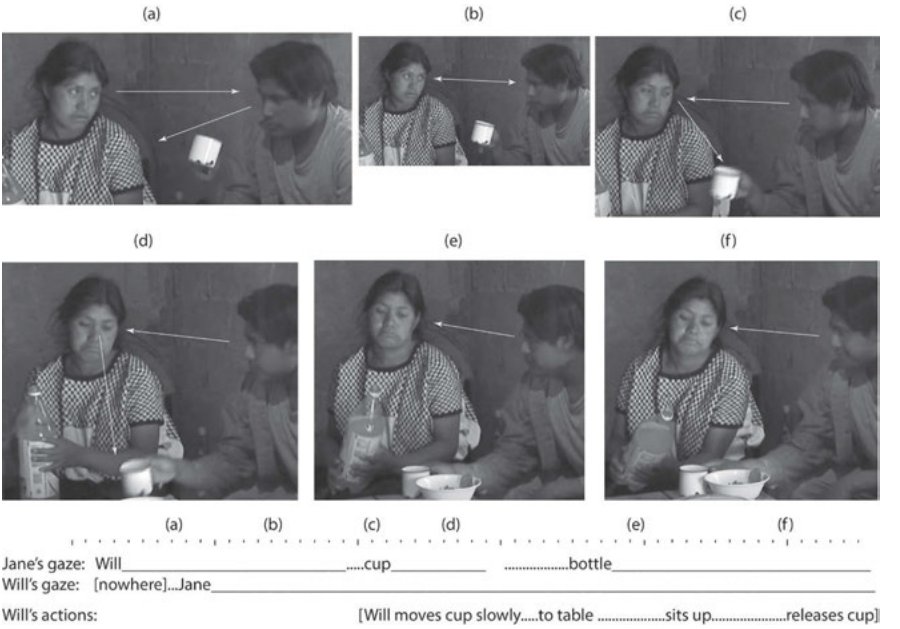


Figure 19: Will slowly returns the cup to Jane. (Timeline graduated in 20ths of a second.)

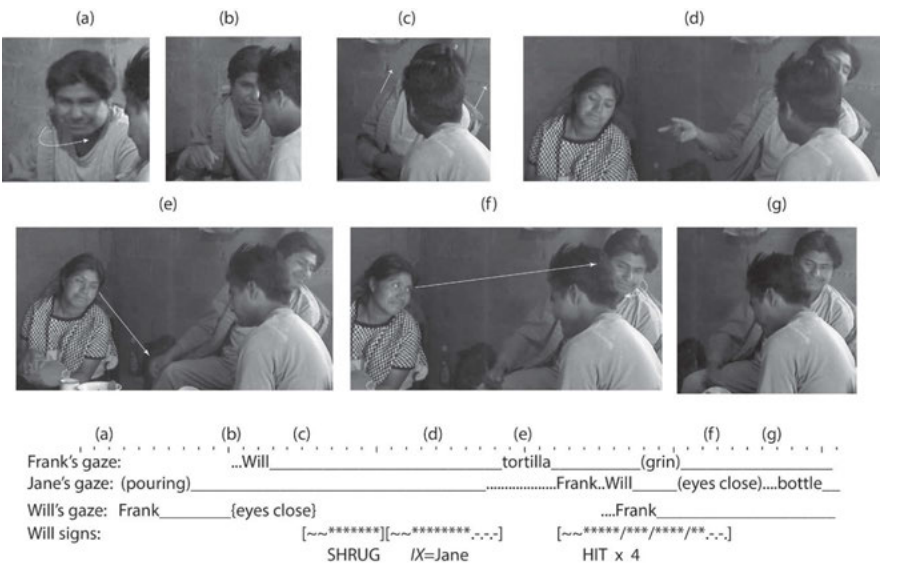


Figure 20: Will to Frank: "She's ridiculous! I should hit her!" (Timeline in 10ths of a second.)

Recall Terry's remark that the Z signers sometimes, for privacy, "sign only with their faces." From the perspective of the overall interaction in the house on that day—my visit and negotiation with the signers' father about a possible long term research project—the tiny scuffle over the soft drink cup was a mere side sequence, not meant for anyone but the three siblings themselves. The multifold deployment of gaze for communicative purposes in such a muted, private context offers a clue to how the eyes can perform multiple (and sometimes deliberately hidden or muted) kinds of work in a new language like Z, adding considerable interactive communicative richness and subtlety to an otherwise undemonstrative exchange. Facial expressivity coupled with visible indexicality (how all the interactants "point" with their eyes, among other articulators) and the manipulation of attention via swift glances permit a complex interaction with a limited (although crucial) set of communicative tools, and with only sporadic recourse to conventionalized manual signs (for example, 'drink') or other embodied emblems (a "pout," a "shrug," and a "frown").

This short Z interaction helps populate a catalogue of potential linguistic uses of the eyes, starting with ordinary reference, first to entities in the world (things, and locations, such as the cup, the soda bottle, the table). These are entities in Jakobson's (1957) E^n, the "narrated event"[11] including narrated participants (P^n) when these entities are co-present or otherwise indexically available to be glanced at in the speech situation. The rapid play of Jane's eyes (in Figure 14 and Figure 15) illustrates how gaze can serve as an efficient and delicate demonstrative.

Gaze also functions demonstratively in Jakobson's "speech event" E^s, although here reference is frequently metalinguistic, as when the eyes (of both signers and recipients) can focus on the signing hand itself (see Figure 18), a device frequently used by Z signers both to initiate signed interaction by calling their interlocutor's visible attention to the relevant articulators and otherwise to focus on specific features of the hand's configuration and position.

More familiar from spoken conversation is the metapragmatic power of gaze to regiment address and recipiency. This also may be part of the domain of reference in E^s—specifically P^s, the "participants in the speech event." For signers, gaze can be a potent addressee selection device, a theme of direct interest as Jane begins her turn in Figure 13. Unable to get Will's attention tactilely when she pokes him to

11 The reader will recall that Jakobson (1957: 3) proposes this notation to represent "two basic distinctions", viz., "1) speech itself (^{s}), and its topic, the narrated matter (^{n}); 2) the event itself (E), and any of its participants (P), whether "performer" or "undergoer"."

no avail (Figure 13 d),[12] Jane selects Frank as the recipient of her complaint about Will's slow drinking by fixing her gaze upon him until he reciprocates (Figure 14 d). Thus arises one of the points of friction in this conversation—one of the ways that her behavior can be characterized subsequently by Will as "ridiculous"—since Jane voices her displeasure with Will to a third party rather than directly to him. In fact, her indirection with Will is evident elsewhere in how she uses her eyes: dealing him sidelong, if accusatory glances (for example at Figure 15 f); or steadfastly avoiding Will's gaze while he gazes at her (Figure 16), instead substituting an injured pout for reciprocal regard. Similarly, Will asks Frank to explain what's bothering Jane by fixing his brother with a stare and adding an interrogative eyebrow wrinkle (Figure 16 e). For interlocutors, returning proffered gaze is a normal way of accepting recipiency; avoiding such mutual gaze (see Jane in Figure 16 or Figure 17) or withdrawing[13] it (Figure 19 d) are effective ways of declining or terminating engagement, or, as in Goffman's "civil inattention" (1977), of altering its character.

One last device, introduced briefly in this little conversational example, is what I have been calling a "gaze to nowhere": a kind of fixed stare whose presumed target (if any) is indexically non-available in the contextual surround. As mentioned, Engberg-Pedersen (2015) considers "signers' looking away in no particular direction at a major syntactic break or when they hesitate" to be one way in which signers convey via gaze what she calls "sender or narrator" perspective—i.e., representing themselves explicitly as sending a message rather than as, say, representing the point of view of a narrative protagonist, P^n, a character in a narrated scene. Sometimes in the examples we have seen, such a "nowhere" gaze seems merely to be a way of conveying that one is, as it were, absent or "lost in thought" (see, for example, Will at Figure 16 b or Figure 19 a). At other times, the nowhere gaze looks *outside* the present moment and circumstances but seems, nonetheless, to be fixed upon a virtual something. This device can invoke a narrated context E^n explicitly de-coupled from the speech

12 As mentioned in the accompanying sociolinguistic sketch, Jane is often ignored by her siblings, part of the miniature sociopolitics of talk in this tiny speech/sign community, if not more widely in Zinacantán gender relationships (see Haviland 2013b, 2016). There are social tensions, humor, and also mutual affection displayed in this scene, in the alignment of the boys against their sister, and the naked (if brotherly) ridicule that characterizes Will's reaction to her sister's behavior.

13 See Goico (2011) for the apparently strategic use of gaze withdrawal by a single deaf student in an inclusion classroom in Peru, a way to cut off interactions in which she no longer wishes to participate. For a possibly related phenomenon, linked to repair, see Manrique and Enfield (2015).

event E^s: imagined or remembered circumstances taking place in another place or time, but into whose space one can still appear to gaze. This may be part of what Will wants to accomplish by looking away from his sister, directing his gaze out of the local scenario, to mitigate the expressed threat of his pounding fist in Figure 20 e—he would like to hit her in some imagined time or place perhaps (but he won't actually do it in the here and now). These issues will reappear in the discussion below.

2.2 Gaze, reference, and turn coordination

To recapitulate, I have suggested that Z conversational structure builds on a series of coordinating devices, present in non-linguistic interaction as well as in talk (spoken or signed), especially indexical uses of pointing and gaze. In the soda-serving scene, gaze functions as a referring device, individuating such referents as bottle, cup, and co-present individuals (in the "narrated event space"), as well as interlocutors (in the "space of the speech event") both sought and rejected. Turn alternation arises in part from patterns of alternating attention in the interaction.

The next, more elaborate, example comes from spontaneous conversation preceding an eliciting session in 2015. The conversational interchange is organized in ways more familiar from spoken languages, and it further emphasizes the plurifunctionality of the eyes and face in structuring linguistic interaction in Z. Here the signers gaze directly at signing hands, use the eyes as depicting devices, and the face as a vehicle not only for affective but epistemic stance. The point of the example is to show how gaze is central to the entire interactional organization.

To fill out the readers' understanding of what is at stake in this brief interaction, let me offer a quick summary of the signed conversation and its context. On the day in question, I was busy with Vic, by then 8 years old, preparing cartoon stimuli on a computer screen for him to narrate to the adult signers, who were sitting around a table waiting for the elicitation session. They were anticipating being bored by both the wait and the elicitation session itself, which we were holding in an unusual place they had not visited before: a room in small house in the Spanish-speaking mestizo town not far from their home village. They were amusing themselves as best they could by looking around the house, and as the video began (Figure 21) Frank was surveying the kitchen area.

As illustrated in Figure 22, Frank began the signed conversation by asking Terry whether a certain stuff (a) was edible (b) or not (c). He then located the stuff in question by gazing at it with a little head flick upward (d).

Figure 21: The deaf siblings look around the anthropologist's kitchen.

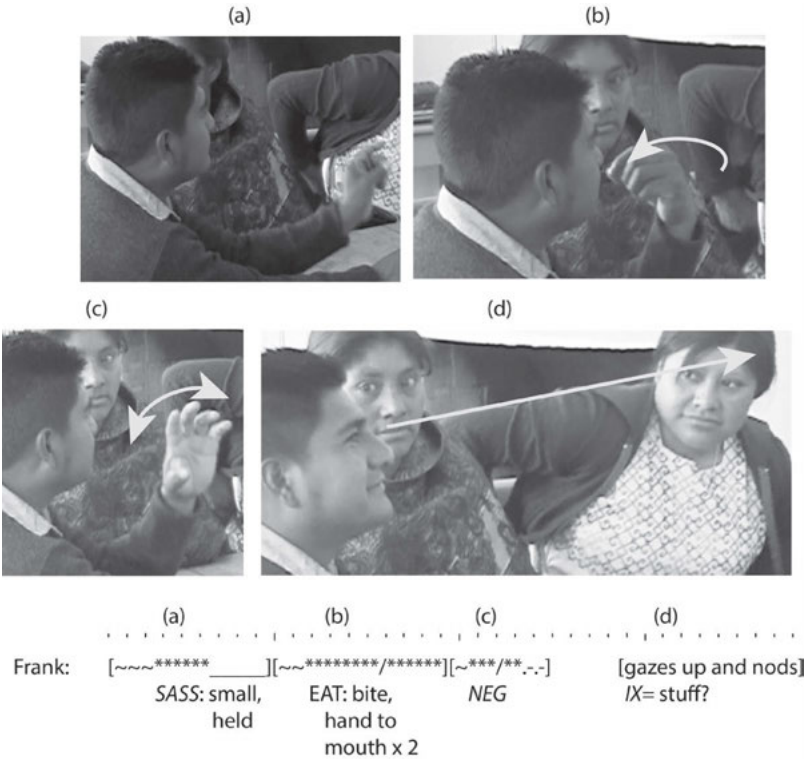


Figure 22: Frank signs "Is that thing stuff up there edible, or not, do you think?" (Timeline graduated in 10ths of a second.)

Jane immediately replied that she thought the stuff was not edible, although her disparaging remark (conveyed by both a negative head shake and a somewhat disgusted facial expression—Figure 23 a) went without uptake.

Figure 23: Jane replies to Frank negatively.

Terry decided to share her insider information about the food in question, which the signers could see and smell from where it sat in a glass bowl atop my refrigerator. She got Frank's attention by reaching out to touch him on the wrist (Figure 24 a). She informed him that I had told her the food was made from small beans. This she accomplished through a sequence of signs. She referred to the mysterious food at the beginning of her utterance by both gazing and pointing at something on my kitchen counter (to her left—see again Figure 24 b). Then she signed "small" with a size and shape specifier (SASS) illustrating how one would grip such an item with thumb and forefinger (c). "Size-shape specifiers" are frequently motivated in Z by an iconic principle of indicating the size and shape (and sometimes the heft)[14] of a referent by demonstrating how human beings characteristically engage manually with a particular object (see Safar and Petatillo Chan, this volume).

14 For example, by muscle tension—or its lack—and even by facial expression miming effort or ease.

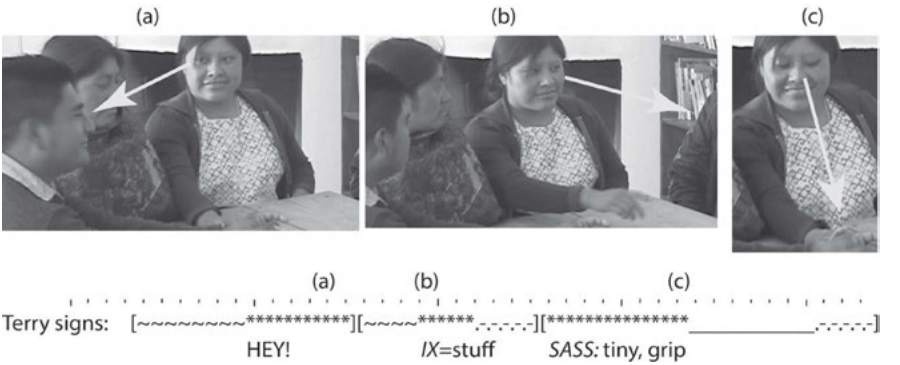


Figure 24: Terry starts to tell Frank about the stuff. (Timeline graduated in 15ths of a second.)

A Z SASS is frequently followed by a "characterizing" element to clarify what sort of entity so sized and shaped the signer intends to denote. As can be seen in Figure 25, following the "small" SASS (a), Terry's characterizing sign for "bean" was based on the action pattern that Zinacantecs use for cleaning beans, namely sifting them back and forth between cupped hands while blowing on them to remove pebbles and other debris (b). She ended the turn by bringing her palms together (c) and tilting them forward in a deictic reference to me (JBH), sitting in front of her across the table (d).

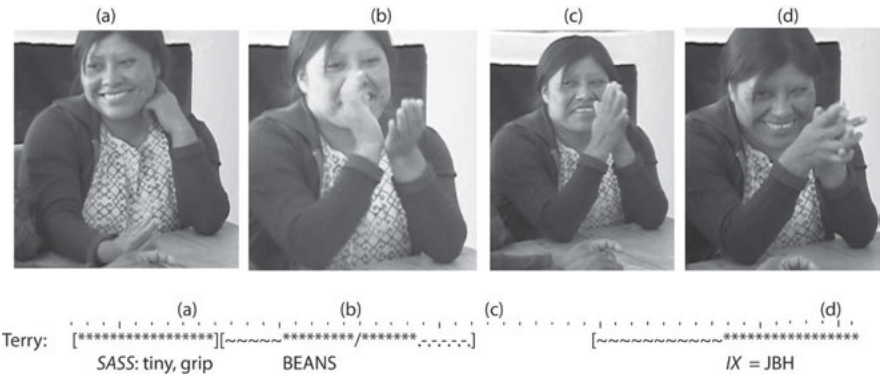


Figure 25: Terry: "JBH says it's little beans" (Timeline graduated in 15ths of a second.)

When Frank did not respond, Terry immediately elaborated, telling Frank that what she had just said was not quite right: the food was not really made of beans (Figure 26).

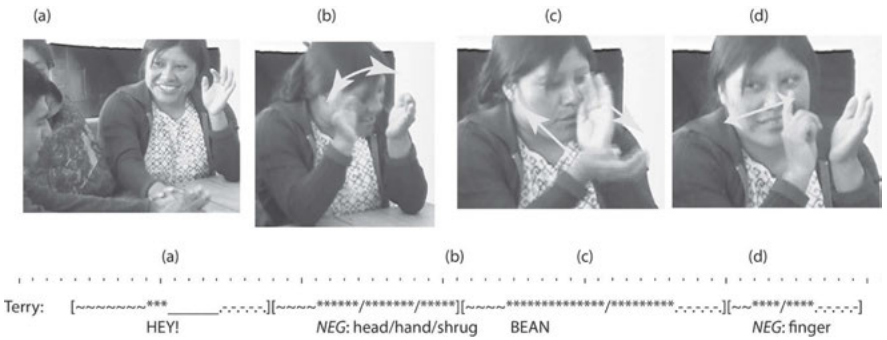


Figure 26: Terry: "Hey, it's not beans." (Timeline graduated in 20ths of a second.)

Instead, it was made of something that, according to me (Figure 27 a), was small like a bean (b). However, it was not that (c) but rather another unknown entity (d).

So, Terry continued, that "stuff" (Figure 28 c, e) was made from an unknown bean-like thing (Figure 28 b-c) with a strong smell (d).

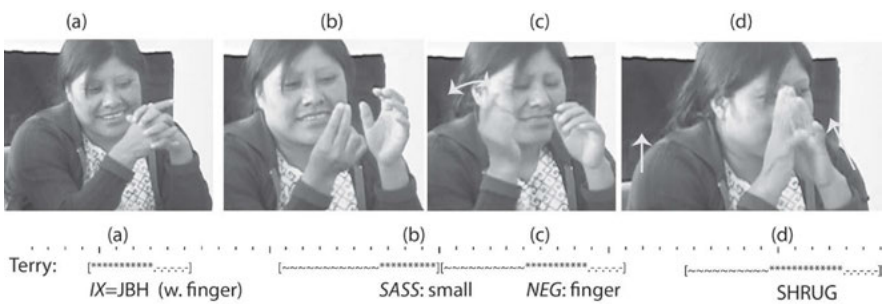


Figure 27: Terry: "He says it's something else small, not sure what" (Timeline graduated in 20ths of a second.)

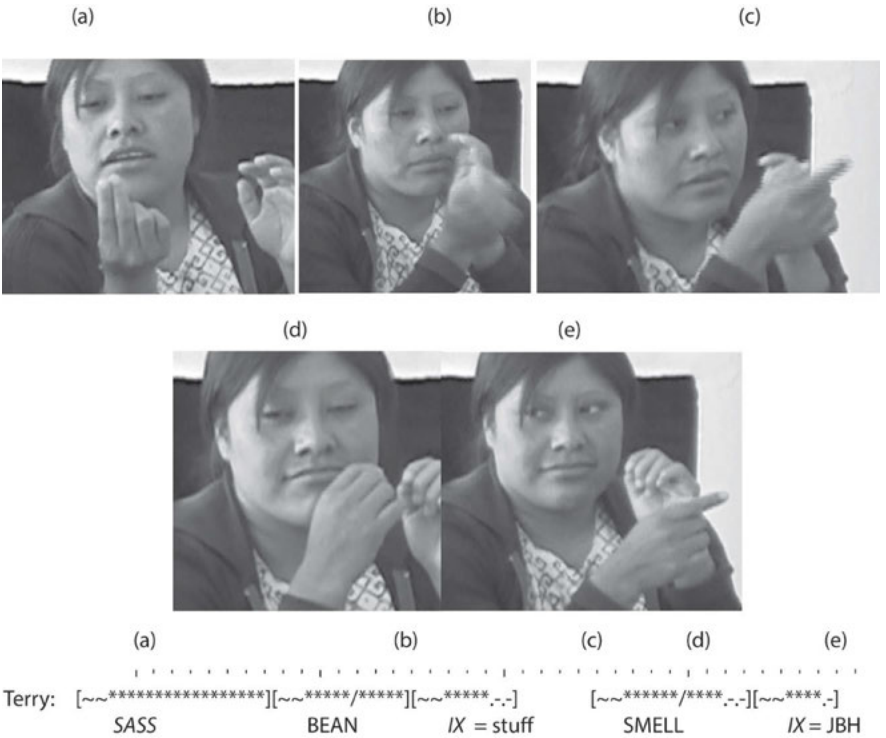


Figure 28: Terry: "There: a small kind of bean, with a malodorous substance" (Timeline graduated in 10ths of a second.)

The smell is from something like an onion (Figure 29 a-b) but unlike an onion (c), of a smaller size (d) although equally smelly (e)—that is, a piece of garlic .

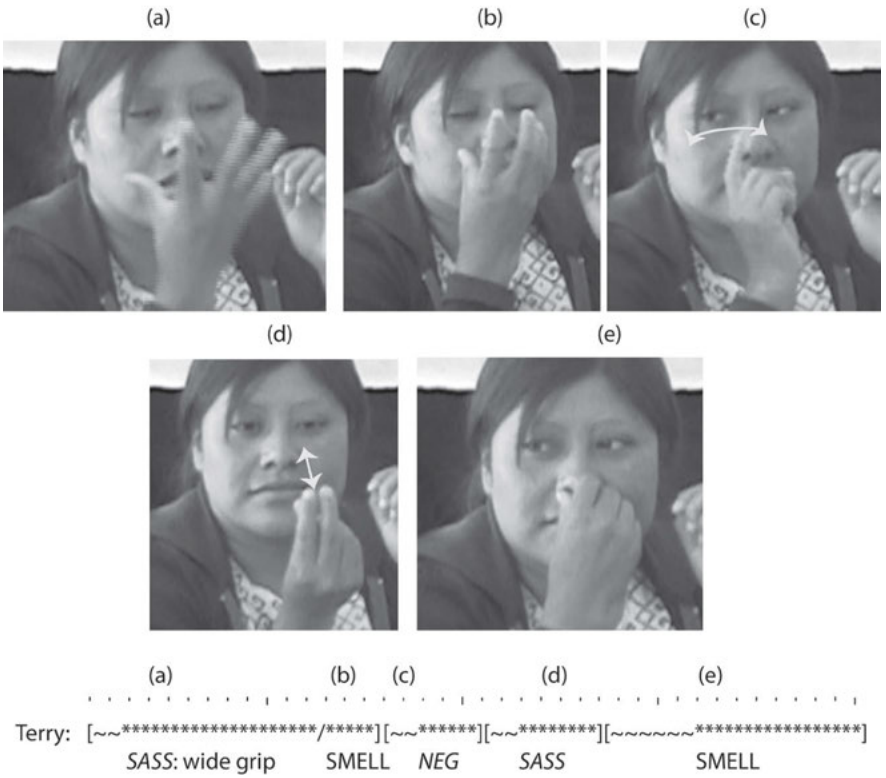


Figure 29: Terry: "He says it's not a regular sized onion, but a smaller onion-like thing." (Timeline graduated in 15ths of a second.)

And, she concludes, that is what was put into the strange foodstuff, accounting for its odor (Figure 30).

The full story will not surprise those readers versed in the niceties of ethnographic fieldwork. My "exotic" food, the thought of which so disgusted poor Jane, was hummus, made from chickpeas ("little beans"), and perfumed with garlic, considered by Zinacantecs as more a cure for witchcraft than a vegan delicacy. In fact, when we had entered the house earlier that morning, I had tried to explain away the strong garlic smell in the kitchen by telling Terry, in Tzotzil, how hummus is made and what it contains. She was passing that information along to the others.

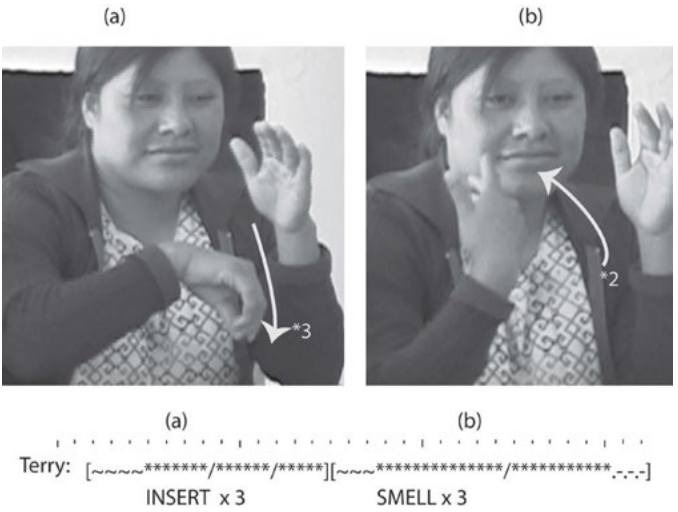


Figure 30: Terry: "He put that in, and that's where the smell comes from." (Timeline graduated in 15ths of a second.)

This initial account of the short conversation about my food concentrates on its explicitly signed referential content, in particular that expressed by the signers' hands. However, what originally drew my attention to this tiny signed interaction was not the signing, since I was attending to other things at the time, but rather "the play of gaze."

Later that same day, when we had finished the eliciting session, I remembered that something in Terry's signing had caught my attention while I was setting up the computer. Looking through the video recording I discovered that it involved what might be called "bystander" gaze—my gaze, as a non-ratified participant in the developing conversation between the signers. Terry had started to sign to Frank and the others, but when I looked up at her from my computer screen my gaze seemed to throw her off.

Here are relevant parts of the clip, shown now with synchronized split screen images from a second video camera showing my face superimposed over the lower right hand corner of the image. As we saw above (Figure 24), after Frank's initial turn (which I appear not to have noticed at all in the moment) Terry turned her gaze to him and reached out to touch his arm: "Hey!" As can be seen in Figure 31, which diagrams the play of our gazes in addition to Terry's signing, at that point I was still concentrating on the computer screen in front of me (a-b), although both Jane and Frank turned to look at Terry as she gazed and pointed at something related to the strange food—perhaps the raw chickpeas sitting on my kitchen counter across the table from her (b). Terry then switched her gaze to

me (referred to as JBH on Terry's "gaze line" in Figure 31, see frame c), perhaps checking to see whether I was paying any attention to her. When she performed the pointing movement I had still been fully engrossed in my computer screen. However, at (d), perhaps noticing her outstretched finger (which Will seemed to glance at as well, turning his gaze to Terry's face almost simultaneously with me), I glanced up and our gazes met fleetingly as I caught her in mid-utterance. At that point she immediately began to drop her eyes towards her own signing hand, a process completed by (e).

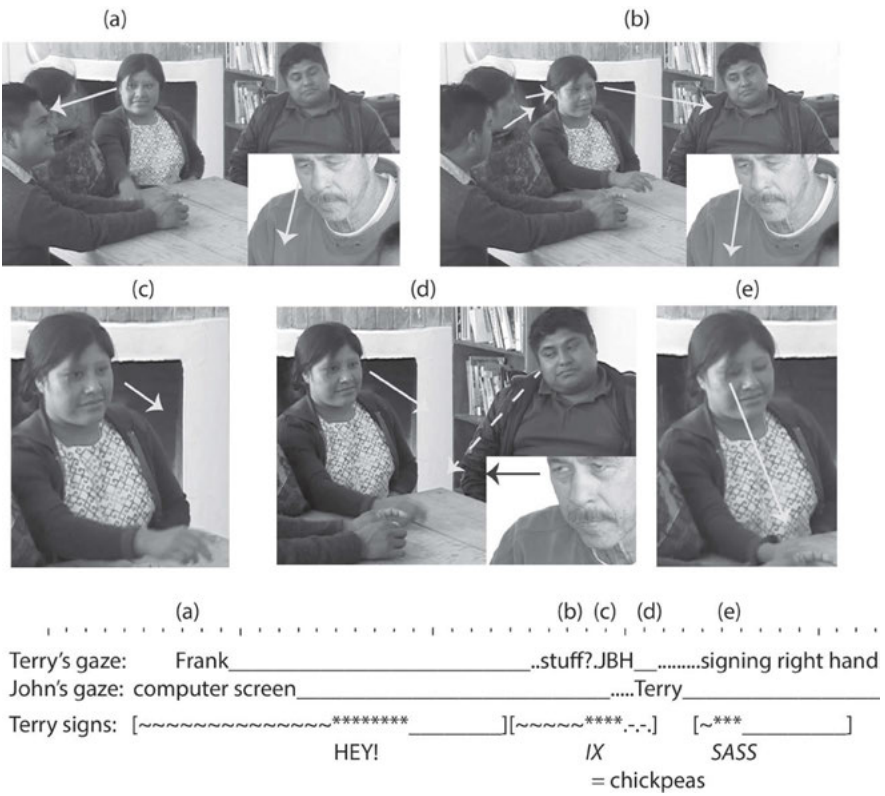


Figure 31: When I catch Terry signing, she seems to drop her gaze. (Timeline graduated in 15ths of a second.)

The exact movements of Terry's eyes can be seen somewhat more clearly in Figure 32, where the quick changes of gaze can best be appreciated from the numbers (in the format sec.msec) of the video frames. First Terry gazes at the malodorous food (a), and in the next frame her eyes move to me (b). One tenth of a second later, my eyes meet hers (c), and within another two tenths of a second

her gaze has dropped (d). The whole sequence illustrated takes only one third of a second to complete.

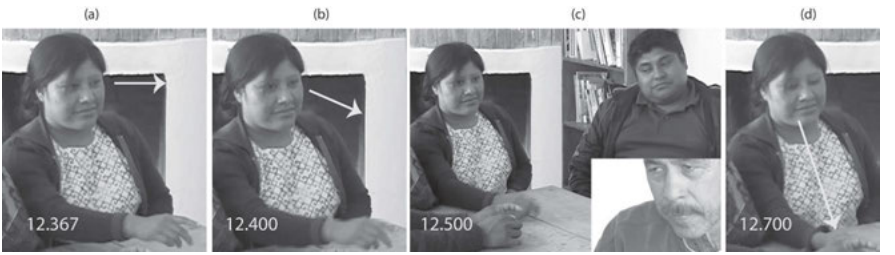


Figure 32: Detail of Terry's gaze when I look up at her.

Terry appeared to be somewhat disconcerted by my catching her signing, and she moved into a notably minimal signing mode, in which her movements were small and occupied a limited space, slightly visually obscured at least from me (Figure 33). While I continued to watch her, she gazed at her own lowered right hand as she signed a small two-fingered gripping SASS (a) to denote a small object that can be so held, first holding it very low against the table (b), and then lifting it slightly more into view (c) as she trained her gaze on Frank. With a somewhat abashed grin, perhaps because she was aware that I was still watching her, she performed a highly stylized version of the conventional sign for "beans"[15] (d) before returning to a rest position (e) with her two palms together in front of her face (again, slightly obscuring my continued view).

15 Whereas her version here is brief and truncated, the more fulsome versions of this sign, seen above in Figures 25 and 26, involves alternating motions between the two hands and simultaneous miming with the mouth the process of blowing on the beans to remove extraneous bits of vegetation and rubbish.

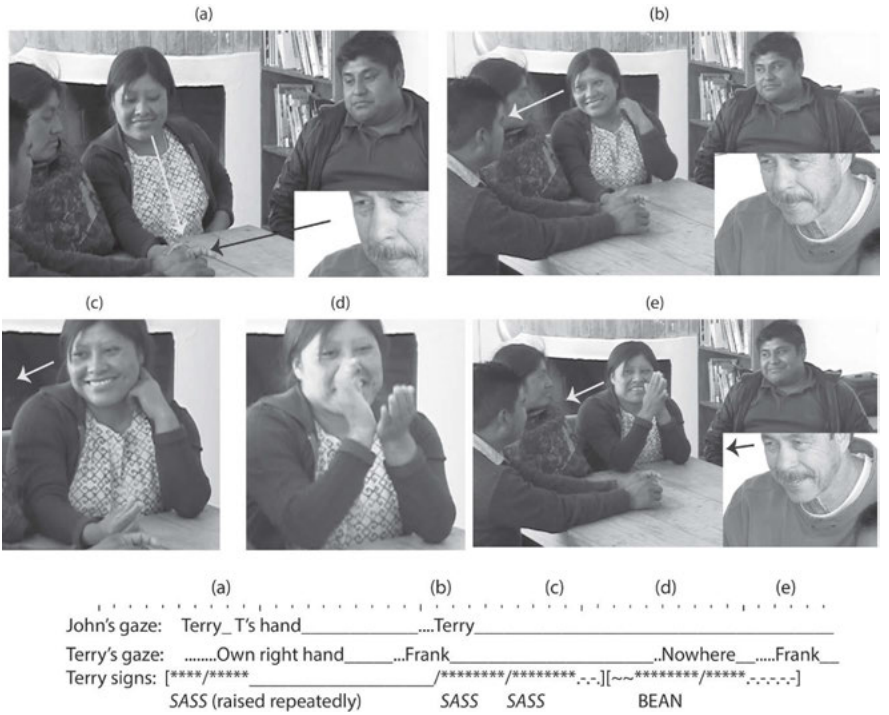


Figure 33: Terry signs, in minimal form, "small" and "beans" as JBH watches. (Timeline graduated in 15ths of a second.)

At this point in her utterance Terry apparently wanted to point at me, by way of saying "according to John"—what she had evidently started out to sign earlier with a finger point when she caught me watching her (between frames c and d on Figure 31). While I continued to gaze at her, Terry grinned at Frank (see Figure 34 a), folding her hands in front of her face. Then she merely shot me a quick glance, her eyes obscured from me both by her deliberate squint and by her folded hands whose fingers were slightly extended to allow a half secretive pointing gesture (b). That she succeeded in referring to me may be confirmed by the fact that Will started to turn his gaze to me as well (d). I, on the other hand, after meeting her Terry's gaze (a-b)—and, I think, reluctant to continue to interrupt her apparent signing about me—dropped my eyes (c) ostensibly to return my attention to my computer screen. Apparently freed from my constraining scrutiny, Terry now overtly pointed in my direction to complete her utterance (e)—readable in full as "According to John it is small beans"—and folded her hands to conclude (f).

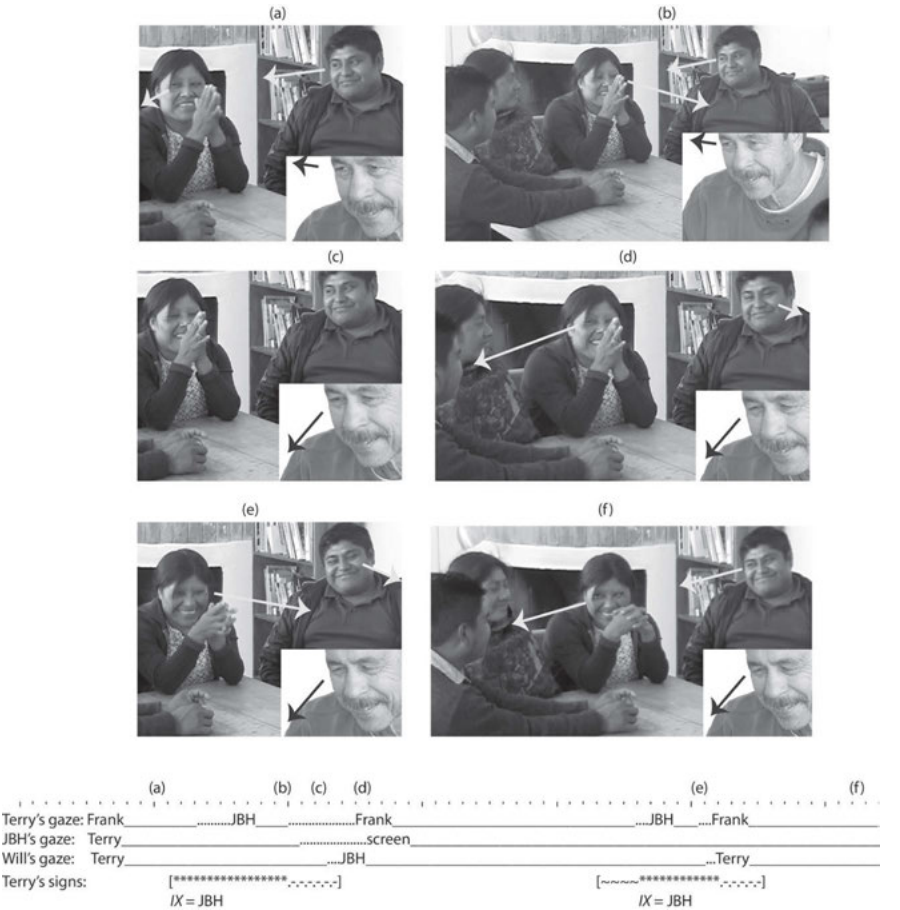


Figure 34: Terry glances in a clandestine way at me, and then points overtly. (Timeline graduated in frames.)

That a signer's utterance is in part a product of who is looking at her should, of course, be no surprise if we think about commonplace alternations in linguistic structure that reflect the identities of interactants: register-like choices of lexicon and syntax, pronominal alternations, use of names, nicknames, and other vehicles of person reference, and, indeed, alternations between entire languages, or different constraints on who is expected or allowed to speak at all, as in co-tellings and re-tellings. All of these are familiar indices of the identities and statuses of interlocutors (and, indeed, even of possible referents) in the linguistic anthropological literature. As Goffman (1974) pointed out, the currently perceivable social world in which co-present individuals are positioned to monitor one another, partly via gaze, continually imposes constraints on actions

by co-present individuals; and these constraints may extend to the structure of utterances—a special kind of actions. Talk (or signing), like all collaborative action, responds to the mutual attention of the participants, and, in turn, it reorganizes and directs this attention as a primary resource for communication, especially since gaze, attention, and 'reference' in an maximally general sense are inextricably linked.

Finally, it remains to demonstrate that patterns of gaze and patterns of turn-taking in this extremely young sign language are closely interrelated and, perhaps, mutually constitutive. Consider further details of mutual or directed gaze in just the first few interactions between the ratified participants in this example. How is the topic of my hummus raised, and by whom? Here again is the very first part of the sequence, now marked up to diagram the patterns of mutual gaze among the interlocutors. I call the reader's attention to the choreography of gaze "turns," its apparent contribution to the progress of the conversational interaction, and the constitution of its universe of discourse referents.

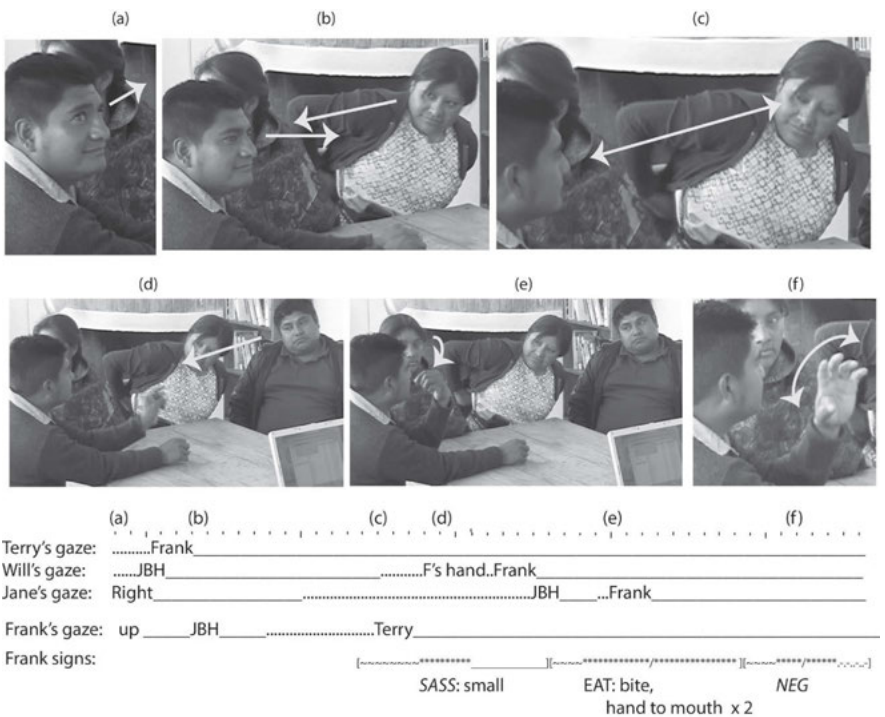


Figure 35: Frank and Terry initiate an exchange of gaze, and Franks asks whether the strange stuff is edible or not, also attracting the attention of both Will and Jane. (Timeline graduated in 20ths of a second.)

As shown in Figure 35, at the start of the scene Frank was surveying things in my kitchen (a). Noticing his gaze, Terry glanced in Frank's direction (b). Frank went on to gaze at Terry, and having established mutual gaze (c), he began to sign to her, attracting Will's (seemingly very bored) attention at the same time (d). Frank here started to produce the size-shape specifier with gripping fingers to denote the foodstuff he had been looking at. By the time he signed 'EAT' to ask whether the stuff was edible (e), he had the visual attention of all three of his interlocutors, including Jane who had been previously disengaged from the interaction. Frank maintained the gaze of his three interlocutors as he turned his utterance into a question "can you eat it or not?" by appending a negative hand wave (f).

Finally, Frank indicated his referent by shifting his gaze (see Figure 36 a), with a little upward head flick (b), to the bowl sitting atop my refrigerator. One by one (c, d, & f), the others turned to look at what he had signaled, and Frank turned back to them to wait for their responses (e).

Figure 36: Frank refers with gaze and a chin flick to his referent. One by one, Frank's interlocutors copy his gaze, and he looks to them for a response. (Timeline graduated in 100ths of a second.)

One such response was not long in coming. With a look of disgust on her face (see Figure 37 a), Jane turned to Frank (b) with a series of definitive negative head shakes (c-d): "No, you can't eat stuff like that! Yuck!" The others appeared to pay

her no attention,[16] however, since none of them gazed in her direction at all, nor reacted to her seemingly definitive opinion.

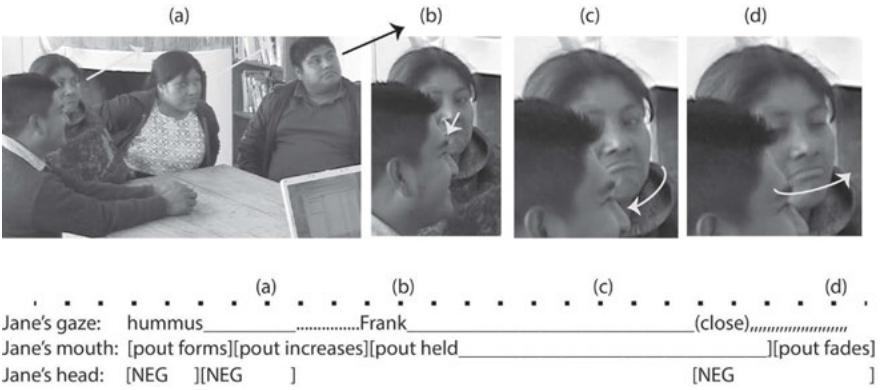


Figure 37: Frank receives a response from Jane. (Timeline graduated in 100ths of a second.)

For the next 8 or 9 seconds the signers continued to gaze at the objects on top of my refrigerator, with Terry and Frank occasionally looking at each other, and Jane apparently trying to figure out what would happen next (see Figure 38). It was clear that there was more to be said, and the signers—especially Frank and Terry, who were visually engaged with each other—seemed to be thinking about who might say it.

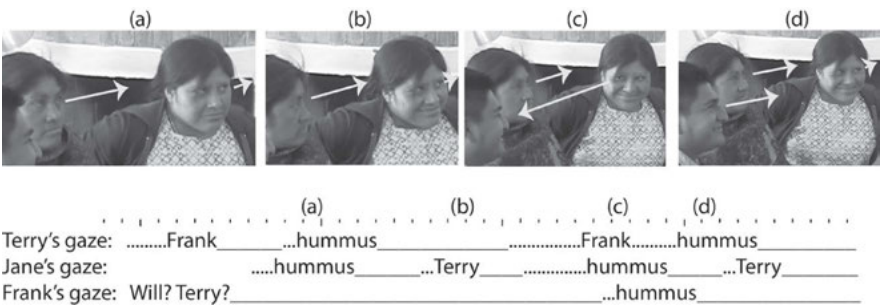


Figure 38: Knowing glances are exchanged between Terry and Frank, interspersed with more looking at the object in question. (Timeline graduated in 10ths of a second.)

16 See footnote 3 above.

It was at this point that Terry began the utterance which was interrupted by my looking up at the signers. We have already seen (in Figures 31 and 32 above) how my gaze seemed to disrupt or alter Terry's signing in this segment. Here I concentrate on the play of gaze in the resulting overall turn structure. When she made up her mind to answer Frank's question about whether or not the smelly hummus was meant to eat, Terry gazed fixedly at Frank (see Figure 39). Then, still staring at Frank, she directed a manual "Hey!" sign at him, which attracted Jane's gaze (a). Terry then physically touched Frank's wrist to signal her desire to begin a signed turn, and Frank started to turn to reciprocate her gaze (b). Note that at the same time Jane also gazed at Terry's hand touching Frank. When Terry raised a rapid pointing finger to indicate the offending foodstuff (c), Jane was by then watching her face, and Will, too, had noticed her pointing hand. Immediately thereafter, Terry was nonplussed to gaze at me (d) and notice that I was now also looking at her (e). She quickly dropped her eyes (f), effectively delaying for three seconds any further signing. By this time the other interactants, judging from the fact that she had attracted all their gazes, seemed to be watching her expectantly.

It was in the next segment that Terry seemed to be most acutely aware of my watching her as she signed, resorting to a variety of "whispering" techniques—reduced or small signs, in a limited signing space, and performing a distracting "self grooming" movement (touching her neck and hair)—as she articulated a tiny SASS with a small gripping handshape (see Figure 40). The SASS was partially obscured from my view by being performed behind Frank's arms, but it was clearly visible to the other signers, all of whom looked first at her hand (a), and then at her face (b-c). Will alternated his visual attention between Terry and Frank, apparently checking the latter's comprehension or anticipating a response from him as Terry signed (b-e). Terry's gaze moved from her signing hand (a), to Frank (b-c), and then to a kind of imaginary or empty space where she seemed to be gazing at nothing actually in the present surround as she performed the depictive sign for cleaning beans (e). This is another example of an unanchored "gaze to nowhere" [17] because it seems formally to evoke or index a non-present imagined scene not to be found anywhere in the narrating space. Finally Terry seemed to check Frank's comprehension by gazing at him to end the scene (f).

17 I have sometimes referred to this as a "neutral space," which is not to be confused with the "neutral" signing space or "neutral zone" (see de Vos 2012) which is an area of signing space where certain discourse referents may be creatively positioned. Here, instead, I mean that the gaze seems to be directed at some imagined (or, at least, currently invisible) referent—what I elsewhere dub the "gaze to nowhere."

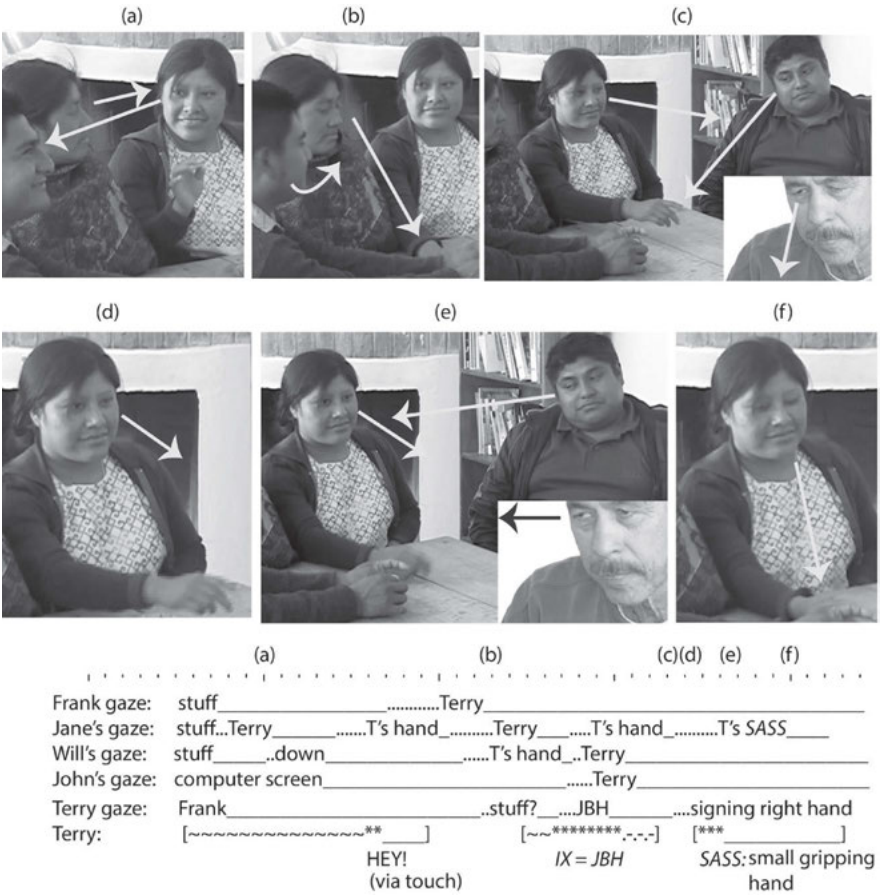


Figure 39: Terry initiates a response to Frank (disrupted by JBH gaze). (Timeline graduated in 20ths of a second.)

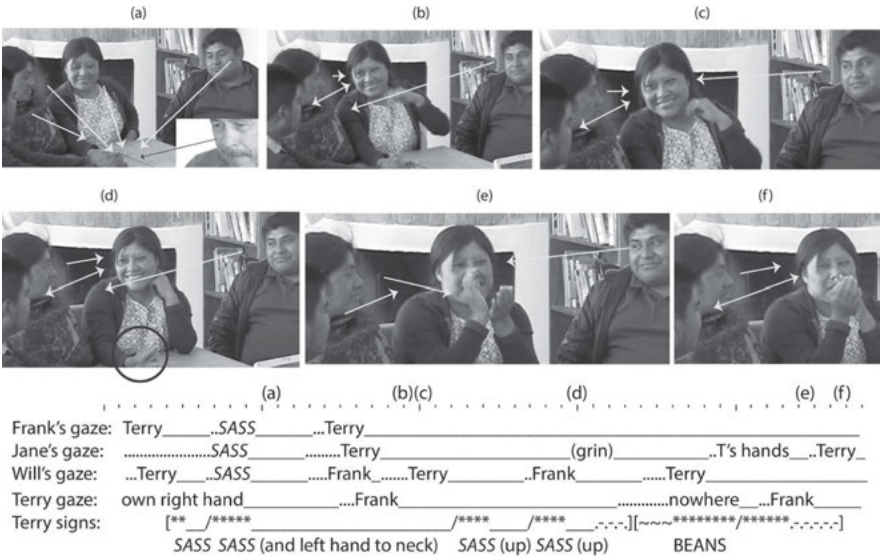


Figure 40: Terry directs her interlocutors' gazes to her hand as she forms a SASS, holds it low for about 3 seconds and then signs "beans" with a "gaze to nowhere." (Timeline graduated in 15ths of a second.)

Terry, as we saw in Figure 34 above, then seemed to want to point at me, first in a discrete way, and then more demonstratively once I finally decided (intentionally) to drop my gaze and stop intruding on her signed explanation of the "little beans." Both Jane and Will glanced at me after Terry referred to me in this somewhat secretive indexical way (see Figure 41 a). Terry turned her gaze back to Frank (b), her principal addressee in this sequence, as did the other signers, apparently waiting for him to respond to Terry's explanation that the stuff they could see (and smell) on top of my fridge was some kind of bean concoction. Frank actually dropped his gaze and showed no sign of intending to continue at this point (c).

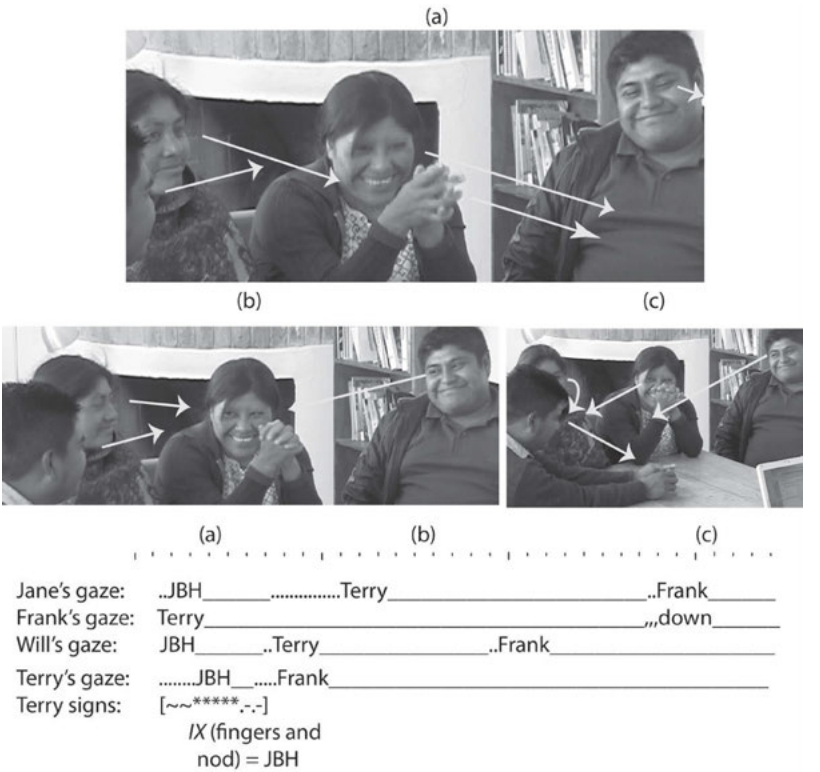


Figure 41: After Terry finishes her utterance by pointing to me, all apparently await a response from Frank, which is not forthcoming. (Timeline graduated in 15ths of a second.)

3 Discussion

I began this chapter by trying to illustrate how mutual attention, partially achieved through gaze, is crucial to organizing conjoint action in non-speech contexts in Zinacantec life. I have dissected in some detail the elaborate dance of gaze in these two sequences of Z signing to support my claim that the sorts of mutual monitoring that characterize many sorts of collaborative action, including talk, in Zinacantán (if not everywhere) are heavily employed in the organization of Z signing as well. In the examples presented we see gaze at work both in the formation of signed utterances and in their interactive synchronization and coordination.

Gaze is a basic mechanism to index referents in narrated events, as well as speech-act participants in the speech/sign situation itself. With respect to referents, gaze can also contribute (via a "gaze to nowhere") to establishing the absent status of imagined, hypothetical, or invisible referents in E^n depictions—for example, the depicted beans that an imagined ego cleans in the mimed bean-cleaning action embodied in Terry's sign in Figure 25 (b). This is, of course, the converse of the direct but also superimposed indexing of such referents, available to be directly gazed at in E^s, which must then be laminated onto E^n—for example, the immediately co-present JBH who at a different time told Terry about the exotic food on his fridge, as she now narrates the matter. Perhaps more important in these materials, is how gaze recruits and selects speech-act participants: addressees, next-speakers (and signers), or conversely non-speakers and non-recipients (those who avoid gaze to eschew participation, or who are left unaddressed, or unattended to, when they speak/sign). These extended examples of Z signing are meant to show how (inter)action can be managed in Z, and how carefully choreographed mutual (dis)attention seems to be.

As above, paralleling Jakobson's (1957) distinction between narrated events (E^n) and speech events (E^s), one can distinguish narrated spaces (within which narrated entities can, if only virtually, be gazed at) and speech-event spaces (in which, minimally, speech act participants are available to be looked at, at least in canonical cases, and perhaps most especially in sign language). That these spaces routinely overlap—because we frequently may want to narrate events or situations which coincide within the same spaces, and perhaps with the same cast of characters, as those in the current speech event—means that indeterminate indexical devices (like all Jakobsonian "shifters") including referential gaze may frequently inadequately disambiguate by form alone between such different domains of reference. For example, they may not clearly distinguish between Jakobson's P^n and P^s ("participants in the narrated event" vs. "participants in the speech event"), to cite one of the simplest cases. Moreover, gazing at or otherwise indicating a co-present interlocutor may, sometimes, specify him or her as a referent in E^n (for example, "John is the one who said that..," at Figure 34 b, followed by Will's confirmatory gaze and head nod at me in Figure 34 d). Alternatively, in E^s, it may serve to indicate an expectation that an interlocutor will take up a next turn (as Terry appears to do with Frank in Figure 35 b), or to constitute an invitation to be an addressee (as Frank seems to do with Terry before starting his turn in Figure 35 c). These latter two phenomena, which clearly link to turn management, should perhaps be added to the catalogue of typical cases of what Engberg-Pedersen (2015) calls "sender/narrator" perspective, noted above.

A more interesting case for a sign language is illustrated by the fact that signing itself may invite interlocutors' mutual gaze as a mechanism to highlight

and share aspects of a sign's denotation. As mentioned above Z signers frequently explicitly direct their gaze at their own signing hands. We saw one such moment when Terry, disconcerted by my catching her talking about me, "secretly" (or as one might gloss it, "in a whisper") formed a small SASS hand and seemed explicitly to invite her interlocutors to inspect it—which they did (Figure 40 a). It may also be that, in Z at least, gaze at one's signing hands is part of a sign's exact formation—an invitation, as it were, to inspect carefully details of a hand shape. Note, for example, that Terry regularly stares directly at her hand as she forms the SASSes associated with the chickpeas (Figure 28 a) or contrasts the size of onions with that of garlic (Figure 29 a and d). That gaze to a sign may be taken as a potential invitation to interlocutors similarly to focus their attention on gripping handshapes is clear from the fact that they do indeed sometimes shift their gaze from the signer's face (see Emmorey, Thompson, and Colvin 2009) to her hands at such moments.

The complex nature of gaze in E^s is further illustrated by two other phenomena I have described in Z. There are first the varieties of "nowhere" gaze—or perhaps more simply gaze into a neutral space—which locate the signer conceptually, as it were, in E^n through a (virtual) gaze at something or someplace demonstrably *not* in E^s. There is perhaps a link between this variety of "nowhere" and the perspectivally marked gaze that Engberg-Pedersen describes for Danish Sign Language as "imitative" gaze, one which reflects what she calls "referent" (as opposed to sender/narrator) perspective. As she puts it: "When the signer's locus represents a referent in a narrative, their gaze direction often, but not always, imitates that referent's gaze in the represented event" (Engberg-Pedersen 2015: 218). Here the match between what Engberg-Pedersen identifies and what the Z signers do is not exact. For an emerging sign language like Z which in only limited ways makes systematic use of space for grammatical purposes (see, for example, DeVos and Pfau 2015, but see also Haviland 2013a), there are only rare occasions when the direction of a protagonist's gaze indexes an arbitrarily established signing space populated by pre-established argument loci, or which a subsequent signer can then exploit (by, as it were, "quoting" it). Instead, the "nowhere" gaze of Z narrative seems to be linked with sign-formation itself: a way of showing that a depiction is organized around virtual entities nowhere to be seen in E^s. Such is Terry's gaze when performing the "bean" sign, in which she moves her hands and mouth as if sifting beans, but fixes her gaze on nothing—since no actual bean referents are meant to be evoked (for example in Figure 26 c); or, perhaps most clearly, when she signs "onion" with an onion-sized gripping hand SASS in front of a wrinkled nose, but looking nowhere, referring to no onion in particular but denoting "onions" (Figure 29, a-b). How systematic such

a potentially grammaticalized use of gaze might be in Z is an empirical question requiring further research.

Finally, to return to the central issue of this chapter—how interactive mechanisms in conjoint action in general can be recruited by an emerging sign language like Z to contribute to the structuring of turn exchanges—let me end by considering, very briefly, gaze withdrawal. One way that sign language may be expected to differ significantly from spoken language is in the relatively strong requirement, a consequence of its visual modality, that an addressee attend visually to a signer. Some of Goodwin's early (1981) research on mutual gaze in spoken conversation deals with how a speaker courts, but then abandons, mutual gaze from an addressee. However, as we have seen above (see especially Figures 23 and 37, when Jane expresses her low opinion of my hummus, but no one pays attention to her), while speech can be heard and attended to with no visual contact between interlocutors, signers depend more directly on attracting recipients' gaze. Explicitly withdrawing—or never even offering—one's gaze is thus a particularly strategic means to refuse recipiency (in some ways parallel to a naughty child's covering his or her ears so as ostentatiously not to hear scolding). Therefore, for sign addressees, gaze is central, partly for demonstrating that one is attending to what is being signed, but equally, and perhaps in a more marked way, for withdrawing attention by withdrawing gaze, even when being explicitly addressed.

Here is a tiny, somewhat exaggerated final example. In an eliciting session, Jane was meant to describe a complex video scene involving her father. But as she started, she initially appeared to forget how the scene began (see Figure 42, where the images start with a split-screen frame [a] which partly disguises the fact that Jane's brother Will, her interlocutor in the task, is actually looking directly at her). Jane's hesitation provoked a marked reaction from Will, whose job was to pick the scene Jane was describing from an array of candidate video stills. Jane looked down and scratched her head, and when she looked up to meet Will's gaze (b), he withdrew it within a third of a second (c) and literally rolled his eyes for almost 3 full seconds (c-h) until Jane remembered what she wanted to say.

Figure 42: Jane forgets what she is going to sign to Will, and Will rolls his eyes in impatience. (Timeline graduated in 20ths of a second.)

Jane then ventured a new turn-initiating "Hey!' sign, but she had to repeat the sign three times (Figure 43 a-c) before Will, with demonstrative reluctance (d), returned his gaze to her (e), breaking into a slight smile as she proceeded with her narration (f). In fact, he attended to only part of her performance, perhaps because he thought he had enough information already to identify the scene she was narrating.[18] He then turned away from her again, leaving the last part of Jane's signing stranded and apparently unobserved.

I have described elsewhere (see Haviland 2013b, 2016) some of the power imbalances in the miniature Z signing community, and the subordinate role that Jane occupies within it, despite being the oldest sibling and, in a clear sense, the originator of Z itself. Such gaze withdrawal as a sign of impatience or simple non-recipiency is, however, a frequent interactive ploy between all the signers, and it demonstrates another way in which Z depends on mutual gaze as an active signal of collaboration and coordination.

18 This is, of course, a defect in the elicitation "method," distancing it in obvious ways from ordinary signed interaction.

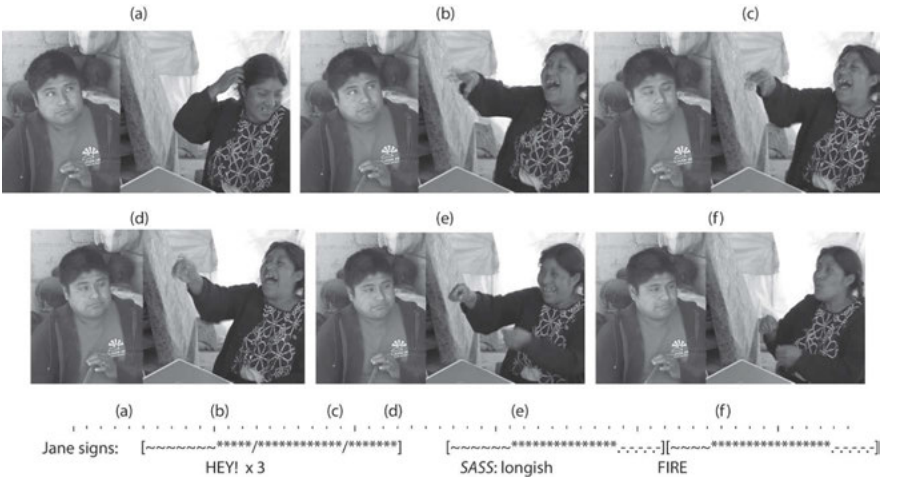


Figure 43: Will only returns his gaze to Jane when she starts signing again. (Timeline graduated in frames.)

3.1 Z conversation exploits Zinacantec interaction

In this chapter I have meant to suggest partial answers to a quite specific, vexing puzzle. How is it possible that the tiny community of half a dozen Z signers, without exposure to other sign languages, and building initially on only those few parts of spoken and gestured communication to which they have access, has managed in fewer than four decades to create a communicative system with quite remarkable expressive and collaborative power? I have explored the hypothesis that conjoint and coordinated action itself provides a scaffolding for language, starting with (non-linguistic) structures of alternating turns in various sorts of action and quite general human capacities for interactive mutual attention (both achieving it and refusing it), repetition and imitation (which depend on the semiotics of iconicity and depiction, especially as applied to human actions themselves), learning, and cooperation.

The indexical power of such attention-management devices as pointing, placing, and gaze of course gives direct rise as well to referentiality, rendered incrementally more and more efficient over repeated cooperative engagements, although also complicated by the multiplicity of indexically available "spaces" within which interlocutors can both point and gaze.

I have touched laterally on some of the socio-political and biographical preconditions that facilitate (or limit) these iterated engagements seemingly

derivative of patterns of mutual gaze. The first example, above, of a mini virtual conversation between Will, Jane, and her infant son Vic over his evident desire for some of his uncle Will's soft drink (Figures 6 to 8) shows that gaze itself can be a primary instrument for orchestrating turn-like exchanges of action, especially once young Vic has begun to learn the complex semiotics of pointing. And, as the example in Figures 9 to 11 shows, both gazing and pointing are activities young Vic is attending to and emulating well before he starts to talk. The soda serving example that follows (Figures 12 to 20) shows that even with minimal conventional manual signs, gaze and accompanying referring devices allow complex interactive exchanges, inflected as well by affective uses of the face as Jane expresses her displeasure with Will, and he his ridicule for her. Finally, the last examples of complex Z signing reveal a bidirectional relationship: between gaze as both an invitation to signing and a device for regulating or coordinating attention to it (Figures 21 to 30, and Figures 35 to 41), or sometimes for suppressing signing (Figures 31 to 34). Conversely, the final example (Figures 42 and 43) demonstrates that withholding mutual gaze can clearly signal refusing sign-recipiency.

Z also provides clear evidence for the creation of characteristic linguistic structure on top of this underlying collaborative scaffold, several examples of which we have met in passing in the illustrative materials presented: conventionalized lexemes divided into formal parts of speech (Haviland 2013c), SASS classifiers, grammatical and pragmatic particles including those explicitly designed for attention management (Haviland 2015), and finally inflectional categories of status and evidence (Jakobson 1957, see Haviland in press). It seems, however, that it is the structure of collaborative face-to-face interaction itself, rather than the specifics of the emerging sign language, that propels the Z signers into the elaborate communicative exchanges and the accompanying conjoint actions in which they routinely and effortlessly engage.

References

Acredolo, Linda & Susan Goodwyn. 1988. Symbolic gesturing in normal infants. *Child Development* 59. 450–466.

Baker, Charlotte. 1977. Regulators and turn-taking in American Sign Language discourse. In Lynn A. Friedman (ed.), *On the other hand: New perspectives on American Sign Language,* 215–236. New York: Academic Press.

Baker, Charlotte & Carol Padden. 1978. Focusing on the nonmanual components of American Sign Language. In Patricia Siple (ed.), *Understanding language through sign language research*, 27–57. New York: Academic Press

Bakhtin, Mikhail. 1986. *Speech genres and other late essays*. Austin: University of Texas Press.

Bates, Elizabeth. 1976. *Language and context: Studies in the acquisition of pragmatics*. New York: Academic Press.

Bates, Elizabeth, Donna Thai & Kimberly Whitesell. 1989. Integrating language and gesture in infancy. *Developmental Psychology* 25. 1004–1019.

Brown, Penelope. 1998. Conversational structure and language acquisition: The role of repetition in Tzeltal. *Journal of Linguistic Anthropology* 8(2). 197–221.

Brown, Penelope & Stephen C. Levinson. 2005. Comparative response systems. Paper presented to the annual meetings of the American Anthropological Association, San Francisco, November.

Carter, Anne L. 1975. The transformation of sensorimotor morphemes into words: A case study of the development of 'more' and 'mine'. *Journal of Child Language* 2(2). 233–250.

Clark, Herbert H. 1996. *Using language*. Cambridge: Cambridge University Press.

Clark, Herbert H. 2003. Pointing and placing. In Kita, Sotaro (ed.), *Pointing: Where language, culture, and cognition meet,* 243–268. Mahwah, NJ: Erlbaum.

Coates, Jennifer & Rachel Sutton-Spence. 2001. Turn-taking patterns in Deaf conversation. *Journal of Sociolinguistics* 5(4). 507–529.

Cooperrider, Kensy, James Slotta & Rafael Núñez. 2018. The preference for pointing with the hand is not universal. *Cognitive Science,* 42(4). 1375–1390.

Coppola, Marie & Elissa L. Newport. 2005. Grammatical subjects in home sign: Abstract linguistic structure in adult primary gesture systems without linguistic input. *Proceedings of the National Academy of Sciences* 102(52). 19249–19253.

Coppola, Marie, Elizabet Spaepen, & Susan Goldin-Meadow. 2013. Communicating about quantity without a language model: Number devices in homesign grammar. *Cognitive Psychology* 67(1–2). 1–25.

De León, Lourdes 1998. The emergent participant: interactive patterns in the socialization of Tzotzil (Mayan) infants. *Journal of Linguistic Anthropology* 8(2). 131–161.

de Vos Connie, Francisco Torreira & Stephen C. Levinson S.C. 2015. Turn-timing in signed conversations: Coordinating stroke-to-stroke turn boundaries. In Judith Holler, Koben H. Kendrick, Marisa Casillas & Stephen C. Levinson (eds.), *Turn-taking in human communicative interaction*, 183–195. Lausanne: Frontiers Media.

de Vos, Connie. 2012. *Sign-spatiality in Kata Kolok.* Nijmegen, The Netherlands: Radboud University dissertation.

deVos, Connie & Roland Pfau. 2015. Sign language typology: The contribution of rural sign languages. *Annual Review of Linguistics* 1. 265–288.

Dobrich, Wanda & Hollis S. Scarborough. 1984. Form and function in early communication: Language and pointing gestures. *Journal of Experimental Child Psychology* 38. 475–490.
Du Bois, John. 1985. Competing motivations. In John Haiman (ed.), *Iconicity in syntax,* 342–365. Amsterdam/Philadelphia: John Benjamins.
Duncan, Starkey. 1972. Some signals and rules for taking speaking turns in conversations. *Journal of Personality and Social Psychology* 23(2). 283–292.
Duncan, Starkey. 1974. On the structure of speaker–auditor interaction during speaking turns. *Language in Society* 3(2). 161–180.
Duncan Jr, Starkey. 1973. Toward a grammar for dyadic conversation. *Semiotica* 9(1). 29–46.
Emmorey, Karen, Robin Thompson & Rachael Colvin. 2009. Eye gaze during comprehension of American Sign Language by native and beginning signers. *Journal of Deaf Studies and Deaf Education* 14(2). 237–243.
Enfield, Nicholas J. 2001. 'Lip-pointing': A discussion of form and function with reference to data from Laos. *Gesture* 1(2). 185–211.
Enfield, Nicholas J. 2009. *The anatomy of meaning: Speech, gesture, and composite utterances*. Cambridge: Cambridge University Press.
Engberg-Pedersen, Elisabeth. 2015. Perspective in signed discourse: the privileged status of the signer's locus and gaze. *Open Linguistics* 1. 411–431.
Feldman, Heidi, Susan Goldin-Meadow & Lila Gleitman. 1978. Beyond Herodotus: the creation of language by linguistically deprived deaf children. In Andrew Lock (ed.), *Action, symbol, and gesture: The emergence of language,* 351–414. New York: Academic Press.
Fusellier-Souza, Ivani. 2004. *Sémiogenèse des langues des signes, Étude de langues des signes emergentes (LS ÉMG) pratiquées par des sourds brésiliens.* Paris: Université Paris 8 dissertation.
Fusellier-Souza, Ivani. 2006. Emergence and development of sign languages: From a semiogenetic point of view. *Sign Language Studies* 7(1). 30–56.
German, Austin. 2018. *Constructing space in Zinacantec family homesign*. San Diego, CA: University of California San Diego BA Honors thesis.
Goffman, Erving. 1974. *Frame analysis: An essay on the organization of experience*. Cambridge, MA: Harvard University Press.
Goffman, Erving. 1977. The arrangement between the sexes. *Theory and Society* 4(3). 301–331.
Goico, Sara. 2011. *A study of talk-in-interaction between a deaf and hearing Student in an inclusion classroom in Iquitos, Peru*. San Diego, CA: University of California San Diego MA thesis.
Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language.* New York: Psychology Press.
Goldin-Meadow, Susan. 2012. Homesign: gesture to language. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language. An international handbook*, 601–625. Berlin: Mouton de Gruyter.
Goldin-Meadow, Susan, Cynthia Butcher, Carolyn Mylander & Mark Dodge. 1994. Nouns and verbs in a self-styled gesture system: What's in a name? *Cognitive Psychology* 27. 259–319.
Goodwin, Charles. 1981. *Conversational organization: Interaction between speakers and hearers*. New York: Academic Press.
Haviland, John B. 1996. 'We want to borrow your mouth.' Tzotzil marital squabbles. In Charles L. Briggs (ed.), *Disorderly Discourse,* 158–203. Oxford: Oxford University Press.

Haviland, John B. 1997b. Shouts, shrieks, and shots: unruly political conversations in indigenous Chiapas. *Pragmatics* 7(4). 547–573.
Haviland, John B. 2000. Early pointing gestures in Zinacantán. *Journal of Linguistic Anthropology* 8(2). 162–196.
Haviland, John B. 2002b [publ. 2004]. Evidential mastery. In Mary Andronis, Erin Debenport, Anne Pycha & Keiko Yoshimura (eds.), *Proceedings of the Annual Meeting of the Chicago Linguistics Society: The Panels*, 38(2). 349–368. Chicago: Chicago Linguistics Society.
Haviland, John B. 2005. Dreams of blood: Zinacantecs in Oregon. In Mike Baynham & Anna de Fina (eds.). *Dislocations/relocations: Narratives of displacement*, 91–127. Manchester, UK, Northampton, MA: St. Jerome Publishers.
Haviland, John B. 2007. Person reference in Tzotzil gossip: Referring dupliciter. In Tanya Stivers & Nicholas J. Enfield (eds.), *Person reference in interaction*, 226–252. Cambridge: Cambridge University Press.
Haviland, John B. 2009. Little rituals. In Gunter Senft & Ellen B. Basso (eds.), *Ritual communication*, 21–50. Oxford, New York: Berg.
Haviland, John B. 2010. Mu xa xtak'av: "He doesn't answer. *Journal of Linguistic Anthropology* 20(1). 195–213.
Haviland, John B. 2011a. Musical spaces. In Charles Goodwin, Jürgen Streeck & Curtis LeBaron (eds.), *Multimodality and human activity: Research on human behavior, action, and communication*, 289–304. Cambridge and New York: Cambridge University Press.
Haviland, John B. 2011. Nouns, verbs, and constituents in an emerging 'Tzotzil' sign language. In Rodrigo Gutiérrez-Bravo, Line Mikkelsen & Eric Potsdam (eds.), *Representing language: Essays in honor of Judith Aissen*, 157–171. California Digital Library eScholarship Repository. Linguistic Research Center, University of California, Santa Cruz.
Haviland, John B. 2013a. Xi to vi: "Over that way, look!": (Meta)spatial representation in an emerging (Mayan?) sign language. In Peter Auer, Martin Hilpert, Anja Stukenbrock & Benedikt Szmerecsanyi (eds.), *Space in language and linguistics. Geographical, interactional, and cognitive perspectives*, 334–400. Berlin/Boston: Walter De Gruyter.
Haviland, John B. 2013b. (Mis)understanding and obtuseness: "Ethnolinguistic borders" in a miniscule speech community. *Journal of Linguistic Anthropology* 23(3). 160–191.
Haviland, John B. 2013c. The emerging grammar of nouns in a first generation sign language: Specification, iconicity, and syntax. *Gesture* 13(3). 309–353.
Haviland, John B. 2014. Different strokes: gesture phrases and gesture units in a family homesign from Chiapas, Mexico. In Mandana Seyfeddinipur & Marianne Gulberg (eds.), *From gesture in conversation to visible action as utterance*, 245–288. Amsterdam: John Benjamins.
Haviland, John B. 2015. "Hey!" *Topics in Cognitive Science* 7. 124–149.
Haviland, John B. 2016. "But you said 'four sheep'.!": (sign) language, ideology, and self (esteem) across generations in a Mayan family. *Language and Communication* 46. 62–94.
Haviland, John B. 2017. Mayan conversation and interaction. In Judith Aissen, Nora C. England & Roberto Zavala (eds.), *The Mayan languages*, 401–432. Oxford: Routledge.
Haviland, John B. 2019. Grammaticalizing the face (as well as the hands) in a first generation sign language: The case of Zinacantec Family Homesign. In Claudia Fabrizio & Michela Cennamo (eds.), *Papers from the International Conference of Historical Linguistics* 22 [Current Issues in Linguistic Theory, 348], 520–560. Amsterdam: John Benjamins.
Herreweghe, Mieke van. 2002. Turn-taking mechanisms and active participation in meetings with Deaf and hearing participants in Flanders. In Ceil Lucas (ed.), *Turn-taking, finger-*

spelling and contact in signed languages. 73–106. Washington D.C.: Gallaudet University Press.

Holler, Judith, Koben H. Kendrick, Marisa Casillas & Stephen C. Levinson (eds.). 2016. *Turn-taking in human communicative interaction*. Lausanne: Frontiers Media.

Jakobson, Roman 1957. Shifters, verbal categories and the Russian verb. Harvard University, Department of Slavic Languages and Literatures, Russian Language Project, 1957. (Also: *Selected writings, II,* 130–147. The Hague: Mouton.)

Kegl, Judy, Ann Senghas, Marie Coppola. 1999. Creation through contact: Sign language emergence and sign language change in Nicaragua. In Michel DeGraff (ed.), *Language creation and language change: Creolization, diachrony, and development*, 179–237. Cambridge: MIT Press.

Kendon, Adam. 1967. Some functions of gaze-direction in social interaction. *Acta Psychologica* 26. 22–63.

Kendon, Adam 1972. Some relationships between body motion and speech: An analysis of an example. In Aron Wolfe Siegman & Benjamin Pope (eds.), *Studies in dyadic communication,* 177–210. New York: Pergamon Press.

Kendon, Adam. 1980. A description of a deaf-mute sign language from the Enga Province of Papua New Guinea with some comparative discussion. Part III: Aspects of utterance construction. *Semiotica* 32(3–4), 245–314. Mouton de Gruyter.

Kendon, Adam 2004. Gesticulation and speech: Two aspects of the process of utterance. In Mary Ritchie Key (ed.), *Nonverbal communication and language*, 207–227. The Hague: Mouton de Gruyter.

Kendon, Adam 2004. *Gesture: Visible action as utterance*. New York: Cambridge University Press.

Kendon, Adam & Mark Cook. 1969. The consistency of gaze patterns in social interaction. *British Journal of Psychology* 60. 481–494.

Kita, Sotaro, Ingeborg van Gijn & Harry van der Hulst. 1998. Movement phases in signs and co-speech gestures, and their transcription by human coders. In Ipke Wachsmuth & Martin Fröhlich (eds.), *Gesture and sign language in human-computer interaction,* 23–35. London: Springer-Verlag.

Kobayashi, Hiromi & Shiro Kohshima. 2001. Unique morphology of the human eye and its adaptive meaning: comparative studies on external morphology of the primate eye. *Journal of Human Evolution* 40(5). 419–435.

Levinson, Stephen C. 2016. Turn-taking in human communication–origins and implications for language processing. *Trends in Cognitive Sciences* 20(1). 6–14.

Levinson, Stephen C. & Judith Holler. 2014. The origin of human multi-modal communication. *Philosophical transactions - Royal Society. Biological Sciences* 369(1651). 201302.

Levinson, Stephen. C. & Francisco Torreira. (2015). Timing in turn-taking and its implications for processing models of language. *Frontiers in Psychology* 6. 731.

Liszkowski, Ulf. 2006. Infant pointing at twelve months: Communicative goals, motives, and social-cognitive abilities. In Nicholas J. Enfield & Stephen C. Levinson (eds.), *Roots of human sociality: Culture, cognition and interaction*, 153–178. New York: Berg.

Liszkowski, Ulf, Penny Brown, Tara Callaghan, Akira Takada & Conny De Vos. 2012. A prelinguistic gestural universal of human communication. *Cognitive Science* 36(4). 698–713.

Lock, Andrew J. 1980. *The guided reinvention of language.* London: Academic Press.

Lock, Andrew J.1993. Human language development and object manipulation: Their relation in ontogeny and its possible relevance for phylogenetic questions. In Kathleen R. Gibson

& Tim Ingold (eds.), *Tools, language, and cognition in human evolution*, 279–299. Cambridge: Cambridge University Press.

Lock, Andrew, Andrew Young & Penelope Chandler. 1990. Some observations of the origins of the pointing gesture. In Virginia Volterra & Carol J. Erting (eds.), *From gesture to language in hearing and deaf children*, 42–55. Berlin: Springer-Verlag.

Manrique, Elizabeth & Nicholas J. Enfield. 2015. Suspending the next turn as a form of repair initiation: evidence from Argentine Sign Language. In Judith Holler, Koben H. Kendrick, Marisa Casillas & Stephen C. Levinson (eds.), *Turn-taking in human communicative interaction*, 215–235. Lausanne: Frontiers Media.

Mather, Susan M. 1996. Initiation in visually constructed dialogue. In Ceil Lucas (ed.), *Multicultural aspects of sociolinguistics in Deaf communities,* 109–131. Washington, D.C.: Gallaudet University Press.

McCleary, Leland & Tarcísio de Arantes Leite. 2013. Turn-taking in Brazilian Sign Language: Evidence from overlap. *Journal of Interactional Research in Communication Disorders* 4(1). 123–154.

Meir, Irit, Carol Padden, Mark Aronoff & Wendy Sandler. 2007. Body as subject. *Journal of Linguistics* 43. 531–63.

Nonaka, Angela. 2009. Estimating size, scope, and membership of the speech/sign communities of undocumented indigenous/village sign languages: The Ban Khor case study. *Language and Communication* 29. 210–229.

Nyst, Victoria Anna Sophie. 2007. *A descriptive analysis of Adamorobe sign language (Ghana)*. Amsterdam: Universiteit van Amsterdam dissertation. Utrecht: LOT.

Quine, Willard V. O. 1960. *Word and object.* Cambridge, Mass: MIT Press.

Rossano, Federico. 2013. Gaze in conversation. In Tanya Stivers & Jack Sidnell (eds.), *The handbook of conversation analysis,* 308–29. Chichester, U.K.: Wiley.

Rossano, Federico, Penelope Brown & Stephen C. Levinson. 2009. Gaze, questioning and culture. In Jack Sidnell (ed.), *Conversation analysis: Comparative perspectives,* 187–249. Cambridge: Cambridge University Press.

Sacks, Harvey, Emanuel A. Schegloff & Gail Jefferson. 1974. A simplest systematics for the organization of turn-taking for conversation. *Language* 50(4 part 1). 696–735.

Sandler, Wendy, Irit Meir, Carol Padden & Mark Aronoff. 2005. The emergence of a grammar: Systematic structure in a new language. *Proceedings of the National Academy of Sciences* 102(7). 2661–2665.

Senghas, Ann, & Marie Coppola. 2001. Children creating language: How Nicaraguan Sign Language acquired a spatial grammar. *Psychological Science* 12(4). 323–328.

Stivers, Tanya, Nicholas J. Enfield, Penelope Brown, Christina Englert, Makoto Hayashi, Trine Heinemann, Gertie Hoymann, Federico Rossano, Jan-Peter De Ruiter, Kyung-Eun Yoon & Stephen C. Levinson, 2009. Universals and cultural variation in turn-taking in conversation. *Proceedings of the National Academy of Sciences* 106(26). 10587–10592.

Streeck, Jürgen 2014. Mutual gaze and recognition. In Mandana Seyfeddinipur & Marianne Gullberg (eds.), *From gesture in conversation to visible action as utterance,* 35–58. Amsterdam/Philadelphia: John Benjamins.

Thompson, Robin, Karen Emmorey & Robert Kluender. 2006. The relationship between eye gaze and verb agreement in American Sign Language: An eye-tracking study. *Natural Language & Linguistic Theory* 24(2). 571–604.

Werner, Heinz & Bernard Kaplan. 1963. *Symbol formation.* New York: Wiley.

Yngve, Victor H. 1970. On getting a word in edgewise. In Robert I. Binnick (ed.), *Papers from the Sixth Regional Meeting of the Chicago Linguistics Society, April 16–18 1980,* 567–578. Chicago: Chicago Linguistics Society.

Zeshan, Ulrike & Connie de Vos (eds.). 2012. *Sign languages in village communities: Anthropological and linguistic insights*. Berlin: Walter de Gruyter & Ishara Press.

Laura Horton

Representational strategies in shared homesign systems from Nebaj, Guatemala

1 Introduction

Young children[1] who are deaf, and cannot hear the spoken language in their environment, and who also are not exposed to accessible linguistic input[2] or medical intervention, nonetheless generate productive manual systems to communicate with their hearing family and friends (Goldin-Meadow 2003, Fusellier-Souza 2006). These novel manual communication systems, sometimes referred to as homesign systems,[3] are idiosyncratic to their particular individual child innovator. Despite this idiosyncracy, they exhibit significant internal systematicity and stability. The limited distribution of standard[4] sign languages,

1 This work was generously supported by a pre-dissertation fieldwork grant from the Tinker Foundation and the Center for Latin American Studies at the University of Chicago, NSF Doctoral Dissertation Research Improvement Grant #1627540 and NSF BCS 1227908 to Diane Brentari.

2 By "accessible linguistic input" I mean language input in a modality that is accessible to the child. For example, for a hearing child this could include any spoken or signed language, or a deaf child any sign language.

3 The communication systems developed by individual deaf children in interactions with hearing family members, friends and neighbors have been described using a variety of terms that highlight different dimensions of these systems including the number of deaf signers, the location (urban or rural) of the sign system, and the extent to which the system is used by hearing and deaf signers. Some of these terms include: homesign systems (Goldin-Meadow 2003), village sign languages (Nonaka 2009, Zeshan and de Vos 2012, Nyst 2012) communal homesign (Zeshan 2010), shared sign languages (Nyst 2012) and natural sign (Green 2014). These terms are not interchangeable and describe unique constellations of sign use in particular locations, I include them here because they are in some ways similar to the shared homesign systems I describe in this chapter.

4 In this chapter I used the term standard (Frishberg 1987) sign language to refer to sign languages that have the following characteristics: intergenerational transmission (whether within families with genetic deafness or across age-cohorts in an institutional setting), institutional support, either in a school setting or from civic organizations like deaf clubs and a substantial community of users who use the language in their daily lives. Other authors have referred to these languages as "established, deaf community sign languages" (Meir et al. 2010). In this volume, other authors use the term "institutionalized" sign languages.

https://doi.org/10.1515/9781501504884-003

coupled with the rarity of genetic deafness,[5] would suggest that homesign systems are commonplace for many children who are born deaf around the world (Zeshan 2010).

In this chapter, I present data from homesign systems developed by deaf children and adults in the town of Nebaj, Guatemala (see sociolinguistic profile of Nebaj shared homesign systems, this volume, for more details). I use these data to expand and clarify the social circumstances, or communicative ecology, in which homesign takes part (Nonaka 2009; Hou 2016; Haugen 2001; Mühlhäusler 2003; Zeshan 2010).

The homesigners I work with are embedded in diverse communicative ecologies. They engage in highly varied communicative interactions with the hearing and deaf relatives, peers, friends and neighbors they encounter at home, at school and in public. I ask whether these diverse ecologies affect the use of referential strategies by child homesigners on a lexical elicitation task. Specifically, I consider the role of interactions with other deaf homesigners. I describe three factors that could interact with a homesigner's communicative ecology and correspond to differences in child homesign lexicons. These factors include the availability of diverse referential strategies, specifically indexical and iconic strategies; the predictable relationships between iconic strategies and referent type, described as "patterned iconicity" (Padden et al. 2013, 2015; Hwang et al. 2017); and the set of conventional gestures used by hearing people who interact with homesigners. In this study, I ask:

- Is there a correspondence between the communicative ecology in which a homesigner is embedded and patterns of referential strategies (indexical and iconic) in the lexicons of child homesigners? For example, are homesigners embedded in one type of communicative ecology more likely to use iconic referential strategies in their lexicon of signs?
- Is there evidence for patterned iconicity in child homesign systems and is there a correspondence between the communicative ecology of a homesigner and the type of iconic strategy they use?
- Does communicative ecology correspond to the use of sign forms adapted from conventional gestures produced by hearing speakers in the lexicons of child homesigners?

5 In a recent survey, Mitchell and Karchmer (2004) estimate that 92% of children who are deaf or hard of hearing in the United States are born to hearing parents, approximately 4% are born to one deaf or hard of hearing parent and one hearing parent and approximately 4% are born to two deaf parents.

This study is a preliminary description of the referential strategies that child homesigners mobilize in their emergent lexicons. Based on previous research on child homesign systems, I expect significant individual variation across the child homesign lexicons, but also significant internal consistency for each system, in terms of referential strategy – the relative prevalence indexical (deictic) and iconic forms.

The chapter begins with a discussion of prior work on referential strategies in young and standard sign languages, patterned iconicity in standard sign languages, and the use of conventional gestures in sign languages. In section 3, I discuss a taxonomy of shared homesign systems and how the communicative ecologies of these systems impact the social interactions in which homesigners are engaged. The fourth section introduces the participants and the fieldsite where the data for this chapter were collected and section fiive describes the elicitation methods and procedures used to annotate signs. The next section (6) presents the results of the study, which are discussed further in section 7, followed by a conclusion.

2 Referential strategies in young sign languages and homesign systems

This section discusses relevant existing literature on the referential strategies that will be explored in child homesign lexicons in this chapter. I begin with a review of the work on iconicity and indexical (deictic) signs in standard and young sign languages, followed by a review of work on patterns within iconicity that are common crosslinguistically. I conclude with work that has studied the relationship between co-speech gestures and forms in standard sign languages.

2.1 Iconicity and indexicality

In his second trichotomy of signs, Charles Saunders Peirce identifies three types of signs – icons, indices and symbols (Peirce 1932, 2: 247–249). In this study, I focus on two of these three types: icons and indices. This section first discusses indices, and their function in homesign systems as well as standard and young sign languages, followed by a discussion of iconic signs in homesign systems and standard sign languages.

The index is a sign vehicle that relates to its sign object[6] through spatial and/or temporal co-occurrence, a relationship of contiguity (Deacon 1997). In visual-manual languages, as well as co-speech gestures, deictic signs or gestures – points – are an obvious example of this type of sign. The signer or speaker moves a body part to create a vector that indicates, or draws their interlocutor's attention towards, an object, location, person or other feature of the physical context. The form of these signs may be conventional and involve internal structure that indicates features like distance and direction, in both deaf and hearing communities (see Mesh 2017 for a description of pointing conventions in a Chatino community in Mexico).

Deixis, or pointing, is also an obvious manual strategy for child homesigners to incorporate into their homesign systems. In work on a child homesigner, called David, from the United States, researchers identify two kinds of pointing gestures[7] in David's productions: demonstrative points and category points (Hunsicker and Goldin-Meadow 2012). They show that David combines demonstrative points with iconic characterizing gestures or category points in multigesture combinations to form nominal constituents. The data for their study was longitudinal, and David initially produced primarily single demonstrative (glossed as *that*) or nominal (e.g., an iconic or deictic sign glossed as *penny*) gestures. Over time, David produced an increasing number of multigesture combinations, and these combinations were used to refer to the same kinds of entities (people, animals, vehicles, etc.) as single gestures. Multigesture utterances also followed a predictable order and were produced at similar rates as single-gesture utterances. Pointing gestures thus form a critical, structured component of David's homesign system, particularly early in development (data from the Hunsicker and Goldin-Meadow (2012) study were collected between ages 2;10-5;02).

6 Peirce (1932) uses the terminology *sign vehicle* or *representamen* to denote the sign form, and the term *sign object* to denote the entity that the sign refers to. His definition of a sign further includes the sign's *ground* and its *interpretant*. When discussing Peirce's work, I use the terms *sign vehicle and sign object*, however, for the remainder of the chapter I will use the terms "sign" and "referent" to denote the form of the sign and the concept it represents. While this collapses important distinctions, for the purposes of this chapter, these terms were sufficient.

7 Hunsicker and Goldin-Meadow (2012) use the term "gestures" to refer to David's forms, so I use their terminology for his productions. I also use the term "gestures" when describing the movements hearing people make with their hands while speaking. I refer to the productions from the Guatemalan homesigner participants in this study as signs. The distinction between gestures and signs remains contested (see Green 2018 and Kusters and Sahasrabudhe 2018 for recent discussion) and I do not attempt to distinguish "gestures" from "signs" in the utterances that Guatemalan homesigner participants produced.

In addition to forming a critical component of hierarchical, structured utterances in homesign, signs that resemble co-speech pointing gestures are an integral part of the grammatical system of standard sign languages (Sandler and Lillo-Martin 2006) as well as young sign languages (Coppola and Senghas 2010). In two studies of a young sign language in Nicaragua (Coppola and Senghas 2010) and an emerging family sign language in Oaxaca, Mexico (Mesh 2017), researchers trace the path that co-speech pointing gestures take as they enter the sign languages in the community. Coppola and Senghas (2010) show that over successive age cohorts, signers of Nicaraguan Sign Language (NSL) begin to use pointing signs for more grammatical functions, such as marking subjects, functioning as pronouns and forming anaphoric constructions. In San Juan Quiahije Chatino Sign Language, Mesh (2017) identifies three components of pointing gestures – direction, elbow height and handshape – used by hearing Chatino speakers, that are conventionalized and combine to mark distinctions in distance and direction. SJQCSL signers adopt two of these features, direction and elbow height, but not handshape, in their pointing signs. The work by Coppola and Senghas (2010) and Mesh (2017) highlight the diversity of paths through which young sign languages begin to incorporate a co-speech gesture produced by hearing speakers into a sign language. Pointing in adult and child homesign has also been extensively documented (Coppola 2002; Fusellier-Souza 2006; Goldin-Meadow and Mylander 1984; Morford 1996). In this study, we evaluate how frequently child homesigners use indexical, pointing signs when they are engaged in a lexical elicitation task.

The icon is a sign vehicle that relates to its sign object through some form of resemblance (Peirce 1932; Deacon 1997). A sign vehicle that is iconic may also be conventional – an iconic legisign (Peirce 1932; Parmentier 1994) – but some aspect of the sign vehicle continues to be motivated by some aspect of the sign object, which ties the sign vehicle to a particular instantiation of that sign object. Importantly, the iconic relationship between sign vehicle and sign object only holds if it is recognized by an interpretant. Taub (2001: 19–20) highlights this fact about iconicity as well.

Iconicity is not an objective relationship between image and referent; rather, it is a relationship between our mental models of image and referent. These models are partially motivated by our embodied experiences common to all humans and partially by our experiences in particular cultures and societies.

For homesigners, iconicity is a critical tool to making themselves understood by the hearing people in their immediate social context. Lacking a shared set of conventional signs – a common language – homesigners must make their message clear to interlocutors through whatever means are most legible to their communication partners. The interlocutors that homesigners encounter will have

variable degrees of experience using their hands to communicate. If homesigners are able to iconically represent an object, an action or an event in a way that is legible to a communication partner, then it seems this might be a route towards mutual comprehension between homesigner and less-experienced, hearing interlocutor. Thus "transparent" iconicity becomes critical to the homesign system. Homesigners must identify iconic strategies that are transparent, readily identifiable and common to their predominately (or exclusively) hearing interlocutors. Additionally, Green (2014) emphasizes the significance of both interlocutors in these interactions, specifically their commitment to mutual understanding (see Green (2014), for a discussion of the ethics of interactions between deaf people and hearing people in Nepal).

The presence of iconic signs in homesign systems has been extensively documented (Goldin-Meadow 2003; Fusellier-Souza 2006). In section 6.1 we describe the frequency of indexical and iconic signs across homesign lexicons and discuss possible sources of variation in the distribution of indexical versus iconic strategies in emergent homesign lexicons.

2.2 Patterned iconicity

After an initial period in which iconicity was virtually ignored by sign language researchers,[8] much contemporary work has been dedicated to understanding the iconic relationship between signs and their referents (Perniss, Thompson, and Vigliocco 2010; Pizzuto and Volterra 2000; Taub 2001; Occhino 2017; Occhino et al. 2017; Ortega et al. 2014). This work has demonstrated that iconicity is neither simple nor monolithic.

Recognition of the motivated, iconic relationship between a sign and its referent involves a process of image selection, conceptual mapping and schematization (Taub 2001; Emmorey 2014; Lepic and Padden 2017). This process is complex and it is not clear when and how it becomes accessible or useful for children acquiring standard sign languages (Ortega, Sümer, and Özürek 2017; Magid and Pyers 2017; Caselli and Pyers 2017; Thompson et al. 2012; Orlansky and

8 Early work on sign languages minimized their obvious iconicity as a response to claims that sign languages were not fully linguistic, but simply pantomime or mimicry (Greene 1975, cited in Lane 1992). Researchers cited arbitrariness as a defining and unique feature of linguistic systems (Saussure 1986), and as justification for "disqualifying" sign languages as natural human languages. Early sign language researchers thus sought to minimize the amount of iconicity in sign languages and its contribution to their structure.

Bonvillian 1984). In one example of the complexity of an iconic mapping between components of a sign and the components of a referent, Lepic and Padden (2017) present an analysis of the sign for TIME[9] in contemporary American Sign Language (ASL) (reproduced from Lepic and Padden 2017: 500).

Table 1: Aspects of the modern iconic mapping for TIME (in ASL).

Form	Meaning
non-dominant hand	a human hand
back of the wrist	the location of a wristwatch
dominant hand	a human hand
crooked index finger	a human finger
contacting movement	a human finger contacting a wristwatch
repeated movement	a repeated action

In this analysis, the ASL sign iconically uses the human body to represent a human body: the signer's hands represent human hands, the signer's wrist represents a human wrist. The sign also depicts a prototypical activity – pointing to a wristwatch, or the typical location of a wristwatch – to inquire about the time. Despite the apparently simple, transparent iconicity of this sign, historically it originates from French Sign Language and pre-dates the invention of the wristwatch. The place of articulation for the original sign was the back of the signer's non-dominant hand. The original sign iconically represented a mechanical component of a clock that would ring a bell to mark the time. The place of articulation was adjusted slightly in the contemporary version of the sign, to the wrist, and (re)analyzed by contemporary signers as an iconic representation of tapping the face of a watch. This historical change, as well as the slight shift in the place of articulation of the sign, illustrate the ways in which even "transparent" iconic signs may derive from older forms that were also iconic, but based on an entirely different mapping between sign form and sign meaning (Shaw and Delaporte 2010).

Diverse and complex types of iconicity are characteristic of homesign systems in addition to standard sign languages (Goldin-Meadow 2003; Fusellier-Souza 2006). In an early account of child homesigners from the United States, Goldin-Meadow and Mylander (1990) describe these iconic forms as "characterizing."

9 Following sign language research conventions, I gloss signs with CAPITALS. In signs with multi-word glosses, words are separated by hyphens.

While all of the characterizing forms that they identified in child homesign systems were iconic, they varied in the transparency of this iconicity. As an example, one of the homesigners they studied produced a sign for 'school' in which they brought their hands together at chest height, pantomiming the act of praying. The child associated this activity with school because the school that they attended was Catholic and each day began with a prayer (Goldin-Meadow and Mylander 1990: 333). This link between this sign (pantomimed praying) and its referent (school) would only be comprehensible to an interlocutor familiar with the context of the child's school, and is thus less transparent than signs such as the sign for eating, produced by the child, which was articulated with a fist, brought to the child's mouth while they pantomimed the act of chewing. We could thus think of iconic signs as existing on a continuum of transparency and opacity. Green discusses a similar kind of "continuum of recognition... At one end would be conventional signs, the forms of which are not immanent in bodily or other non-linguistic routines...On the other end of the continuum would be signs that, although one had never encountered them before, could be recognized through what Hanks calls 'the knowing body' " (Green 2014: 91).

This continuum of recognition intersects with another dimension of iconicity that has been observed crosslinguistically for young and standard sign languages. "Patterned iconicity" (Hwang et al. 2017; Padden et al. 2013, 2015), describes a predictable, stable relationship between certain types of referents and certain iconic strategies. In a study of eight sign languages, including both standard sign languages (American, Japanese and German Sign Languages), young sign languages (Israeli Sign Language, Al-Sayyid Bedouin Sign Language, Kenyan Sign Language and Ha Noi Sign Language) and a village sign language (Central Taurus Sign Language), Hwang et al. (2017), describe the iconic strategies that are used for three lexical semantic categories: tools, animals, and fruits and vegetables (see also Safar and Petatillo Chan, this volume, for a discussion of patterned iconicity in Yucatec Maya Sign Language). Hwang et al. (2017) find that signs for tools tend to use *manipulation*, an iconic strategy in which the signer's body represents a human body, and the signer's hand represents a human hand acting on the referent. For animals, all participants tended to use an iconic strategy called *personification*, in which the body of the signer represented the body of an animal and the hands represented a salient body part. Signs for fruits and vegetables typically used either a *manipulation* or *object* iconic strategy, in which the hands represented the shape of the referent. Based on the presence of these patterns across unrelated sign languages, researchers suggest a common cognitive base for sign and gesture systems, as well as bodily iconic affordances that are grounded in experience using the body both to engage in everyday activities and to communicate (Padden et al. 2013, 2015; Hwang et al. 2017).

I explore whether patterned iconicity extends to child homesign systems, as a factor that shapes emergent lexicons, in addition to communicative ecology.

2.3 Conventional gestures from hearing speakers

Sign languages researchers have suggested that sign languages may take, as their "raw materials," the gestural repertoires of the surrounding hearing community (Newport and Supalla 2000; Pfau and Steinbach 2006; also see Le Guen et al., this volume, for YMSL). Specific examples of this process include the process of grammaticalization of a French gesture, meaning 'to go,' as a future marker in American Sign Languge (ASL) (Janzen and Shaffer 2002). In this chapter, I consider how communicative ecology might affect the degree to which homesigners incorporate conventional gestures from the speakers in their social ecology into their homesign lexicons.

I suggest that the communicative ecology of a homesign system will affect the organization and form of the system that emerges. In this section, I have reviewed prior literature on three dimensions of signed languages – referential strategy, patterned iconicity and the inventory of conventional co-speech gestures – that might interact with communicative ecology, ultimately corresponding to predictable differences in child homesign systems. In the next section, I describe in greater detail the range and characteristics of communicative ecologies present at my fieldsite in Nebaj.

3 Communicative ecologies: Shared homesign

3.1 Shared homesign: Terminology and characteristics

Deaf people in many communities around the world differ from the individual homesigner children studied previously in the United States and other Western countries (Goldin-Meadow et al. 2009) along multiple dimensions, but in this chapter I focus on two – the role of deaf homesigner adults on child homesign systems and the role of peer homesigner children on each other's homesign systems. These two types of transmission and interaction have been described as vertical and horizontal transmission, and have been studied extensively in Nicaraguan Sign Language (NSL), the young sign language used in Managua, Nicaragua (Senghas 2003).

Although the majority of deaf children are born into hearing families, there are communities which have a higher than average incidence of deafness in the population, due to a combination of genetic traits and consanguineous marriage (Kisch 2008, 2012). Deaf people in these communities may lack access to a standard sign language, but they do have accessible communicative input, because they can see the homesign system used by a deaf sibling, peer, parent or grandparent (similar to a small family homesign system used in Chiapas, Mexico described by Haviland, this volume). I use the term "shared homesign" for these situations and describe two varieties of shared homesign. In this conception of homesign, the term is not about the total presence or absence of any communicative or social input. Instead, the term homesign is taken to mean the absence of conventionalized linguistic input that is a spoken language or standard sign language in a modality accessible to the language learning child.

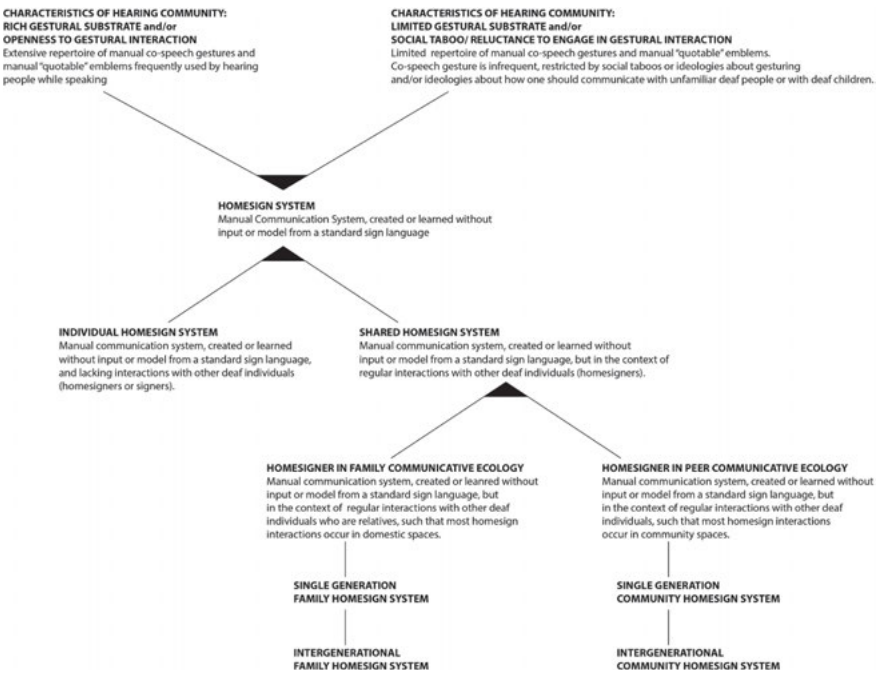


Figure 1: Shared Homesign Systems and their Gestural Context. This diagram illustrates and defines the ways in which a homesign system can exist, even when a homesigner receives some accessible input. These systems likely overlap with emerging sign languages, but they are contingent on the continued presence of deaf signers for their longevity.

3.2 Shared homesign: Transmission and interaction

Each communicative ecology varies on the following dimensions: interaction with other (deaf) homesigner peers, interaction with other (deaf) homesigner adults and the contexts of homesign interaction, either at home or at school.

These dimensions combine to form three ecological types: individual homesigners, homesigners in family ecologies and homesigners in peer ecologies. Characteristics and examples of each ecology are described below and represented diagrammatically in Figure 2.

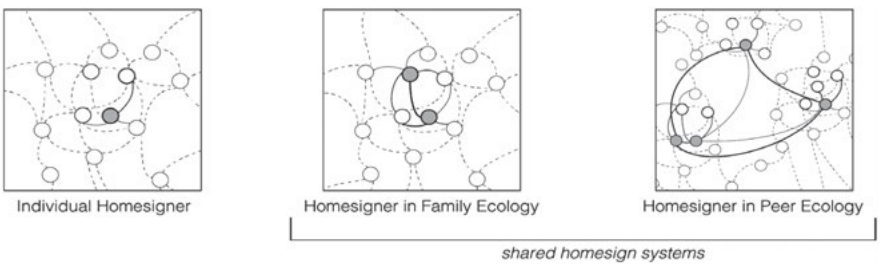


Figure 2: Communicative Ecologies of homesign systems.

In Figure 2, deaf homesigners are represented by grey-filled circles and hearing individuals by white circles. Communicative interactions in homesign are represented by solid lines, communicative interactions in the spoken languages are represented by dashed lines. In an *Individual homesigners ecology* (far left), the homesigner has a limited number of solid-line or homesign interactions, and these all occur with a hearing interlocutor. In a *Family communicative ecology* (center), the homesigner has interactions with another deaf homesigner, and the other members of their family have more interactions using the homesign system, represented by more solid-line connections. In the *Peer communicative ecology*, the homesigner may have few homesign interactions in the family environment, but they have homesign exchanges with other deaf homesigners in a community setting like school or work.

Deaf versus hearing signers

As illustrated in Figure 2, above, I make a critical distinction between hearing people who are related to homesigners, or who interact socially with homesigners, and individuals who are deaf and thus use their homesign system as their primary and only means of communication. While there are certainly hearing children of deaf parents who are homesigners and hearing children who are siblings of deaf homesigners who are fluent communicators with the deaf homesigner they

interact with regularly (though see Carrigan and Coppola (2017) and Richie et al. (2013; 2014) for evidence that even extended contact between hearing and deaf homesigners does not guarantee mutual comprehension or a shared lexicon of signs). For the purposes of this study, I emphasize this difference because deaf homesigners do not have an alternative, spoken language and they have not had access to spoken language or sign language input (as described above). A hearing child or adult may be a very proficient signer, but they also maintain the option of speaking at any time, and they have extensive experience interacting with other speakers of their native language. (see also Gagne 2017, for a discussion of the role inconsistent input for hearing children of deaf adult signers in Nicaragua).

Individual homesigners

Individual homesigners do not have regular interactions with other homesigner peers or homesigner relatives. Although hearing relatives and peers may gesture with them, studies of individual homesigners demonstrate that even over extended time, adult homesigners and their hearing relatives do not necessarily converge on a shared lexicon (Richie, Yang, and Coppola 2014). In a study of adult homesigners in Nicaragua, researchers found that hearing relatives of adult homesigners were not always adept at accurately comprehending homesign descriptions of short events. This appears to be moderated by the age at which the hearing relative or friend began communicating with the homesigner, as hearing siblings who were closer in age had better comprehension than hearing parents (Carrigan and Coppola 2017).

The individual child homesigner may rarely see a manual communication system that resembles what they produce (Flaherty et al. 2010, 2016). Their primary interlocutors communicate predominately using the spoken language(s) in the community. Thus the interaction that the individual child homesigner engages in is primarily as a producer of their homesign system, and as a recipient of modified co-speech gestures from hearing family and friends.

As individual child homesigners grow up, friends, siblings or other relatives gain more experience using a manual communication strategy, and their system develops through interaction with the individual homesigner. Thus older individual homesigners have more practice as both a producer and a receiver of signs, though this may vary extensively by individual (Coppola, Spaepen, and Goldin-Meadow 2013).

Significantly for the individual child homesigner, the parallel development of their own homesign system and the manual communication strategies used by their hearing communication partners diverges substantially from the typical language learning child. The individual homesigner has the most experience with their emergent communication system, and the most expertise relative to

older, hearing siblings and adults in their communicative ecology. They have less experience negotiating an interaction with another person who uses a similarly structured system. The repeated engagement with other less-experienced hearing interlocutors likely impacts the system that the homesigner gradually develops. They may pursue diverse strategies to make themselves understood, including frequent repetition and clarification. This study includes three children who are individual homesigners and do not interact with other deaf people.

Homesigners in family communicative ecologies

Homesigners who are part of a family communicative ecology have a different social environment from individual homesigner on several dimensions, including communicative input, communicative interaction, and immersion in a multimodal communicative system. Deaf child homesigners in a family ecology have accessible input: they interact with a deaf adult who uses a homesign system. The homesigning child thus receives a visual communicative model, beginning at birth, from an adult whose only experience communicating is in the manual modality. Whether a homesigning parent knows their child is deaf or not, their only modality for communication is manual-visual, so they will sign to communicate with their child. In the case that their child is deaf, this means that the child sees more communicative input and that input is likely more systematic and structured than an individual homesigning child who is only able to observe the gestures that hearing people in their family produce when they speak.

In addition to receiving a communicative model, a child homesigner in a deaf family has a role as both a producer and receiver of a homesign system. This comes from the adult who is deaf, and also from siblings who have communicated with the deaf adult, presumably using gestures. The presence of more than one deaf person in a single family alters the balance of communication modality for the other hearing people in the family. Communication is more likely to happen in the manual modality, giving the child homesigner more exposure to interactions not only between themselves and another deaf person, but the opportunity to observe the deaf adult in their family interact with other hearing people in the family and community. The child homesigner in a deaf family has more exposure to what "works" in terms of a communicative strategy, meaning, what is interpretable to hearing interlocutors versus what isn't successful. Child homesigners in Nebaj may interact more with other children, even if they have a deaf parent (see section 4.1). If one of the parents or adults in a family is deaf, however, this means that all of the hearing children (the siblings of the child homesigner) have experience communicating with that deaf adult. Thus even the hearing children the child interacts with may have greater fluency with a manual communication system than the hearing children that an individual child homesigner encounters. In a

family with deafness across multiple generations, the hearing parent of a child homesigner who has grown up with a deaf parent has a lifetime of experience using a manual communication when their child arrives, because they grew up with one parent who was deaf. This is the circumstance for one of two family homesign participants in this study.

Homesigners in peer communicative ecologies

Deaf students who attend school together are embedded in a communicative ecology that differs from both homesigners in family ecologies and individual homesigners along dimensions of input and interaction. The students often do not have regular input from a deaf adult homesigner, but they do interact with same-aged peer homesigners daily at school. They are thus producers and receivers of homesign systems, though the contact between homesign systems occurs in the context of school, rather than home. In addition to being both producer and receiver, students at the school encounter more diverse examples of peers who are deaf at school than within the context of a family with two or three deaf members. Though the actual number of homesign contacts may not be substantially higher than a child homesigner with deaf relatives, having deaf peers may be fundamentally different in quality because it may support an individual homesigner's sense of community and peer network. Deaf homesigning children become aware that there are other individuals who share their communication modality and these are not restricted to people in their household. Additionally, this diversity of deaf peers may support the convergence of formal conventions because of the pressure to increase comprehension between signers on common topics (though interaction between deaf students is not guaranteed, even when they are in the same classroom, Goico 2015).

These communicative ecologies are illustrated in the diagrams above, see Figure 2. The diagrams indicate whether the homesigner child receives homesign input from a homesign adult in their family, whether they interact with another homesigning peer or a homesigning sibling. If a homesigner lacks deaf family members or peers, they are primarily a producer of their system, and rarely see another homesign system nor negotiate interactions with another deaf person who relies exclusively on their homesign system to communicate. The diagrams also reflect the relative density of interactions that a homesigner might have, given the number of other deaf people in their local communicative ecology. The density of a communicative ecology interacts with the age of the deaf or hearing homesigners who are interlocutors. In families or communities with multiple deaf individuals of the same age – peers – there may be more interactions in the homesign system than in families or communities in which the homesigners are a combination of adults and children. This prediction is based on the frequent

observation that conversation between children and adults can be infrequent in many Maya communities, even when adults and children are in close physical proximity (Rogoff 1981). In other words, homesign interactions are likely to reflect broader cultural socio-communicative patterns in a community, with adults typically interacting with other adults and children typically interacting with same-aged peers (Rogoff 1981; Gaskins 1999).

4 Communicative ecologies and cultural context

4.1 Shared homesign in Nebaj

In addition to a general pattern of age-based interactions, there is a strong notion of family identity in Nebaj. Deaf people typically follow this pattern, identifying with their family and local community, rather than a community based on shared deafness. Within the family, children tend to socialize with children, and adults with adults, thus both age and kinship ties seem to predominate, rather than deafness, as an identity marker. This pattern of affiliation mirrors the structure of social relations in Nebaj more broadly (as well as other Maya communities in Guatemala, Tax 1963). Although local housing patterns have been affected by the civil war and migration (Stoll 2013; Ibáñez-Holtermann 2011), most residents of Nebaj, however, continue to live in small compounds occupied by multiple generations of extended family, regardless of their hearing status. Based on observations and informal interviews throughout my fieldwork, deafness itself does not serve as a strong marker of identity, compared with gender, age, religious affiliation and kinship. The relative lack of deafness as an identity marker may be partially attributed to the framing of deafness as a voluntary choice to not speak, rather than deafness *per se* (as described in the sociolinguistic sketch of Nebaj, this volume), but also mirrors the situation in other Mayan communities where researchers have noted that there is not a strong sense of deaf solidarity (Fox Tree 2009: 328). This situation offers a contrast to the Deaf community in the United States, in which deafness, and in particular, the use of sign language, is a strong or primary source of identity (Lane et al. 1996; Padden and Humphries 2006).

Deaf people in Nebaj are, however, immersed in multilingual, multimodal communicative worlds (see also Safar 2017). Within a single family, there may be three active communicative systems: spoken Ixil and the accompanying co-speech gestures, spoken Spanish and the accompanying co-speech gestures, and the family homesign system. The use of each system fluctuates, relative to the balance of deaf and hearing family members, the presence of adults versus

children, as well as the level of education of family members present, which affects the degree of fluency in spoken Spanish.

Patterns of language socialization typical of Nebaj[10] also intersect with shared homesign systems. It is more common for children in Nebaj, regardless of hearing status, to interact with other children than adults, similar to observations from other Mayan communities (Gaskins 1999; Rogoff 1981). This means that even if a deaf child has a deaf adult relative like a parent or grandparent, it does not guarantee significant interaction between the two deaf people. This general trend – of children socializing other children more than adults actively socializing children – is affected by the size of the family. Two of the deaf children in Nebaj, Sara[11] and Alejandro, are part of smaller nuclear families – Sara has one older (hearing) brother, and Alejandro has only one older (hearing) brother. These are relatively small families, compared to many of the families I have visited in Nebaj. Sara has more interactions with her mother, who is also deaf, than many children might, simply because she does not have younger siblings to care for and her mother has a smaller household to maintain in terms of cooking, cleaning and laundry.

4.2 Child homesign participants from Nebaj

Individual child homesigners in Nebaj

Three of the child homesigner participants in this study are 'individual homesigners': they do not have deaf relatives, do not attend school with other deaf students and do not have any known contact with other deaf individuals. The oldest individual homesigner, Alejandro (age 13), briefly (and intermittently) attended a school with other deaf students, but now attends the regular elementary school near his house. He has an older half-sibling and lives with his mother who is hearing and communicates with him via spoken Ixil and using gestures. The two other individual homesigners, Jacinto (age 10) and Antonio (age 7) recently began attending their local elementary schools, without any other deaf students or interpreting services.

Jacinto has an older half-sister and a younger sister, both hearing; his older sister interacts with him using gestures when she is at home. She conducted several of the tasks during one session and was very comfortable communicating with her brother, eliciting many descriptions from him. Antonio has more siblings

10 These may be characteristic of many Mayan communities.

11 All names of participants are pseudonyms.

than either Alejandro or Jacinto, and all are hearing. He spends a lot of time observing activity in his neighborhood and playing with similar-aged relatives and neighbors. Some of his older siblings gesture with him, but they report not always understanding what he is trying to communicate to them. While I have observed both successful and unsuccessful communication between Antonio and his siblings, I would require more ethnographic evidence to evaluate the assertion of his brothers and sisters regarding their comprehension of his signing. In her work on the natural sign systems that are shared by hearing and deaf people, Green (2014) notes that comprehension between deaf signers and their interlocutors is contingent on more than familiarity with the sign system, but also a commitment on the part of both conversation participants to make an effort for understanding. This is an area that I hope to pursue in future work, with more naturalistic interactions between child siblings and peers.

Homesigners in family ecologies in Nebaj

There are two families in this study with multiple generations of deafness. The Bernal Family (Figure 3a) is small compared to most families in Nebaj. The mother, Lucia is deaf, as is her daughter Sara (now age 11). The father, Abel, is a monolingual Ixil speaker. He has mentioned that Lucia may have a sister who is deaf, but I have not been able to verify this. Finally, Ramon (now age 14), Sara's brother, is hearing. Neither Abel, Sara's father, nor Lucia are literate, but both Ramon and Sara attend their local, regular school, where Sara is in classes with exclusively hearing students. Ramon is the only member of his family who reads, writes and speaks Spanish proficiently. He often serves as an interpreter and translator for the rest of the family. Sara regularly plays with a neighbor, Ana (age 9), who is hearing but gestures to communicate with Sara and Lucia when she is visiting the house. I have observed Lucia interacting with her neighbors and women who occasionally stop by to use the family's water supply. Lucia also describes interacting with less familiar acquaintances, for example, a man who buys the pigs that the family sometimes raises. She related haggling with the man and ultimately refusing to sell their pig because he attempted to offer her a far lower price than her neighbors.

The Marcos Family (Figure 3b) consists of three generations, including Pedro, now aged 82, his daughters and their families. One of Pedro's hearing daughters reports that he has an older brother who is also deaf. Both men married and had children. Pedro's wife (hearing) is deceased and all of his children are hearing, but two of his grandchildren (Rosa age 7 and Pedro age 2) are also deaf. Rosa began attending her local school a year ago, but has been reluctant to go regularly and frequently stays home with her mother to help around the house and take

care of Pedro and a new younger sister (hearing). As of August 2017, Rosa had begun attending the local school for special education with other deaf students.

Each family with multiple homesigners is represented in the family trees above. In the Bernal family, Lucia and her daughter Sara are deaf. In the Marcos family, Pedro and his brother Marco are deaf, as well as Pedro's granddaughter Rosa and his grandson Pedro. His daughter, Luisa, who is hearing, thus has a father who is deaf and two children who are deaf.

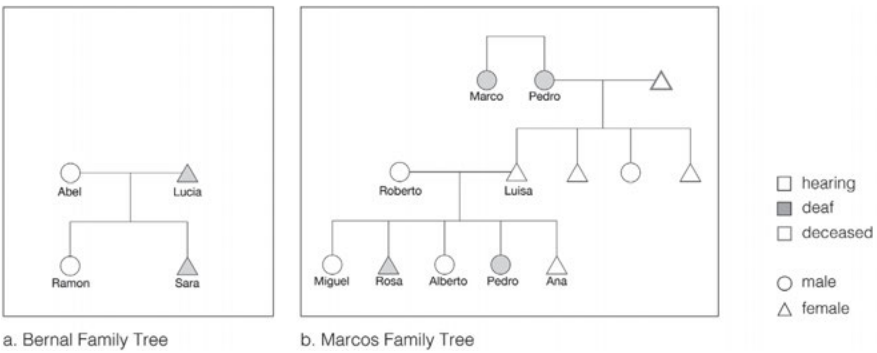


Figure 3: (a) Bernal Family Tree and (b) Marcos Family Tree.

Homesigners in peer ecologies in Nebaj

Four homesigners in the study attend the local school for special education (EOEE) together: Tomás (age 14) and Diego (age 16) are cousins, and Jose (age 10) and Juana (age 14) are siblings. Prior to a few years ago, Tomás and Diego lived in adjacent houses, although now they live quite a distance from each other. All four students have attended the EOEE school for at least 4 years. At the school, Tomás, Diego, Jose and Juana interact with up to four other deaf students. In past years, the deaf students were in different classrooms, but more recently all of the deaf students have been in a single classroom, despite variable age and academic experience.

There is a gender imbalance at the school, with significantly more male students who are deaf than female. Over the four years that I have worked at the school, there were three to six deaf students who are male, but Juana has been the only female deaf student. The boys play games together during free times and other hearing students at the school gesture with them where they are able (the school includes students with a range of cognitive and physical disabilities between ages 4 through 18). Though Juana sometimes interacts with the other male students who are deaf, she often chooses not to engage in their games, or is not included by the boys. I have observed Juana to cultivate casual friendships

with other students at the school who are hearing, particularly another female student who was roughly the same age. The two girls would remain in the classroom during recess, while the boys would be outside in the yard playing marbles or card games. Juana and the hearing student did gesture with each other during recess and class, often shielded by a workbook, propped up to hide their gestures from the boys.

Instruction at the school is provided in a combination of spoken Ixil and Spanish. One of the teachers at the school has been trained to teach special education and obtained an illustrated dictionary of Guatemalan Sign Language (LENSEGUA). For a period of time, the LENSEGUA manual alphabet was posted at the school, and some of the teachers occasionally use common signs (e.g., for 'house' and 'sit') when they are talking to deaf students. The students also have limited access to the illustrated dictionary by ASORGUA, the Guatemalan Association for the deaf, and Jacinto and Antonio have copies of an illustrated picture dictionary that I made for them to have at home. Few students at the school have made progress reading and writing Spanish. Tomás, Diego and Jose rarely use lexical signs from LENSEGUA with each other and I have never observed them to use LENSEGUA with any hearing family members.

5 Child homesign lexicons: elicitation methods and annotation

5.1 Lexical elicitation task

The data for this study were collected in June and July, 2015, December 2015, and June and July 2016. I travel to Nebaj for three to eight weeks each summer and spend time visiting with families and volunteering at the EOEE school. I stayed in a small hostel owned by a local family and traveled around Nebaj and to neighboring *aldeas* with friends from Nebaj who are native Ixil speakers. I visited families with at least one friend from the community who knows the family either through their relatives or neighbors.

Familes and children were recruited through local contacts from Nebaj, particularly facilitated by Las Mujeres y Hombres por la Paz, a local collective of women and men. My visits with families in their homes lasted for up to three hours. I engaged participants in a variety of semi-structured elicitation, play and conversation. All of the sessions were recorded with the consent of participants. When visiting families, I took a set of toys and books that have been

used in other studies of homesigners in the United States, Turkey, Taiwan and Nicaragua (Goldin-Meadow et al. 2009; Coppola, Spaepen and Goldin-Meadow 2013). Participants also watched short video clips on a laptop and described them to an interlocutor. The primary interlocutor was either the author, or a deaf or hearing relative, friend or neighbor. When I was the interlocutor, I used Spanish to communicate with family members and gestures to communicate with homesigners. These were often simple conventional gestures, such as turning my hands over, in a palm-up gesture, to prompt a response or indicate a question, but also nods, points and pantomimed actions. The lexical elicitation task that I used to collect data for this study is fairly simple and required minimal instructions or prompting. All of the child participants appeared to understand the task.

Participants were given a book with photos of familiar animals, foods, vehicles, clothing, tools, people and places and encouraged to describe each picture. I took these photos in Nebaj during the first trip to the field so that the images would be familiar and identifiable to anyone from the area, some examples are presented in Figure 4. The photo book was one of the first items that many participants interacted with during sessions, as they enjoyed seeing images of everyday objects and items that they had in their homes and yards.

Figure 4: Sample images from the stimulus set. Stimulus set included: food (tomatoes, upper left), vehicles (truck, upper right), animals (pig, lower left), and utensils/tools (hatchet, lower right). All photos were taken by the author in Nebaj, Guatemala and were familiar to the participants in this study.

Although the full set of photos in the book includes 65 items from the following categories: people, animals, food, utensils/tools, structures/locations and vehicles, a subset of 12 items[12] were selected for analysis for this task. The stimuli items used in this analysis are presented in Table 2.

Table 2: Stimulus items for this analysis.

Type	Photo	Description	Quantity
Vehicle	Bicycle	man riding a bicycle	1
Vehicle	Car	car parked (no people in photo)	1
Vehicle	Truck	large truck parked (no people in photo)	1
Vehicle	Van	microbus van waiting for passengers (man on cell phone in photo)	1
Animal	Cat	grey cat sitting on the floor	1
Animal	Pig	pig in grass	1
Animal	Dog	dog sniffing a trashbag	1
Animal	Turkey	turkeys standing in pen	2
Food	Tomatoes	medium tomatoes (in a pile)	5
Food	Pineapple	pineapple	1
Food	Potatoes	small potatoes (in a pile)	3
Food	Chilies	chilies, red, green and yellow (in a pile)	12
Utensil/Tools	Mug	mug on a shelf	1
Utensil/Tools	Padlock	unlocked padlock with key	1
Utensil/Tools	Paintbrush	paintbrush	1
Utensil/Tools	Hatchet	hatchet	1

The aim of this task was to elicit homesign labels for the items in the photos. The task was completed by 9 child homesigners, presented in Table 3 below. As described above, homesigners rarely had trouble identifying the objects in the photos and producing a sign to describe them. In fact, they often produced more than one sign to describe the item in the photo. The annotation system for this task is described in section 5.2. If a signer did not recognize an item, or appeared to not have a sign for the item, frequently indicated by shrugging their shoulders or a slight wave of an open, flat hand, then the task would proceed. This task has

12 These 12 items were selected because at least 7 out of 9 participants provided at least one sign for each photo and appeared to recognize the items in these photos. They were also chosen to achieve a balanced set of photos with 4 instances from each of the four categories. In ongoing work, the full set of 65 items is being analyzed.

been repeated with many participants longitudinally, across the four years.[13] In future analyses, these data will be used to evaluate the stability of homesigner sign forms over time.

Table 3: Participants who completed the lexical elicitation task.

Participant	Age	Relatives who are deaf	School
Antonio	6;1	None	Regular Elementary School
Rosa	7;7	Grandfather, Younger Brother	EOEE (as of 2017, sporadic attendance prior)
Jacinto	9;3	None	Regular Elementary School
Jose	10;2	Sister (Juana)	EOEE
Sara	10;6	Mother	Regular Elementary School
Alejandro	12;0	None	Regular Elementary School
Tomás	13;4	Cousin (Diego)	EOEE
Juana	14;5	Brother (Jose)	EOEE
Diego	16;3	Cousin (Tomás)	EOEE

5.2 Annotating signs

Sign forms produced by the participants were annotated by hand using ELAN, an annotation software developed at the Max Planck Institute for Psycholinguistics in Nijmegen (Brugman and Russel 2004). The system for annotation is based on coding systems used for homesign systems and emerging sign languages described in Brentari et al. (2015) and Goldin-Meadow (2003).

All of the communicative signs elicited for a photo were annotated. For a sign to be considered communicative, it must have been directed to an interlocutor and it must not have been an imitation of the preceding form produced by the interlocutor or a functional act performed on a toy or tool. All signs that met the criteria above were annotated, including deictic forms – points used to draw

13 This means that this was not the first time that most of the participants had completed this task. For all but two participants (Jose and Juana), participants had completed this task one year earlier and in some cases for the preceding two or three summers. One reviewer asks whether this repetition could have affected participants' responses. While it is possible that completing the picture labeling tasks caused participants to be more consistent in their sign forms (because they became familiar with the stimulus photos over time) this is not something testable without comparing participants' individual stability longitudinally, something that is planned for future analyses.

attention to specific exemplars or locations in the immediate context – and discursive markers – used to indicate affirmation, negation and inquiry (e.g., head nods to indicate affirmation, palm-up gestures to indicate confusion or inquiry). This analysis focused on deictic and iconic signs. Signs that were annotated as discursive markers and signs that were extraneous to the task, including signs directed to other people present and longer narratives about the people, places or items in the photos were thus excluded from this analysis.

The majority (7 out of 9) of the participants produced 1 to 4 signs to describe each photo. Where participants provided longer descriptions and narratives about the photos, a decision was made between the coder – a trained, hearing research assistant from the Goldin-Meadow lab at the University of Chicago – and the author about whether the signs constituted a response to the stimuli photo or a comment about items and events in the surrounding context.[14] The author was present at all elicitation sessions and could provide clarification about some interactions, however, where it was unclear what participants were referring to in a description, their signs were annotated as Q-Ref (indicating that the referent is unclear based on the context of the utterance) and the representational strategy as *Other*.

We coded each sign for its referential strategy. The referential strategy describes the relationship between a sign and its referent (see section 2.1). The majority of signs related to the referent through either indexicality or iconicity, thus the two primary categories were deictic signs and iconic signs. Iconic signs were further coded for the iconic relationship between the signer's hands and the referent using categories developed in Padden et al. (2013, 2015) and Hwang et al. (2017).

5.3 Indexical (deictic) signs

Deictic signs were a common strategy used by some, but not all of the participants (a result presented below in section 6.1). Deictic signs were used by participants

14 It is difficult to know whether participants are providing a "lexical item" or a description of the particular person, animal, object or event in a given photo. One way to address this in future studies is with an analysis of other semi-spontaneous conversational data from the same participants where they discuss similar topics. If they use the same form for the same referent in these other contexts, then we can be more confident that the sign form (or series of sign forms) is/are functioning like a lexical item in the system. This analysis, however, is outside the scope of this chapter, so we describe the strategies in the signs that were elicited without making a judgment about their status in the larger sign system.

when describing stimuli photos to indicate either an example of the item in the photo, physically present in the context, for example, a point to a dog in the yard, IX:DOG, to describe a photo of a dog. Participants also used deictic signs to indicate a prototypical location for the item in a stimulus photo, for example, a point to a road, IX:LOC-ROAD, to indicate that this is where they typically see cars, trucks, or vans. These signs also frequently indexed locations in their yard, or a neighbor's yard where they knew an animal or item could typically be found, e.g., a point to the neighbor's yard, IX:LOC-YARD where there a horse is often kept, even if the horse is not there presently, to describe a photo of a horse. Deictic signs indicating a physically present referent accounted for 32% (N=13) of all deictic signs while deictic signs indicating a typical location for a referent not physically present or not visible accounted for 67% (N=27) of deictic signs.[15]

Signers sometimes used pronominal pointing signs, to indicate themselves or others, for example to indicate that they like to eat spicy chilies, in a response to a photo of chilies, a signer might point to themselves, IX:PRO-1. Signers also produced pronominal points to refer to a person they associated with the item in the photo, for example, pointing to their father IX:PRO-3 to describe a photo of a hat worn by most men in Nebaj, or pointing to their aunt IX:PRO-3, in a description of a photo of a backstrap loom or weaving because their aunt weaves. Pronominal pointing signs (N=9) were excluded from this analysis. Significantly, however, all of these deictic signs are temporally or contextually contingent. They are only meaningful when the referent is physically present (in the example of a deictic gesture to an actual exemplar of a dog) or in the case that the interlocutor knows, for example, that those neighbors keep a horse in their yard. We explore this point further in the discussion.

5.4 Iconic signs

Our annotation system was comprised of four iconic strategies, signs that shared a form with one of four conventional gestures commonly produced by hearing Nebaj residents (see section 5.4.5) and one additional category for signs that were difficult to assign to one of the iconic strategies (see section 5.4.6). When the signer's body represented a human body, the sign was coded as using an *enactment* strategy. When the signer's body did not represent a human agent and their handshape represented a size or shape dimension of the referent, the sign was coded as using a *hand-as-object* strategy. If the signer used their body

15 In 1% of cases, we were unable to determine the referent of the deictic sign.

to represent the body of an animal and their hands to represent the body part of an animal, the sign was coded as using a *hand-as-body-part* strategy. Iconic signs that did not meet any of the criteria above were coded as *other*. These iconic strategies are summarized in Table 4 and described in detail with examples from the data in sections 4.4.1–4.4.4.

Table 4: Summary of Iconic Strategies used by Homesign Participants.

Iconic Strategy	Signer's body represents	Signer's hand resembles	Movement of the Sign resembles	Example
Enactment: Hand-as-hand iconicity	body of a human actor	the handshape that would be used to manipulate the referent	the movement of acting on or manipulating the referent	The sign PAINT in which the signer's body represents a human body and their hand resembles a human hand holding a paintbrush (see Figure 5). The movement of the sign resembles the movement of painting.
Enactment: Hand-as-object iconicity	body of a human actor	the shape of the referent	the movement of acting on or manipulating the referent	The sign PAINT in which the signer's body represents a human body and their hand resembles the shape of a paintbrush (see Figure 6). The movement of the sign also resembles the movement of painting.
Hand-as-object iconicity (SASS)		a size or shape dimension of the referent	sign is stationary in neutral space in front of the signer's torso or the movement of the two hands represents a size dimension	The sign SMALL-ROUND-SHAPE in which the signer's handshape resembles a small round object (see Figure 8)
Hand-as-body-part iconicity	body of an animal	the shape of a body part	Sign is stationary at an iconic location on the body, or movement traces the extent of the body part	The sign BEAK in which the signer's head represents the head of a bird and their hand resembles the shape and location of a beak (see Figure 9).

5.4.1 Enactment: Hand as hand iconicity

Enactment signs with hand-as-hand iconicity (*handling* in Padden et al. 2013, 2015; *manipulation* in Hwang et al. 2017) encoded an interaction between a human agent and the object. Three examples of this iconic strategy are provided in Figure 5. When the signer produced an enactment hand-as-hand sign, their body represented the body of a human acting on the referent, and their hands iconically resembled the handshape that would be used to act on or manipulate that referent. The movements of these signs resembled the movements that would occur during the manipulation of the referent, thus in the example of the sign STEER, below in Figure 5, the signer repeatedly moved his hands up and down slightly in the movement that would be used when driving a car. In the sign PAINT, the signer moved her hand up and down above her head, in the movement that would occur if someone were painting a vertical surface. Hand-as-hand signs included signs for acting directly on the referent (for example, the signs EAT and PAINT, in Figure 5), but also signs for using a tool to act on the referent, such as signs in which the handshape resembled a handshape for holding a tool to peel something such as a potato. These signs were very common throughout the dataset and were produced by all homesigners.

Figure 5: Examples of enactment: hand-as-hand signs, including STEER (left photo) produced to label the photo of a car, PAINT (middle photo) produced to label the photo of a paintbrush and EAT (right photo) produced as part of a label for pineapple.

5.4.2 Enactment: Hand as object iconicity

Enactment signs with hand-as-object iconicity (*instrument* in Padden et al. 2013, 2015; *manipulation* in Hwang et al. 2017) also represented an interaction between a human agent and the referent. Three examples of hand-as-object iconicity are provided below in Figure 6. In these enactment signs the signer's body represented a human actor's body, similar to enactment signs with hand-as-hand iconicity. The signer's handshape configuration, however, resembled the shape of the object itself, rather than the handshape that would be used if one were manipulating the object. The movement of hand-as-object signs resembled the movement that would occur if the referent were being used to perform an action. Thus in the sign CHOP, below in Figure 6, the signer brought his hand downward in a short, vertical motion resembling the motion of chopping something. In the sign PEEL, the signer slid her hand up her arm. This movement resembled the movement that would occur if someone were peeling a potato. In the examples in Figure 6, all of the signs also include the secondary hand, often representing the entity being acted on by the signer in the manipulation. In future studies we will analyze whether it is more common for signers to use their non-dominant hand in this way for enactment: hand-as-object signs relative to enactment: hand-as-hand signs. Signs with enactment: hand-as-object iconicity were common throughout the dataset and were produced by all participants.

Figure 6: Examples of enactment: hand-as-object signs, including PEEL (left photo) produced to label the photo of a potato, PAINT (middle photo) produced to label the photo of a paintbrush and CHOP (right photo) produced as part of a label for tomato.

Enactment strategies

For many signs with enactment iconicity, the same action can occur with both hand-as-hand iconicity and hand-as-object iconicity. Figures 5 and 6 both include examples of the sign PAINT, in Figure 5, the signer uses a hand-as-hand sign and in Figure 6, the signer uses a hand-as-object sign.

Padden and colleagues (2013) have documented systematic preferences for hand-as-hand iconicity or hand-as-object iconicity across the lexicon in a number of standard sign languages. Brentari et al. (2015) also cite the distribution of hand-as-hand versus hand-as-object dominance in the lexicon as a potential source of typological variation in established sign languages. In this volume, Safar and Petatillo Chan document the use of these iconic strategies in Yucatec Maya Sign Language (YMSL), finding that some dialects of YMSL (specifically the dialect used in Chicán) show a strong preference for instrument, or hand-as-object iconicity, in a survey of the lexicon. While we do not discuss the preference for a particular iconic strategy across the lexicons of child homesigners, we are investigating this in ongoing work (Rissman et al. 2017, 2018). In addition to a preference grounded in the language, Ortega and Özyürek (2016) observe that certain objects seem to elicit particular iconic strategies also in hearing gesturers. The interaction of the type of object and the general tendency across the lexicon of a system remains an open question for our future work.

The difference between hand-as-hand and hand-as-object iconicity has previously been studied in child homesign systems (Hunsicker and Goldin-Meadow 2013), where it is argued to mark a distinction between nouns and verbs. A similar pattern is reported in the shared homesign system of a group of siblings in Chiapas, Mexico (Haviland 2013). In these systems, hand-as-hand iconicity was used to refer to actions, while hand-as-object iconicity was used to refer to objects (Safar and Petatillo Chan, this volume, point out that an association between a particular iconic strategy and actions or objects does not automatically entail that the strategies are used to mark a grammatical distinction in the language). In the current study, grammatical distinctions were not the focus of the analysis. All of the stimulus photos included only the target item on a neutral background (sometimes one or more items, see Table 2). There was not a human agent in the photos using or acting on the objects, except for one item – bicycle, in which a person was riding the bicycle in the photo. In ongoing work, we are comparing the signs that homesigners use to describe photos and short video clips of stationary items, versus a person acting on the items, to better understand the strategies that signers use to distinguish actions from objects.

5.4.3 Hand as object iconicity (SASS)

When the signer's hands were not representing an action, either through the movement of the sign, or through an indication that the body represented a human actor, the signers often produced signs that iconically resembled a particular dimension of the referent. This could be the size of the referent, with a contrast between large and small, short and tall, or short and long. These signs also represented the shape of the referent, whether a flat object or a round object. These signs were coded as *hand-as-object* iconicity (*modeling* in Kendon 2004 or *object* in Hwang et al. 2017).

In other studies of standard, young, emerging and village sign languages, these forms are often referred to as size and shape specifiers (SASS), and they have been described for almost all of the sign systems that are currently documented (Klima and Bellugi 1979; Supalla 1982, though see Nyst 2007). In a 2016 study, Nyst presents an extensive taxonomy of SASS signs based on data from Adamorobe Sign Language (AdaSL), used in an Akan village in Ghana. Nyst (2016) identifies two kinds of iconicity: shape for shape depiction and distance for size depiction. Both of these types of depiction can occur with or without movement between two hands. In the following sections, we discuss these strategies in the dataset from Nebaj.

Hand-as-object signs with movement

In hand-as-object signs, movement of the hands represents the extent of the shape or a change of size, but not the movement that would be produced if a person were acting on the object or if the object were moving through space. In this dataset, very few hand-as-object signs involved movement, those that did often represented a size dimension, such as TALL, in which both hands were raised above a signer's head or long, in which the two hands moved apart to indicate a length dimension (see Figure 6). Hand-as-object signs with this kind of movement were only produced by two signers and occurred three times in this dataset.

TALL

LONG

Figure 7: Examples of hand-as-object sign showing a size dimension, TALL (left photo) produced to label the photo of a van.

Static hand-as-object signs

The remaining hand-as-object signs were static and involved one or two hands. The distance between two articulators represents a size dimension of the object (*distance for size* iconicity from Nyst 2016), or the configuration of one or two articulators represents the shape of an object (*shape for shape* iconicity from Nyst 2016). Examples of each kind of iconicity are given in Figure 8 below. These two iconic strategies could overlap, as seen is Figure 8c, in which the signer's sign indicates both the shape of the object, shape-for-shape iconicity and the size of the object – distance-for-size iconicity.

STATIC:
SMALL DIMENSION

STATIC:
SMALL SHAPE

STATIC:
LARGE SHAPE

Figure 8: Different Types of Iconicity in hand-as-object signs.

The left image shows *distance for size* iconicity, the signer indicates the length of a referent with the space between his hands. He describes a photo of a chili. The middle image *shape for shape* iconicity, the shape of the signers hand represents the shape of the referent. He describes a photo of a tomato. The right image shows *shape for shape* and *distance for size* iconicity, the shape formed by the signer's hand resembles the shape of the referent and the space between the two hands represents the size of the object. She describes a photo of a pineapple.

Static hand-as-object signs were produced frequently by the participants. They often used them in combination with an additional iconic sign, a process that has been described as compounding in Al-Sayid Bedouin Sign Language (ABSL), a young village sign language used in Israel (Sandler et al. 2011; Tkachman et al. 2013). The compounding process for ABSL (and also YMSL, Safar and Petatillo Chan, this volume) involves a SASS sign that is suffixed onto an iconic sign. The iconic sign typically resembles how the object is used. This strategy is also described in a family homesign system used in Chiapas, Mexico one strategy for marking nominal arguments (Haviland 2013). We plan to explore the question of the emergence of this strategy in child homesign in future work.

5.4.4 Hand as body part iconicity

The homesigner participants in the study used an additional iconic strategy, in which their body represented the body of a non-human entity, frequently an animal. They then used one or both hands to represent an additional body part of an animal. In Figure 9, for example, the signers use a hand to represent the mouth of a dog, the beak of a bird, and the feathers of a turkey. In these signs, the placement of the hands provides information about the body part that is being represented, and this relative location is what indicates that their body acts as a stand-in for the animal's body.

I have observed signers to occasionally use this strategy for inanimate items, for example, using the human head to represent the shape of a pineapple and a hand to represent the leaves coming out of the top of the pineapple, but in this dataset, this hand-as-part strategy was only used in descriptions of other animate referents.

Figure 9: Examples of hand-as-body-part signs. The left image shows the sign BARK, produced to describe a photo of a dog. The middle image shows the sign BEAK, produced to describe a photo of a turkey. The right photo shows the sign FEATHERS, also produced to describe a photo of a turkey.

5.4.5 Signs with the same form as conventional gestures used by Ixil speakers

Some signs produced by participants resembled conventional gestures used by hearing Ixil speakers in Nebaj (see Le Guen et al., this volume, for more discussion of these conventional gestures in Mesoamerica). The forms of conventional gestures were verified in at least two of three possible sources: an informal pilot study to collect emblems from hearing speakers of Ixil in the Nebaj community based on an emblem elicitation task described in Johnson et al. (1975) (Horton, unpublished data), a dictionary of conventional gestures in Mexico and Latin America (Meo-Zilio and Mejía 1981, 1983), and a descriptive account of regional sign systems proposed by Fox Tree (2009). There were four conventional signs (ANIMAL,[16] BIRD, EAT and DRINK) that were attested in at least two of three of these sources and that were also common in the productions from deaf homesigner participants in this study. They are illustrated in Figure 10 and described in Table 5 below.

16 Le Guen (this volume) notes that the gestures that are glossed as BIRD and ANIMAL in this chapter are conventional gestures throughout Mesoamerica, used to refer to the size of an animal or bird. In this chapter, I refer to these forms with the gloss animal and bird, as I have not conducted a detailed analysis to determine whether the participants in this study appear to use this form to indicate size in the way that hearing speakers do when gesturing while talking.

Table 5: Summary of Conventional Forms.

Gloss	Form	Attested Sources	Iconic Strategy
EAT	Loose B-Hand waved in front of signer's mouth	Survey of co-speech emblems of Ixil speakers in Nebaj (Horton, unpublished data); Meo-Zilio & Mejía (1980: 79)	Other Iconic Strategy[17]
DRINK	Hand in fist with Thumb extended, raised and moved toward and away from signer's mouth	Survey of co-speech emblems of Ixil speakers in Nebaj (Horton, unpublished data); Meo-Zilio & Mejía (1980: 52)	Enactment: hand-as-object
ANIMAL	B-hand, palm oriented to signer's midsagittal plane (several variants for placement and movement)	Survey of co-speech emblems of Ixil speakers in Nebaj (Horton, unpublished data); Fox Tree (2009: 335, 341); Meo-Zilio & Mejía (1983: 54)	Other Iconic Strategy
BIRD	Curved, spread B-hand, palm oriented down, held at mid-chest height. Second hand: curved, spread B-hand, palm oriented up, held below the dominant hand.	Survey of co-speech emblems of Ixil speakers in Nebaj (Horton, unpublished data); Fox Tree (2009: 356)[18]	hand-as-object (SASS)[19]

While the conventional gestures for EAT and DRINK were easily elicited from hearing speakers of Ixil, the gesture for ANIMAL was not produced spontaneously by some of the hearing participants when they completed the emblem elicitation task, based on Johnson, Ekman, and Friesen (1975). This could be evidence for variability in the distribution of and familiarity with conventional co-speech gestures across the hearing community. Alternatively, this could be due to the participants' interpretation of the task and the typical use of these gestures to

17 Although the place of articulation of this sign is iconic (articulated at the mouth, with the mouth typically open), the waving movement at the mouth lacks a transparent relationship with the act of transferring food to the mouth, thus it was not considered iconic in our coding system.
18 Fox Tree describes a form that is similar to the form elicited for BIRD from multiple deaf signers and hearing Ixil speakers. The form that is illustrated in Fox Tree, however, represents the palm of the dominant hand facing outward, away from the signer's body. He reports that in Nahualá (Western Guatemala) this form is used to refer to infants, while in Chiapas it refers to corn/maize ears.
19 Le Guen et al. refer to these forms as manual classifiers (Le Guen et al., this volume) and note that the forms BIRD and ANIMAL are common throughout Mesoamerica

Figure 10: Signs that have the same form as conventional gestures used by hearing people in Nebaj. These are the signs for ANIMAL, BIRD, DRINK and EAT. Top row: child homesigners producing conventional gestures from the hearing community during the lexical elicitation task. Bottom Row: Hearing speakers of Ixil producing conventional gestures during emblem elicitation task.

provide size information about animals.[20] These data are also from a gesture elicitation task – hearing Ixil speakers were asked how they would use their hands to tell someone they were hungry, for example. It is still possible that in a comprehension version of this task, a speaker would easily understand and give a definition for the gestures that were unevenly produced in the elicitation task.

Conventional gestures need not be iconic, but many forms do resemble some component of their referent. For example, the conventional gesture glossed as DRINK represents a cup, or a hand holding a cup, bringing a drink to the mouth (see Figure 10). Conventional gesture forms may be less likely to encode particular distinctions between objects. For example, the same conventional EAT gesture was produced by some participants as a description for elicitation photos of both chilies and potatoes, which are notably different in size and shape, how they are processed and consumed, but both are things that can be eaten. Importantly,

20 I thank a reviewer for pointing this out.

as noted in Table 5, above, some conventional gestures overlap with the other iconic coding categories – the conventional gesture for BIRD, which uses a hand-as-object iconic strategy, and the conventional gesture for DRINK, which uses an enactment iconic strategy – but in this data, when homesigners produced these forms they were coded as *signs from conventional gestures*, rather than enactment or hand-as-object signs.

5.4.6 Other iconic strategies

Participants did produce signs that appeared to be iconic, either in their place of articulation or movement, but which were not clearly iconically related to their referent using the strategies listed above. When signs did not clearly use one of the iconic strategies in our system, they were coded as Other-Iconic. These included signs for which the handshape did not iconically represent the object but the movement of the sign and its location represented the action of going or driving in a back and forth motion (typically used in descriptions of vehicles).

In the next section, we present the results of the data that were coded using the categories described above. Participants produced signs that varied in their iconic strategies and we begin by discussing the distribution of strategies for each individual (section 6.2) and then discuss whether participants associated particular iconic strategies with particular types of items from the stimulus set (section 6.3).

6 Results: Referential and iconic strategies in shared homesign systems in Nebaj

The nine participants (3 female, mean age 11;1) who completed the elicitation task for this study produced a total of 482 signs to describe the 12 stimulus photos listed in Table 2 (section 5.1). Among them, 37 of these signs were discourse markers, including head-nods to indicate agreement or palm-up gestures to indicate uncertainty; 61 signs were deictic, and were directed at the elicitation materials and 43 signs were unrelated to the task, either directed at other people or describing other events happening in the context. These signs (29% of the total number of signs) were excluded from further analysis.

In the following sections, we describe the distribution of referential and iconic strategies in this set of 328 signs. We begin by discussing the production of indexical (deictic) signs and iconic signs in section 6.1. In the next section, the distribution of the five iconic strategies described above (section 5.4) is presented. We then present

these iconic strategies relative to the category of the sign referent (animal, food, tool, vehicle) to address whether there is evidence for patterned iconicity in child homesign lexicons. In the final section we discuss the use of conventional gestures common to the hearing community in which homesigners are socialized.

6.1 Referential strategies in homesign systems: Indexical and iconic

In this section, we discuss the relationship between characteristics of the participant, particularly age, but also communicative ecology type – individual, family or community – and the use of indexical versus iconic referential strategies. The 328 signs that comprise the data were not evenly distributed across participants: the average number of signs per response for each individual ranged from 1.1 to 6.7, with a mean of 2.3 signs per response. The average number of signs per description are presented in Table 5.

Table 5: Rates of Signing – Including and Excluding Deictic Signs.

		Including Deictic Signs		**Excluding Deictic Signs**	
Participant	*Age*	*Mean signs per Description*	*Maximum signs in a Description*	*Mean signs per Description*	*Maximum signs in a Description*
Antonio*	6;1	2.1 (.2)	4	1.3 (.3)	2
Rosa*	7;7	6.7 (1.4)	22	1.8 (.6)	9
Jacinto	9;3	3.6 (.5)	8	2.1 (.2)	5
Jose	10;2	1.4 (.2)	3	1.4 (.2)	2
Sara	10;6	1.8 (.2)	4	1.6 (.2)	3
Alejandro	12;0	1.1 (.1)	2	1.1 (.1)	2
Tomás	13;4	1.1 (.1)	2	1.1 (.1)	2
Juana	14;5	1.1 (.1)	2	1.1 (.1)	2
Diego	16;3	1.9 (.2)	3	1.9 (.2)	3

**Antonio and Rosa both produced descriptions that consisted of only deictic signs*

Most homesigners produced just over one sign per description, with a maximum description of 2-3 signs for any single description. There were three participants, however, who produced more signs per response than the other child homesigners, including Antonio (age 6;1, 2.1 signs per response), Jacinto (age 9;3, 3.6 signs per response) and Rosa (age 7;7, 6.7 signs per response). When we evaluated the distribution of referential strategies, either indexical or iconic, we found that

these were also the three participants who produced the most indexical (deictic) signs. For Rosa, 74% of her signs (N=79) were deictic, for Jacinto, 40% (N=23) of his signs were deictic and for Antonio, 39% (N=13) of his signs were deictic. Two of the participants (Antonio and Jacinto) are individual homesigners, while Rosa has deaf relatives (shared family homesign system). They are also the three youngest participants in the study.

When we excluded deictic signs, Jacinto, Antonio and Rosa produced iconic signs at similar rates to the other older homesigners. Based on a comparison of the rates of signing with and without deictic signs in Table 5, we conclude that younger homesigners are more likely to use deictic signs, but that they use these in addition to iconic signs.[21] This result is discussed further in section 7.1. The remaining analyses are conducted on the subset of signs that involved an iconic referential strategy.

6.2 Iconic strategies in shared homesign

In this section, we discuss the relationship between characteristics of the participant, particularly their communicative ecology type – individual, family or community – and the proportion of the iconic strategies described in section 6.4 in all of the signs that they produced for the lexical task. For each individual, we calculated the proportion of enactment iconicity, including: hand-as-hand and hand-as-object, hand-as-object iconicity without enactment (similar to SASS signs) and hand-as-body-part iconicity as well as signs from conventional gestures and signs with other types of iconicity. The distribution of these strategies for each participant is shown in Figure 11 below. We discuss which iconic strategies were used by all participants, which strategies were less common, and which strategies vary by communicative ecology.

Enactment iconic strategies: hand-as-hand and hand-as-object
Signs with an enactment iconic strategy were the most common type of iconicity for the majority of the child homesign participants. All participants produced at least some signs with enactment iconicity, and for six out of nine signers (Antonio,

21 One reviewer notes that this could be an effect of the task. This is possible, that signers are inclined to indicate referents that are readily available in context when shown a picture of familiar items. I note, however, that all of the participants had equal opportunity to use either an iconic or deictic sign, as all completed the same task. Only the younger participants produced such high proportions of deictic signs.

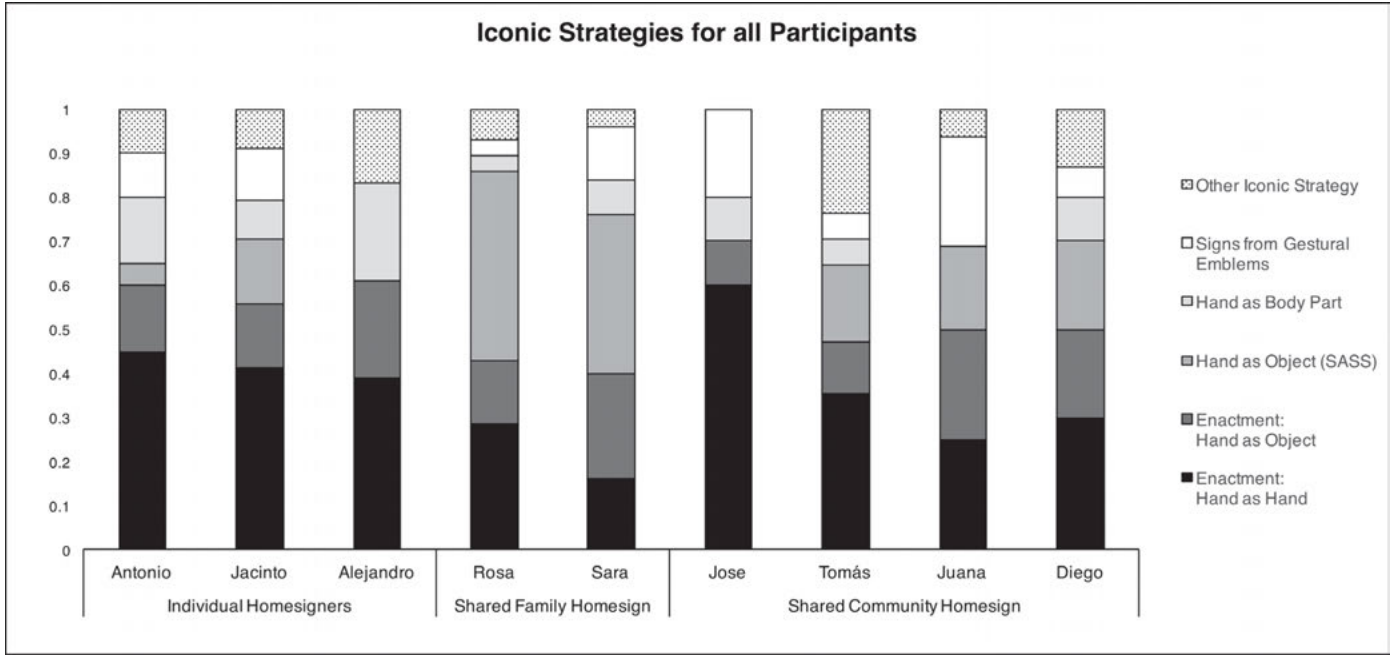


Figure 11: Distribution of iconic strategies for each participant. Individual homesigners appear on the left, family homesigners in the middle and community homesigners on the right. Four iconic strategies – enactment: hand-as-hand, enactment: hand-as-object, hand-as-object (SASS), hand-as-body-part and signs from conventional gestures, plus an additional category of other-iconic strategy, are shown as a proportion of all the iconic signs that the participant produced.

Jacinto, Alejandro, Jose, Juana and Diego), this constituted at least half of the signs that they produced. There were two types of enactment iconicity: forms in which the signer's hand resembled a human hand manipulating an object (hand-as-hand iconicity) and forms in which the signer's hand resembled the shape of the object (hand-as-object iconicity). The three individual homesigners used more hand-as-hand iconicity in their enactment signs than hand-as-object iconicity, while the remaining homesigners used hand-as-hand and hand-as-object iconicity at roughly equal rates (with the exception of Jose, a community homesigner who produced the highest rates of enactment: hand-as-hand signs as any of the other participants).

In general, enactment, in which the signer's body represents a human actor's body, is a very common iconic strategy when signers are labeling the familiar objects in this task. In section 6.3, we explore whether the type of referent affects the use of enactment signs.

Hand-as-object (SASS) iconic strategy

When the signers represented the shape or size of the referent with their hands, and their body or the movement of the sign did not resemble a human actor or an action associated with the object, the strategy was considered hand-as-object iconicity. This type of iconicity was used by all but two homesigners – Alejandro and Jose never produced a hand-as-object signs – however, not all signers produced an equal proportion of hand-as-object signs. Most notably, Sara and Rosa, the two family homesigners, produced a higher proportion of hand-as-object signs compared to the other groups of homesigners. We consider what kinds of referents were more likely to be described by hand-as-object signs in section 6.3. Importantly, while enactment signs are produced frequently by all signers, hand-as-object (SASS) is an iconic strategy that is unevenly used by signers, and is never used by some signers.

Hand-as-body-part iconic strategy

The homesigners in this study produced signs in which their body represented the body of an animal and their hand represented a salient body part of that animal, for example the mouth of a dog or the ears of a horse. These signs used the iconic strategy hand-as-body-part. All but one of the signers used this iconic strategy at least once, however, it was used most frequently by the individual homesigners, Antonio, Jacinto and Alejandro, and more rarely by the remaining participants. This strategy was used almost exclusively for the animal items in the stimulus set, in section 6.3.5 we explore what other iconic strategies were used to represent animals.

Signs with forms similar to conventional hearing co-speech gestures

All but one of the homesigners (Alejandro) produced signs with forms similar to conventional co-speech gestures. The proportion of signs from conventional co-speech gestures was highest for Jose, Juana and Sara. These three participants are all family homesigners (Jose and Juana attend school together with other homesigners as well). These three participants come from smaller families and have a close, hearing sibling who I have observed to communicate with them frequently using homesign. The hearing siblings in these families generally report to me that they are able to understand their sibling who is deaf, though I have not yet verified this with a comprehension measure or task. Importantly, this suggests the possibility that hearing siblings, who interact frequently with a same-aged deaf sibling, might be more likely to incorporate conventional gestures from the hearing community. This could thus become an avenue for the deaf homesigner to assimilate conventional co-speech gestures into their own system of signs.

Other iconic strategies

The final category of iconic strategies included signs that were iconic, but the relationship between the sign and its referent was not clearly one of the iconic strategies discussed above. These were primarily signs produced for vehicles that traced the movement of a vehicle, driving back and forth on a road, or a gesture that was glossed as SPICY, in which the signers hand, in a loose B-handshape shook up and down at the wrist, or waved, to indicate the spiciness of a food, like chilies.[22]

In this section we have presented the results for iconic strategies for each of the individual participants in the study. The most substantive differences occur in the distribution of hand-as-object (SASS) signs, and other-iconic forms. All participants use enactment signs, with both hand-as-hand iconicity and hand-as-object iconicity. In the next section we address the relationship between participant characteristics (whether an individual, family or community homesigner), iconic strategy and referent type.

22 One reviewer notes that this is a conventionalized gesture for "hot" (spicy) and becomes the sign for chili in Yucatec Maya Sign Language (YMSL), an example of a gesture changing/adding meaning when it is taken up in a sign language.

6.3 Iconic strategies by referent type: Patterned iconicity

In this section, we present the distribution of iconic strategies by referent type. As discussed in section 5.1, there were four types of referents in this dataset: animals, foods, tools, and vehicles. Each category had four photos (see Table 2 for full descriptions and Figure 4 for examples). Based on the results from Hwang et al. (2017), we predicted that the category of iconic strategy might be systematically related to the type of referent. We present our results for each of our referent types, within each communicative ecology type, below.

6.3.1 Referent type and iconic strategies in individual homesign systems

The data for the three individual homesigners, Antonio (age 6;1), Jacinto (age 9;3) and Alejandro (age 12;0) are presented in Figure 12. The iconic strategies are organized by the category or type of the referent.

When we evaluate the distribution of iconic strategies for each of the referent types, we find that the individual homesigners Antonio, Jacinto and Alejandro show a strong preference for enactment: hand-as-hand strategies for foods and vehicles. They use roughly the same number of enactment: hand-as-hand and enactment: hand-as-object signs for tools. Antonio only produced iconic descriptions for two out of four possible animal stimulus photos, so his data were excluded for animal referents, but Jacinto and Alejandro both show a preference for hand-as-body-part iconicity for animals. Antonio and Jacinto also produced two signs from conventional gestures – EAT and DRINK (see Figure 10) – for various foods and for the stimulus item 'mug'. They produced an iconic form for vehicles that was coded as iconic-other, this was often a sign tracing a path back and forth, typically taken by a car, motorcycle or truck on a nearby road.

Based on these results, the clearest evidence of patterned iconicity is in the category of animals, where there is a strong preference for a different iconic strategy, relative to the other categories. There appears to be a tendency for individual homesigners to use more enactment: hand-as-object signs for tools, a pattern we will explore further with more data in future analyses. Importantly, we do not observe the pattern reported in Hwang et al. (2017), for signers to use more hand-as-object (SASS) signs in descriptions of foods. Individual homesigners appear to prefer enactment signs for all referent types, except animals. We discuss this result further in section 7.2. In the next section, we present results for family homesigners.

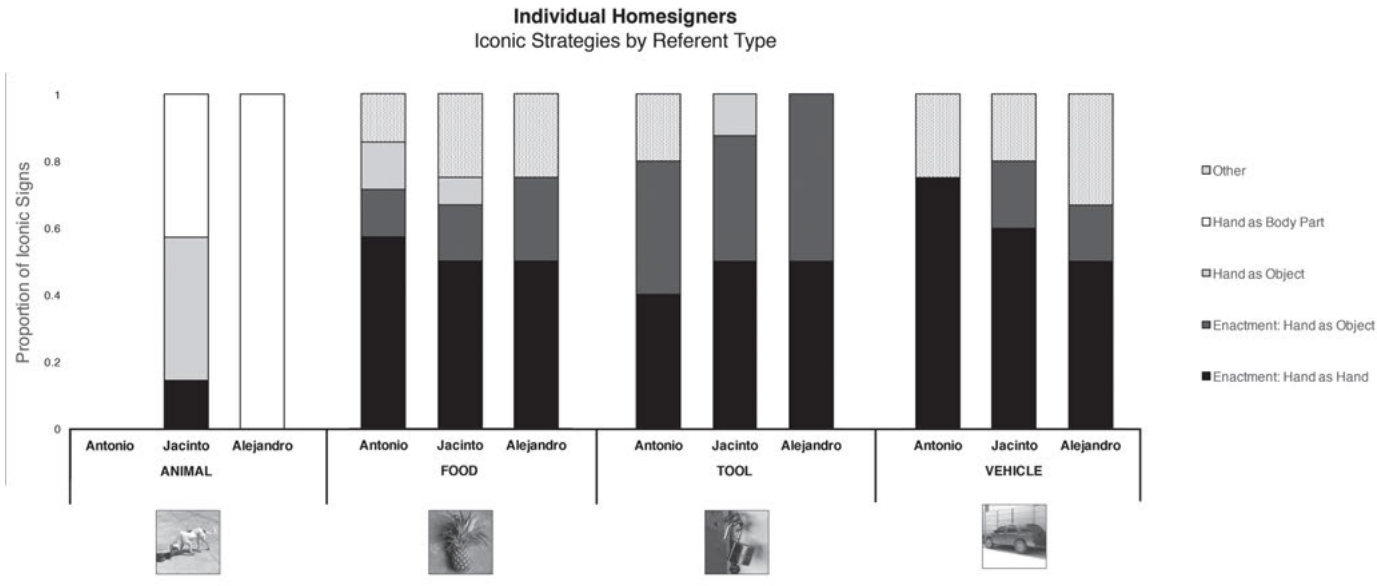


Figure 12: Iconic strategies by referent type for individual homesigners Antonio, Jacinto and Alejandro. The three individual homesigners show a strong preference for enactment iconic strategies for food, tools and vehicles. Jacinto and Alejandro use hand-as-body-part iconicity as well as hand-as-object (SASS) iconicity for animals. Antonio produced iconic signs only for two out of four animal stimulus photos, so his data were excluded here.

6.3.2 Referent type and iconic strategies used by homesigners in family ecologies

In the previous section, we find that individual homesigners did not show patterned iconicity for any referent type except animals. All of the participants tended to produce predominantly enactment iconic strategies in descriptions of food, tool and vehicle stimulus photos. In this section, we present the distribution of iconic strategies for family homesigners, Sara (age 10;6) and Rosa (age 7;7). We find that Sara and Rosa do use different iconic strategies for different referent types, their results are illustrated in Figure 13 below.

Sara and Rosa use different iconic strategies for different referent types. For animals, they used more hand-as-body-part signs (similar to the individual homesigners Antonio, Jacinto and Alejandro), but Sara and Rosa also produced hand-as-object (SASS) signs, often to represent the size of the animal. Sara also used the conventional gesture produced by hearing people to refer to animals (see section 5.4.5). For food referents, Sara and Rosa used primarily hand-as-object (SASS) signs. They also produced enactment signs for food referents. The hand-as-object signs for food typically resembled the shape of the food referent (see Figure 8 for examples). They used enactment signs for tools, using both hand-as-hand and hand-as-object iconicity for these referents. Rosa did not produce enough iconic signs for vehicles to include her data, describing only two out of four referents with iconic signs. Sara, however, used both enactment and hand-as-object (SASS) signs to describe vehicles. The hand-as-object (SASS) signs that Sara used for vehicles were typically descriptions of the size of the vehicle, like the sign TALL, illustrated in Figure 7.

Although they use a range of iconic strategies for different referent types, Sara and Rosa had a distribution of iconic strategies similar to the patterned iconicity observed for standard and village signers in Hwang et al. (2017). They used hand-as-body-part signs for animals, hand-as-object signs for foods and enactment signs for tools. We discuss these results across the groups further in section 7.2 after presenting the results for community homesigners in the next section.

6.3.3 Referent type and iconic strategies used by homesigners in peer ecologies

In the two preceding sections, we found that while individual homesigners only show patterned iconicity for one referent type – animals – family homesigners showed patterned iconicity for all four types of referents: animals, foods, tools and vehicles. In this section we provide the results for Jose (age 10;2), Tomás

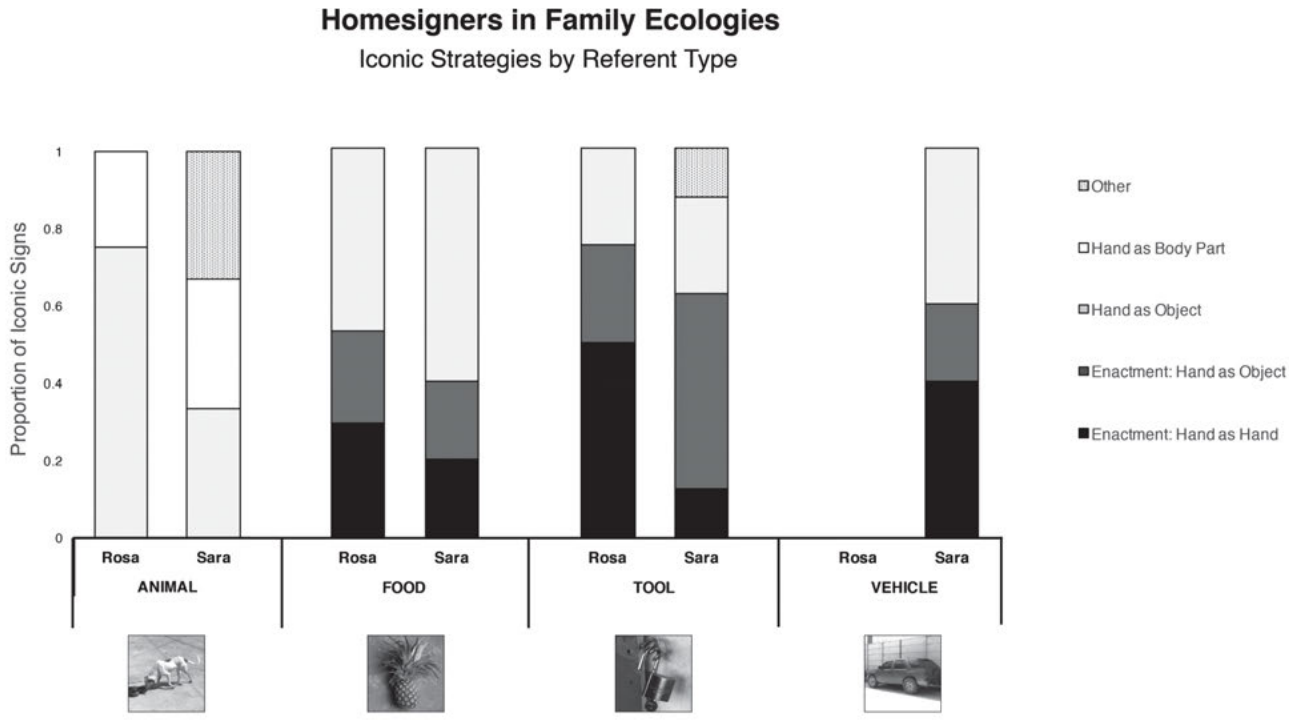


Figure 13: Iconic strategies by referent type for family homesigners Rosa and Sara. The two individual homesigners show a strong preference hand-as-body-part and hand-as-object (SASS) signs for descriptions of animals. They use both enactment: hand-as-hand and enactment: hand-as-object as well as hand-as-object strategies for foods. For tools, they produce primarily enactment strategies, though they differ on the iconic strategy. Rosa only produced iconic signs for two out of four vehicle stimulus photos, so her data were excluded here.

(age 13;4), Juana (age 14;5) and Diego (age 16;3), the four homesigners who attend school together at the EOEE school in Nebaj. Jose and Juana are also brother and sister, and therefore interact with each other at home, as well as in the school setting. The distribution of iconic strategies for Jose, Tomás, Juana and Diego are presented below in Figure 14.

Jose, Tomás, Juana and Diego used different iconic strategies for different referent types, as do Rosa and Sara, the family homesigners. The community homesigners, however, had different preferred strategies for some of the referent types. For animal referents, three out of four community homesigners (Jose, Tomás and Juana) often produced the conventional gesture used by hearing people to refer to animals (see section 5.4.5, Figure 10) (see Le Guen et al., this volume for a discussion of gender differences in use of manual classifiers. He observes that men use this form more often than women). Jose, Tomás and Diego also used hand-as-body-part signs for animals, Juana never used this iconic strategy. For food referents and tools, Tomás, Juana and Diego all used a similar pattern of iconic strategies. They showed a preference for hand-as-object (SASS) signs for food referents and a preference for enactment: hand-as-object signs for tool referents. Jose produced predominately enactment: hand-as-hand signs for both foods and tools. All of the community homesigners used enactment: hand-as-hand signs (specifically the sign STEER, illustrated in Figure 5) to describe the vehicles in the stimulus photo set.

It is interesting that, despite regular contact at school, the community homesigners do not have identical patterned iconicity in this set of signs. The particular outlier in this group is Jose, who not only attends school regularly, but also is Juana's sister, so has even more interaction with a homesigner than Tomás and Diego, who live across town from each other. Despite some variation, this group does still show patterned iconicity. They used a conventional gesture or hand-as-body-part signs for animals, hand-as-object (SASS) signs for foods and enactment: hand-as-object signs for tools and enactment: hand-as-hand signs for vehicles. Though the particular iconic strategies for specific referent types differed between community and family homesigners, both groups showed evidence for patterned iconicity. There was less evidence for patterned iconicity in the signs produced by individual homesigners. These results are summarized in the next section.

6.3.4 Signs from conventionalized co-speech gestures

Signs with the same form as conventionalized gestures were produced for animals, foods and tools. Three of the conventionalized gestures: ANIMAL, EAT, and DRINK (illustrated in Figure 10 and described in section 5.4.5) were produced

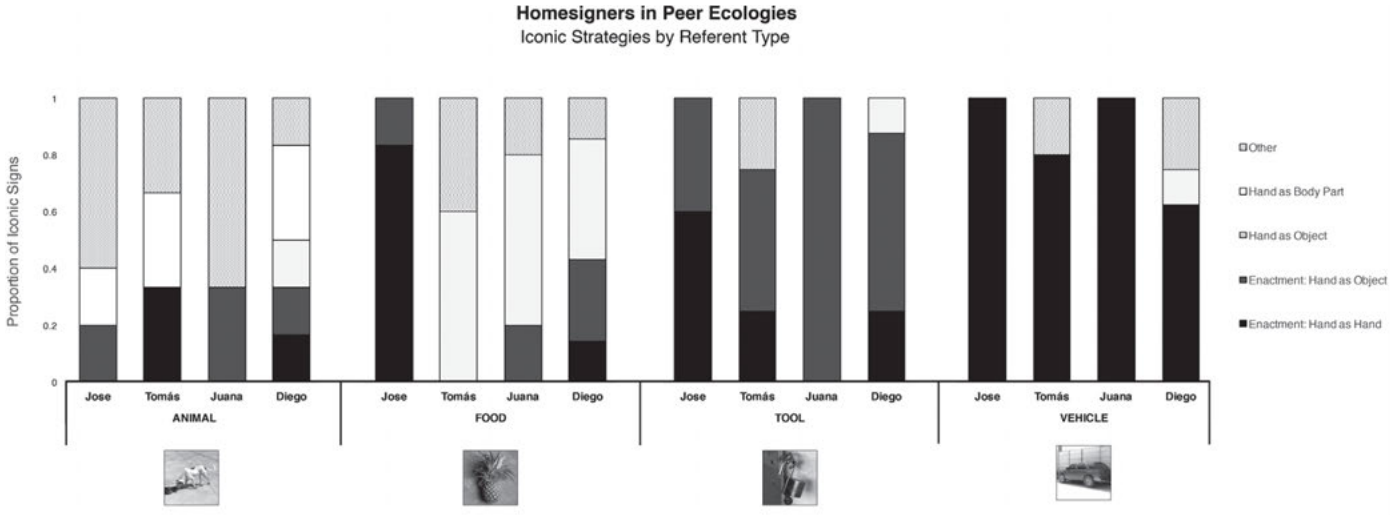


Figure 14: Iconic strategies by referent type for community homesigners Jose, Tomás, Juana and Diego. They produced diverse strategies for animal referents, frequently using other-iconic signs, as well as hand-as-body-part signs. For food, and tool referents, Tomás, Juana and Diego use similar patterns of iconic strategies: hand-as-object (SASS) for foods, enactment: hand as object for tools. For vehicle referents, all four community homesigners use predominately enactment: hand-as-hand signs.

at equal rates, each was produced 8 times. However, these signs were not evenly distributed across participants or stimuli items.

The ANIMAL sign was used by Sara, Jose and Juana for more than one animal in the stimulus set and by Rosa and Tomás once. The sign was never used to represent turkey, the one bird in the set of animals. Sara frequently combined the ANIMAL conventionalized gesture with a non-manual marker unique to each animal. Jose and Juana, who are brother and sister, both used the ANIMAL conventionalized gesture, but for different animals. The most common animal the animal conventionalized gesture was used for was a photo of a dog. The sign for BIRD, which resembled a conventional gesture used by Ixil speakers for birds (see Figure 10), was produced only once for turkey, by Juana.

The DRINK conventionalized gesture was used by all participants to describe the photo of a mug. The EAT conventionalized gesture was used frequently by Jacinto (N=6) for a variety of food stimuli and once each by Jose and Antonio. Thus the signs that formally resemble conventionalized gestures from the hearing community are taken up differently into the homesigners' systems. We discuss this result further in section 7.3 below.

6.3.5 Summary of iconic strategies by referent type across ecologies

In the preceding sections, we have presented the results for individual, family and community communicative ecologies. We found that individual homesigners showed weak evidence for patterned iconicity, based on the preference for a particular iconic strategy. They distinguished animal referents, using hand-as-body-part iconicity but tended to use enactment signs for all three remaining referent types. Family and community homesigners showed evidence for patterned iconicity for all referent types. These results are summarized in Table 6 below.

Table 6: Patterned Iconicity Results by Communicative Ecology.

	Animals	**Foods***	**Tools**	**Vehicles**
Individual Homesigners	hand-as-body-part	enactment: hand-as-hand	enactment*	enactment: hand-as-hand
Family Homesigners	hand-as-object (SASS)/ hand-as-body-part	hand-as-object (SASS)	enactment*	enactment / hand-as-object (SASS)
Community Homesigners	conventional gesture / hand-as-body-part	hand-as-object (SASS)	enactment: hand-as-object	enactment: hand-as-hand

Table 6: (continued)

	Animals	Foods*	Tools	Vehicles
Standard Sign Languages[23]	hand-as-body-part (*personification*) / hand-as-object *(object*)	enactment*/hand-as-object (*manipulation/object*)	enactment: hand-as-hand (*manipulation*)	

Table 6 presents the primary strategy for each ecology, across each of the referent types. We note that some referent types seem to elicit the same iconic strategy across all ecologies, specifically, animal referents, which were most commonly described by hand-as-body-part. The family and community homesigners show a similar preference for hand-as-object iconicity for foods, while individual homesigners tended to use signs with enactment iconicity for foods, tools and vehicles. For tools, all participants tended to use signs with enactment iconicity, however, only community homesigners showed a preference for enactment: hand-as-object iconicity. In ongoing work we are evaluating the role of enactment: hand-as-hand versus enactment: hand-as-object iconicity in signs for tools, as many of the homesigners in this study show a stronger preference for enactment: hand-as-object iconicity than has been reported for other sign languages (see Hwang et al. 2017). In the following sections we summarize these results and discuss their implications for the relationship between communicative ecology and emergent lexicons.

7 Discussion

This study has addressed whether there is a relationship between the communicative ecology of a homesign system and properties of an emerging lexicon of signs. We asked whether a homesigner's communicative ecology might correspond to patterns of referential strategies, the distribution of iconic strategies – termed patterned iconicity – and if ecology might be associated with the use of sign forms based on conventional gestures from the larger hearing co-speech gestural repertoire.

We find that communicative ecology may be associated with the use of particular referential strategies, but that this also appears to be related to the age

23 Standard Sign Languages surveyed in Hwang et al. (2017) included: German Sign Language (DGS), Japanese Sign Language (JSL) and American Sign Language (ASL).

of the homesigner. Communicative ecology was also related to patterns of iconic strategies for four types of referents: animals, foods, tools and vehicles. Individual homesigners did not distinguish these categories with different iconic strategies, but we find strong associations between particular iconic strategies and referent type for family homesigners and community homesigners. Some of these associations are similar to patterned iconicity in young and standard sign languages. We also presented preliminary evidence that many homesigners incorporate signs into their lexicon that resemble conventional gestures used by hearing speakers, but the distribution of these signs varied across and within groups and by referent type.

7.1 Referential strategies and communicative ecology

We compared two referential strategies in the signs produced by our child homesigner participants: indexical/deictic signs and iconic signs. Deictic signs consisted of points to actual items in the immediate context, for example, pointing to a pig in the yard, or points to a location where the same item was typically kept or placed, for example, pointing to the pen where the pig is typically kept. Le Guen (2011a) distinguishes these two kinds of pointing, describing the second type, in which the referent is not actually present in the environment, as "metonymic pointing"). These signs also included points to more distant locations where the referent from the photo could typically be found, such as pointing to the central square where it is common to see trucks or vans.

Deictic signs were overwhelmingly produced by the three youngest participants in this sample, two of whom (Antonio and Jacinto) were individual homesigners, and one (Rosa) who uses a shared family homesign system. This indexical referential strategy is grounded in a relationship of contiguity and/or a significant presumption of shared context. If the item is not physically present at the time that the homesigner points to its location, then the interlocutor must be familiar enough with the context to know what the homesigner refers to in the absence of the intended referent. Additionally, because indexical signs depend on contiguity, or co-presence, they are in many ways less "portable" (Haviland 2013) than other referential strategies.[24] An indexical strategy only functions for

24 When a signer produces an indexical sign, I do not assume that this is the "lexical" sign for that referent in their homesign system. This analysis is simply assessing how frequently signers use particular referential strategies (e.g., indexical versus iconic) in the picture naming task. It would require additional evidence from a variety of signing contexts to establish whether a sign is a stable lexical item.

the signer when the item, or its typical location, is available. This could be the reason that older homesigners, and homesigners who interact with other peer homesigners at school are less likely to depend on indexical referential signs. They primarily interact with other homesigners in a setting where they may or may not have access to a physical example of the referent they wish to discuss, thus they must detach or 'unground' their signs from the affordances of a particular context or setting.

The younger homesigners who did produce a substantial number of deictic signs in the study rarely produced them in isolation, such that the deictic sign was the only sign that they used to label a photo. They produced these signs in addition to iconic signs that were used to describe the photos. Thus this could reflect a larger discursive strategy that these participants rely on to direct the attention of their interlocutor to an example of the referent in the context, in the case that their hearing interlocutor does not correctly interpret their iconic signs. In future analyses, we will explore whether this pattern persists in individual homesigners as they get older. Alternatively, this pattern could indicate a change in the homesigner's understanding of the task.

7.2 Patterned iconicity and communicative ecology

We presented the distribution of four different iconic strategies – enactment (hand-as-hand or hand-as-object), hand-as-object (SASS) and hand-as-body-part, as well as signs from conventional co-speech gestural forms. These strategies could have been used equally across four types of referents in the stimulus set of items – animals, foods, tools and vehicles – but for family homesigners and community homesigners, they were not. Instead, these groups of homesigners used particular iconic strategies for different types of referents, showing evidence of patterned iconicity, found in young sign languages, village sign languages and standard sign languages (Hwang et al. 2017).

Although the five out of six homesigners who interact with another deaf homesigner, do use diverse iconic strategies, the three homesigners who do not interact with other deaf homesigners used primarily signs with enactment iconicity to describe referents including foods, tools and vehicles. Of these enactment signs, most used hand-as-hand iconicity (see Figure 5 for examples). Alejandro and Jacinto did use different iconic strategies for animal referents, specifically hand-as-body-part and hand-as-object signs. The prevalence of signs with enactment iconicity for individual homesigners could reflect their frequent interactions with other hearing relatives and friends who primarily use a spoken language for communication. As they have less experience using their hands to

communicate, and understanding the signs produced in the manual modality, it is possible that signs that mimic the actions performed with or by an object are the most comprehensible to the interlocutors of individual homesigners.

In her work on natural sign Nepal, Green describes the role of shared physical and social experiences, a signer's habitus, on sign forms. She suggest that certain sign forms could be considered *immanent* in the daily, routine activities common to members of the same community (Green 2014, see also Hanks 1990). Green (2014: 91) points out that "forms motivated by shared habituses need not be formally converted into linguistic knowledge to be nevertheless available and recognizable". This availability may shape the iconic strategies that are more referentially "successful" – reference is accurately resolved without further negotiation – compared to other iconic strategies. Green highlights a further dimension of interaction that is critical to communicative encounters between homesigners and their hearing interlocutors, specifically the degree to which both participants in the interaction are committed to achieving mutual understanding. I do not have the data to address this aspect of reference resolution, but it undoubtedly also shapes the forms that are ultimately used by homesigners.

The lexicons of individual homesigners are necessarily shaped by their interactions with hearing interlocutors, as they do not have contact with other deaf homesigners. Homesigners who do have regular contact with each other, however, might be affected by the interaction of their individual system, developed in contexts where they are not in contact with other homesigners, and the systems of other individuals. These homesigners also have the experience of negotiating interaction with another homesigner, who is equally experienced using their own homesign system, thus the homesigner is no longer the only interlocutor who uses primarily the manual modality for communication. When we consider the patterns of iconic strategies used by homesigners who interact with other homesigners – shared homesign systems – we find that they do use particular iconic strategies with different referent types. It appears, therefore, that interacting with another homesigner may support the emergence of patterned iconicity common to many sign languages (see Table 5).

The child homesigners in this study who use shared homesign systems do differ from the standard sign languages in Hwang et al. (2017) and the individual homesigners in their preference for enactment: hand-as-hand iconicity (for foods and tools) as well as the high rate of hand-as-hand (SASS) iconicity in signs for foods. In future work, we are investigating whether this preference extends across the lexicons of individual homesigners, similar to patterns described in Padden et al. (2013) and Brentari et al. (2015). Additionally, future work should investigate whether patterned iconicity is characteristic of utterances produced in more

naturalistic interactions, like conversations or narratives, outside of elicited tasks.

7.3 Communicative ecology and signs from conventional co-speech gestures

Although the child homesigners who used a shared homesign system were more likely to show evidence of patterned iconicity, they also diverged from the patterned iconicity described in Hwang et al. (2017) in some respects. One source of this divergence was the presence of signs that resembled existing conventional gestures commonly used in the hearing community in Nebaj. We found that there were homesigners from each of the three ecologies (individual, family and community) who used signs that resembled conventional gestures, however some homesigners rarely used these signs (Alejandro, Rosa, Tomás and Diego). Of the homesigners who did use signs that resembled conventional gestures, they were not used for the same types of referents across different communicative ecologies.

The two individual homesigners who used signs from conventional gestures (Antonio and Jacinto) almost exclusively used the conventional gesture for EAT (see Figure 10) to label food referents. The family homesigner, Sara, and the community homesigners, Jose and Juana, who used signs from conventional gestures used the conventional form for ANIMAL (see Figure 10) in descriptions of various animal stimulus photos.

In future work, we plan to investigate whether these sign forms from conventional gestures are more likely to be used by homesigners to mark a category of objects, and then be further modified to label a particular referent within the category, for example using the conventional sign for ANIMAL, followed by an iconic sign for BARK, to label a photo of a dog. All participants, except for Alejandro, used a sign from the conventional gesture for DRINK (see Figure 10) to describe a photo of a mug. In this particular set of signs, therefore, the use of signs from conventional gestures seems to be particular to individual homesigners and, potentially, particular objects.[25]

25 The association between a sign from a conventional gestures and a specific item is based on the almost universal use of the sign drink for the photo of a mug. A reviewer helpfully pointed out that the sign from the conventional gesture for drink might also be used for other drinking containers, like a bottle or cup (there were no examples in this subset of the data). This seems probable, and we will check this in the larger set of data, which includes other drinking containers.

8 Conclusion

We have discussed the association between participant age and referential strategy, communicative ecology and the emergence of patterned iconicity, and the use of signs from conventional gestures and communicative ecology. We find that, even with considerable individual variation, some groups show the beginnings of patterned iconicity, found across young and standard sign languages, we also describe some of the ways in which different kinds of homesigners adopt signs that resemble conventional gestures, and how this interacts with patterned iconicity and emergent categories in sign lexicons.

The results presented here provide evidence that the kinds of communicative interactions that child homesigners engage shape the homesign system that they develop in significant ways. Child homesigners who have even one additional deaf homesigner to communicate with may have a homesign system that looks very different from a child homesigner who has no interactions with other deaf homesigners. While this work is preliminary, we suggest that multiple homesigners in contact alters the nature of conversations for the deaf and the hearing people that participate in homesigners' social worlds. The increased experience that a hearing sibling or peer accrues when there are two deaf homesigners in their social network likely affects the signs that they go on to produce. Further, individual homesigners are not only the most experienced user of their system, they also rarely, if ever, are able to observe others interacting using their hands. Homesigners with deaf relatives (vertical transmission) or deaf peers (horizontal transmission) have the experience of seeing two other people talking to each other. This is a critical dimension to consider, alongside the characteristics discussed in this chapter: the age of the child homesigner, iconic affordances of particular referents and the uptake of conventional gestural material into a homesign system. Although the mini-lexicons described in this chapter are quite small, they provide valuable insight into the sophisticated strategies that child homesigners deploy to develop homesign systems for communicating with the hearing and deaf people in their lives. As they navigate conversation using a system that is unevenly distributed across interlocutors, it might seem obvious that the nature of these exchanges would shape the homesign system that the child uses, but it is often difficult to know where to look for a relationship between ecology and structure. This chapter offers several domains, including use of diverse referential strategies, the emergence of patterned iconicity and the use of conventional gestures, in which we might begin to observe these effects.

References

Brentari, Diane, Chiara Branchini, Jordan Fenlon, Laura Horton, & Gladys Tang. 2015. Typology in sign languages: Can it be predictive? In *Proceedings from the 51st annual meeting of the Chicago Linguistics Society*. Chicago: Chicago Linguistic Society.

Brugman, Hennie & Albert Russel. 2004. Annotating multi-media/multi-modal resources with ELAN. In *4th International Conference on Language Resources and Evaluation* (LREC 2004) 2065–2068.

Carrigan, Emily & Marie Coppola. 2017. Successful communication does not drive language development: Evidence from adult homesign. *Cognition* 158. 10–27.

Caselli, Naomi & Jennie Pyers. 2017. The road to language learning Is not entirely iconic: Iconicity, neighborhood density, and frequency facilitate acquisition of sign language. *Psychological Science* 28 (7). 979–987.

Coppola, Marie & Elissa Newport. 2005. Grammatical Subjects in home sign: Abstract linguistic structure in adult primary gesture systems without linguistic input. *Proceedings of the National Academy of Sciences* 102 (52). 19249–19253.

Coppola, Marie & Ann Senghas. 2010. Deixis in an emerging sign language. In Diane Brentari (ed.), *Sign Languages*, 543–569. Cambridge, UK: Cambridge University Press.

Coppola, Marie, Elizabet Spaepen & Susan Goldin-Meadow. 2013. Communicating about quantity without a language model: Number devices in homesign grammar. *Cognitive Psychology* 67. 1–25.

Coppola, Marie. 2002. *The emergence of the grammatical category of subject in home sign: Evidence from family-based gesture systems in Nicaragua*, Rochester, NY: University of Rochester dissertation.

Deacon, Terrence. 1997. *The symbolic species: The co-evolution of language and the brain.* New York: W. W. Norton & Company.

Emmorey, Karen. 2014. Iconicity as structure mapping. *Philosophical Transactions of the Royal Society: Biological Sciences* 369. 20130301.

Flaherty, Molly, Dea Hunsicker & Susan Goldin-Meadow. 2016. The seeds of Nicaraguan Sign Language are not found in gesture. Poster presented at the 41st Boston University Conference on Language Development. Boston, MA.

Flaherty, Molly & Susan Goldin-Meadow. 2010. Does input matter? Gesture and homesign in Nicaragua, China, Turkey, and the USA. In Andrew D. M. Smith, Marieke Schouwstra, Bart de Boer & Kenny Smith (eds.), *Proceedings of the Eighth Evolution of Language* Conference, 403–404. Singapore: World Scientific Publishing Co.

Fox Tree, Erich. 2009. Meemul Tziij: An Indigenous Sign Language Complex of Mesoamerica. *Sign Language Studies* 9 (3). 324–366.

Frishberg, Nancy. 1987. Home sign. In John Van Cleve (ed.). *Gallaudet encyclopedia of deaf people and deafness* (Vol. 3), 128–131. New York: McGraw Hill.

Fusellier-Souza, Ivani. 2006. Emergence and development of signed languages: From a semiogenetic point of view. *Sign Language Studies* 7 (1). 30–56.

Gagne, Deanna. 2017. *With a little help from my friends: The contributions of a peer language network on the conventionalization of space in an emerging language*. Storrs, CT: University of Connecticut dissertation.

Gaskins, Suzanne. 1999. Children's daily lives in a Mayan village: A case study of culturally constructed roles and activities. In Artin Göncü (ed.), *Children's Engagement in the Social World: Sociocultural Perspectives*, 25–61. Cambridge: Cambridge University Press.

Goico, Sara. 2015. Homesigns in Contact: Language emergence in mainstream classrooms in Iquitos, Peru. Paper presented at the Primer Coloquio sobre Lenguas de Señas Emergentes en Las Américas. September 11–12 2015, Mexico City, Mexico.

Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language*. New York: Psychology Press.

Goldin-Meadow, Susan, Asli Özyürek, Burcu Sancar & Carolyn Mylander. 2009. Making language around the globe: A cross-linguistic study of homesign in the United States, China, and Turkey. In Jiansheng Guo, Elena Lieven, Nancy Budwig & Susan Ervin-Tripp (eds.). *Crosslinguistic approaches to the psychology of language: Research in the tradition of Dan Isaac Slobin*, 27–39. New York: Taylor & Francis.

Goldin-Meadow, Susan & Carolyn Mylander. 1984. Gestural communication in deaf children: The effects and noneffects of parental input on early language development. *Monographs of the Society for Research in Child Development* 49.

Goldin-Meadow, Susan & Carolyn Mylander. 1990. Beyond the input given: The child's role in the acquisition of language. *Language* 66 (2). 323–355.

Green, E. Mara. 2014. *The Nature of Signs: Nepal's Deaf Society, Local Sign, and the Production of Communicative Sociality*. Berkeley, CA: University of California dissertation.

Green, E. Mara. 2018. Performing gesture: The pragmatic functions of pantomimic and lexical repertoires in a natural sign narrative. *Gesture* 16 (2). 328–361.

Hanks, William. 1990. *Referential Practice: Language and Lived Space Among the Maya*. Chicago: University of Chicago Press.

Haugen, Einar. 2001. The Ecology of Language. In Alwin Fill & Peter Mühlhäusler (eds.). *The Ecolinguistics Reader: Language, Ecology, and Environment*, 57–66. London: Continuum.

Haviland, John. 2013. The emerging grammar of nouns in a first generation sign language: Specification, iconicity, and syntax. *Gesture* 13 (3). 309–353.

Hou, Lynn Y-S. 2016. *"Making hands": Family sign languages in the San Juan Quiahije community*. Austin, Texas: The University of Texas dissertation.

Hunsicker, Dea & Susan Goldin-Meadow. 2012. Hierarchical structure in a self-created communication system: Building nominal constituents in homesign. *Language* 88 (4). 732–763.

Hunsicker, Dea & Susan Goldin-Meadow. 2013. How handshape type can distinguish between nouns and verbs in homesign. *Gesture* 13 (3). 354–376.

Hwang, So-One, Nozomi Tomita, Hope Morgan, Rabia Ergin, Deniz Ilkbasaran, Sharon Seegers, Ryan Lepic & Carol Padden. 2017. Of the body and the hands: Patterned iconicity for semantic categories. *Language and Cognition* 9 (4). 573–602.

Ibáñez-Holtermann, Esther. 2011. *La Parada: Explaining Ixil day laborers in Virginia, Illegality, loss, hope and community*. Washington, DC: American University dissertation.

Janzen, Terry & Shaffer, Barbara. 2002. Gesture as the substrate in the process of ASL grammaticalization. In Richard P. Meier, Kearsy Cormier and David Quinto-Pozos (eds.). *Modality and Structure in Signed and Spoken Languages*, 199–223. Cambridge, UK: Cambridge University Press.

Johnson, Harold G., Paul Ekman & Wallace V. Friesen. 1975. Communicative body movements: American emblems. *Semiotica* 15. 335–353.

Kendon, Adam. 2004. *Gesture: Visible action as utterance*. Cambridge: Cambridge University Press.
Kisch, Shifra 2008. "Deaf Discourse": The Social Construction of Deafness in a Bedouin Community in the Negev. *Medical Anthropology* 27 (3). 283–313.
Kisch, Shifra. 2012. Demarcating generations of signers in the dynamic sociolinguistic landscape of a shared sign-language: The case of the Al-Sayyid Bedouin. In Ulrike Zeshan & Connie de vos (eds.). *Sign Languages in Village Communities: Anthropological and Linguistic Insights*. Boston: De Gruyter, 87–125.
Klima, Edward & Ursula Bellugi. 1979. *The Signs of Language*. Cambridge, MA: Harvard University Press.
Kusters, Annelies & Sahasrabudhe, Sujit. 2018. Language Ideologies on the difference between gesture and sign. *Language & Communication* 60. 44–63.
Lane, Harlan, Robert Hoffmeister & Ben Bahan. 1996. *Journey into a Deaf World*. San Diego: Dawn Sign Press.
Lepic, Ryan & Carol Padden. 2017. A-morphous iconicity. In Claire Bowern, Laurence Horn & Raffaella Zanuttini (eds.). *On looking into words (and beyond): Structures, Relations, Analyses,* 489–516. Berlin: Language Science Press.
Le Guen, Olivier. 2011. Modes of pointing to existing spaces and the use of frames of reference. *Gesture* 11 (3). 271–307.
Magid, Rachel & Jennie Pyers. 2017. "I use it when I see it": The role of development and experience in Deaf and hearing children's understanding of iconic gesture. *Cognition* 162. 73–86.
Meir, Irit, Wendy Sandler, Carol Padden & Mark Aronoff . 2010. Emerging Sign Languages. In Marc Marschark & Patricia Spencer (eds.). *The Oxford Handbook of Deaf Studies, Language, and Education*, *Vol. 2*, 267–280. Oxford: Oxford University Press.
Mesh, Kate. 2017. *Points of comparison: What indicating gestures tell us about the origins of signs in San Juan Quiahije Chatino Sign Language*. Austin, Texas: The University of Texas dissertation.
Meo-Zilio, Giovanni & Silvia Mejía. 1980. *Diccionario de Gestos: España e Hispanoamérica*, Volume 1. Bogotá: Instituto Caro y Cuervo.
Meo-Zilio, Giovanni & Silvia Mejía. 1983. *Diccionario de Gestos: España e Hispanoamérica*, Volume 2. Bogotá: Instituto Caro y Cuervo.
Mitchell, Ross & Michael Karchmer. 2004. Chasing the mythical ten percent: Parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies* 4 (2). 138–163.
Morford, Jill. 1996. Insights to language from the study of gesture: A review of research on the gestural communication of non-signing deaf people. *Language and Communication* 16. 165–178.
Mühlhäusler, Peter. 2003. *Language of Environment, Environment of Language: A Course in Ecolinguistics*. London: Battlebridge.
Newport, Elissa L. & Ted Supalla. 2000. Sign Language Research at the Millennium. In Karen Emmorey and Harlan Lane (eds.). *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*, 580. Mahwah, N.J.: Lawrence Erlbaum Associates.
Nonaka, Angela. 2009. Estimating size, scope, and membership of the speech/sign communities of undocumented indigenous/village sign languages: The Ban Khor case study. *Language and Communication* 29. 210–229.

Nyst, Victoria. 2007. *A descriptive analysis of Adamorobe Sign Language (Ghana)*. Utrecht: Leiden University dissertation.

Nyst, Victoria. 2012. Shared Sign Languages. In Bencie Woll, Markus Steinbach & Roland Pfau (eds.). *Sign Language: An International Handbook*, 552–573. Berlin: Mouton de Gruyter.

Nyst, Victoria. 2016. Size and shape depictions in the manual modality: A taxonomy of iconic devices in Adamorobe Sign Language. *Semiotica* 210. 75–104.

Nyst, Victoria, Kara Sylla & Moustapha Magassouba. 2012. Deaf signers in the Dogon, Mali. In Ulrike Zeshan & Connie de Vos (eds.). *Sign languages in village communities: Anthropological and linguistic insights*, 251–276. Berlin: Mouton de Gruyter.

Occhino, Corrine, Benjamin Anible, Erin Wilkinson & Jill P. Morford. 2017. Iconicity is in the eye of the beholder: How language experience affects perceived iconicity. *Gesture* 16 (1). 100–126.

Occhino, Corrine. 2017. An Introduction to Embodied Cognitive Phonology: Claw-5 Handshape Distribution in ASL and Libras. *Complutense Journal of English Studies* 25. 69–103.

Orlansky, Michael & Bonvillian, John. 1984. The Role of Iconicity in Early Sign Language Acquisition. *The Journal of Speech & Hearing Disorders* 49. 287–292.

Ortega, Gerardo, Sümer, Beyza, & Özyürek, Asli. 2017. Type of Iconicity Matters in the Vocabulary Development of Signing Children. *Developmental Psychology* 53 (1). 89–99.

Ortega, Gerardo & Asli Özyürek. 2016. Generalisable patterns of gesture distinguish semantic categories in communication without language. In Anna Papafragou, Dan Grodner, Dan Mirman & John Trueswell (eds.). 1182–1187. *Proceedings of the 38th Annual Meeting of the Cognitive Science Society* (CogSci 2016).

Padden, Carol & Tom Humphries. 2006. *Inside Deaf Culture*. Cambridge: Harvard University Press.

Padden, Carol, So-One Hwang, Ryan Lepic & Sharon Seegers. 2015. Tools for Language: patterned iconicity in sign language nouns and verbs. *Topics in Cognitive Science* 7 (1). 81–94.

Padden, Carol, Irit Meir, So–One Hwang, Ryan Lepic, Sharon Seegers & Tori Sampson. 2013. Patterned iconicity in sign language lexicons. *Gesture* 13 (3). 287 – 308.

Parmentier, Richard. 1994. *Signs in Society: Studies in Semiotic Anthropology*. Bloomington: Indiana University Press.

Peirce, C. S. 1932. Division of signs. In C. Hartshorne and P. Weiss (eds.), *Collected Papers of C.S. Peirce*, (Vol. 2), 134–155. Cambridge, MA: Belknap/Harvard University Press.

Perniss Pamela, Robin Thompson & Gabriella Vigliocco. 2010. Iconicity as a General Property of Language: Evidence from Spoken and Signed Languages. *Frontiers in Psychology* 1. 227.

Pfau, Roland & Steinbach, Markus (eds.). 2006. Modality-independent and modality specific aspects of grammaticalization in sign languages. vol. 24. *Linguistics in Potsdam*. Potsdam, Germany.

Pizzuto, Elena & Virginia Volterra. 2000. Iconicity and Transparency in Sign Languages: A Cross-linguistic Cross-cultural View. In, Karen Emmorey and Harlan Lane, (eds.). *The Signs of Language Revisited*, 261–285. Lawrence Erlbaum.

Richie, Russell, Charles Yang & Marie Coppola. 2014. Modeling the emergence of lexicons in homesign systems. *Topics in Cognitive Science* 6. 183–195.

Rissman, Lilia, Laura Horton & Susan Goldin-Meadow. 2017. Crosslinguistic biases shape the semantic structure of verbs: evidence from deaf homesigning children. Paper presentation at the 91st annual meeting of the Linguistic Society of America (Austin, TX).

Rissman, Lilia, Laura Horton & Susan Goldin-Meadow. 2018. Conceptual categories scaffold verbal semantic structure: a cross-cultural study of child homesign. *The Evolution of Language: Proceedings of the 12th International Conference* (EVOLANGXII).

Rogoff, Barbara. 1981. Adults and peers as agents of socialization: A highland Guatemala profile. *Ethos* 9 (1). 18–36.

Safar, Josefina. 2017. Translanguaging in Yucatec Maya Signing Communities. *Applied Linguistics Review*. doi:https://doi.org/10.1515/applirev-2017–0082.

Sandler, Wendy, Aronoff, Mark, Meir, Irit & Padden, Carol. 2011. The gradual emergence of phonological form in a new language. *Natural Language and Linguistic Theory* 29. 503–543.

Sandler, Wendy & Diane Lillo-Martin. 2006. *Sign language and linguistic universals*. Cambridge, UK: Cambridge UP.

Saussure, Ferdinand de, Charles Bally, Albert Sechehaye & Albert Riedlinger. 1986. *Course in General Linguistics*. LaSalle, Ill.: Open Court.

Senghas, Ann. 2003. Intergenerational influence and ontogenetic development in the emergence of spatial grammar in Nicaraguan Sign Language. *Cognitive Development* 18. 511–531.

Shaw, Emily & Yves Delaporte. 2010. New perspectives on the history of American Sign Language. *Sign Language Studies* 11 (2). 158–204.

Stoll, David. 2013. *El Norte or bust!: How migration fever and microcredit produced a financial crash in a Latin American town*. Lanham, Maryland: Rowman & Littlefield Publishers, Inc.

Supalla, Ted. 1982. *Structure and acquisition of verbs of motion and location in American Sign Language*. San Diego, California: University of California dissertation.

Taub, Sarah. 2001. *Language from the body: iconicity and metaphor in American Sign Language*. Cambridge: Cambridge University Press.

Thompson, Robin, David Vinson, Bencie Woll & Gabriella Vigliocco. 2012. The Road to Language Learning Is Iconic: Evidence From British Sign Language. *Psychological Science* 23 (12). 1443–1448.

Tax, Sol. 1963. *Penny capitalism: A Guatemalan Indian economy*. Chicago: University of Chicago Press.

Tkachman, Oksana & Wendy Sandler. 2013. The noun-verb distinction in two young sign languages. *Gesture* 13 (3). 253–286.

Zeshan, Ulrike & Connie de vos (eds.). 2012. *Sign Languages in Village Communities: Anthropological and Linguistic Insights*. Boston: De Gruyter.

Zeshan, Ulrike. 2010. Village sign languages – A commentary. In Napoli, Donna Jo & Mathur, Gaurav. (eds.). *Deaf Around the World: The impact of language*. Oxford: Oxford University Press.

Josefina Safar and Rodrigo Petatillo Chan

Strategies of noun-verb distinction in Yucatec Maya Sign Languages

1 Introduction

In contemporary linguistics, the universality of verbs and nouns as distinct part-of-speech categories is a matter of debate (e.g. Croft 2000). Challenging the notion of the ubiquity of nouns and verbs in all languages (e.g. Sapir 1921), several fieldwork studies on non-European spoken languages showed that not all languages necessarily exhibit a formal distinction between nouns and verbs, and that these categories can be blurred (e.g. in Nootka, Swadesh 1939) – warning that linguists should not expect to find the same parts of speech across all language families and modalities (Haspelmath 2007; Lois and Vapnarsky 2006). These doubts notwithstanding, it is still a widely held view that every language has some kind of distinction between parts of speech that refer to persons, places and things – i.e. nouns – on the one hand, and parts of speech that refer to actions, processes and relations – i.e. verbs – on the other hand (Schachter and Shopen 2007: 5). The specific nature of this distinction can differ considerably, but it is not a purely semantic notion, rather it is somehow inscribed into the language's grammar.

If the noun-verb distinction is a linguistic universal, it must also hold for languages in the visual-manual modality, i.e. signed languages. Indeed, it has been demonstrated that sign languages make use of a range of different – often subtle – strategies for a noun-verb distinction. Previous research has mainly focussed on older, institutionally established sign languages, for instance American Sign Language (ASL) (Supalla and Newport 1978) or Australian Sign Language (Auslan) (Johnston 2001). More recently, some studies contributed findings from emerging sign languages (Tkachman and Sandler 2013; Haviland 2013a; Padden et al. 2013) and homesign systems used by deaf individuals with no access to a signing community (Hunsicker and Goldin-Meadow 2013), adding important hints on the question how and at what point in time a part-of-speech distinction arises in a language. First signs of such a distinction have already been detected in silent gesture of hearing people (Micklos 2016) who show remarkable systematicity in their gesture production for different semantic categories (Ortega

https://doi.org/10.1515/9781501504884-004

and Özyürek 2016). This indicates that gestural patterns can form a base from which a linguistic part-of-speech distinction can originate.

In this chapter, we will explore how Yucatec Maya Sign Languages (YMSLs) – young and non-institutionalised sign languages used in Yucatec Maya villages – refer to objects on the one hand and to actions associated with these objects on the other hand and will critically discuss whether these strategies actually convey a noun-verb distinction.

The data we will present comes from four Yucatec Maya communities with a high incidence of deafness in the peninsula of Yucatan in Mexico (see sociolinguistic profile of the YMSL communities, this volume, for more details). Comparative data was collected from hearing non-signing gesturers in a Yucatec Maya village without any deaf inhabitants. We will examine two strategies for expressing a noun-verb distinction that have been described in previous research, namely the use of Size-and-Shape specifiers (SASSes) as nominal markers (Tkachman and Sandler 2013) and consistent differences in iconic patterns for nouns and verbs ("patterned iconicity", see Padden et al. 2013; Padden et al. 2015). Both strategies are rooted in iconic gestures of hearing people and can be picked up by deaf signers to systematically distinguish parts of speech. In the two studies we ask:

- Do Yucatec Maya Sign Languages use SASSes and patterned iconicity to mark a noun-verb distinction?
- If so, in what way do these strategies differ from their gestural precursors?
- Which patterns of variation can be found between villages and among individual signers?

Based on previous research on other sign languages, we expect that YMSLs – along with other young sign languages – should exhibit seeds for multiple strategies for marking the noun-verb distinction, but that they are not yet fully conventionalised across the communities. Also, we expect a high degree of individual variation across signers.

In Section 2, we summarise previous studies that form a theoretical and methodological framework for our study. We then present the findings from three studies: Study 1 analyses the use of SASSes in YMSL signs for objects (Section 3). Study 2a looks at the distribution of iconic strategies for the depiction of tools in YMSLs and in silent gesture of hearing Yucatec Maya (Section 4.1) and Study 2b examines differences in the use of these strategies for describing tools and actions associated with these tools (Section 4.2). We will discuss how the findings relate to previous studies, what implications they have for a noun-verb distinction in YMSLs and in emerging sign languages in general, and how the

gesture-sign interface can inform our understanding of sign language emergence and evolution (Section 5) before presenting a conclusion in Section 6.

2 The noun-verb distinction in sign languages

2.1 Nouns and verbs in institutionalised and emerging sign languages

In many sign languages, the manual parameters for verbs and nouns are the same or very similar. The visual-manual modality has the potential to exploit iconicity, i.e. the resemblance between a linguistic form and its meaning, to a high degree. If nouns and verbs draw from the same underlying iconic source, this can lead to the presence of "semantically and formationally related pairs" (Tkachman and Sandler 2013), where signs for an object, e.g. 'an iron' and the action performed with this object, e.g. 'to iron' can look very similar. However, it has been demonstrated that sign languages can exhibit various, often more subtle strategies to express a parts-of-speech distinction, such as frequency/number of repetitions of a sign, its duration, size, manner of movement or the presence or absence of mouthing (see Tkachman and Sandler 2013, for a detailed literature review).

In a first study on ASL, Supalla and Newport (1978) demonstrated that for semantically related noun-verb pairs in ASL that share the same hand configuration and place of articulation, the signs for nouns use repeated and restrained movement, whereas verbs can exhibit either a single or a repeated movement, that is articulated in a continuous manner. Similar and additional strategies have been described for other sign languages, for instance Russian Sign Language (RSL) (Kimmelman 2009), Australian Sign Language (Auslan) (Johnston 2001), and Austrian Sign Language (ÖGS) (Hunger 2006). In general, verbs tend to be longer in duration and the movement component is continuous and/or larger, whereas nouns are often characterised by movement repetition and are more frequently accompanied by mouthings of corresponding spoken words than verbs.

While most previous studies focussed on older, established, institutionalised sign languages of larger Deaf communities, Tkachman and Sandler (2013) asked whether young sign languages distinguish nouns and verbs. Examining object-action pairs such as FORK/EAT-WITH-FORK or LIPSTICK/PUT-ON-LIPSTICK in Israeli Sign Language (ISL) and Al-Sayyid Bedouin Sign Language (ABSL) – both young sign languages that emerged in very different sociolinguistic contexts – the authors suggest that a formal noun-verb distinction may not be present in a

language from the beginning but instead, emerges gradually (ibid.: 27). In ISL, manner of movement and mouthing were found to be distinguishing features, whereas in ABSL, several strategies exist, but none of them is used systematically and predictably by all signers. The authors ascribe this to the young age of ABSL, paired with its particular sociolinguistic setting: They assume that the rather small number of signers interacting mostly in face-to-face settings in the homogeneous context of Al-Sayyid might exercise less pressure for developing a robust noun-verb opposition because signers can rely on a critical amount of shared background knowledge and can thus tolerate more variation in grammatical form than signers of urban sign languages (ibid.: 26).

Challenging this claim, Haviland (2013a) shows that even in a very early stage of a language used by a micro-community, roots for a noun-verb distinction are present and even become manifest in multiple strategies. Zinacantán Family Homesign, a sign language used by only one generation of three deaf siblings and their immediate hearing family members, already exhibits three different strategies: 1. constructions involving a Size-and-Shape specifier to mark nouns (see Section 2.2), 2. differences in iconic strategies, i.e. instrument vs. handling handshapes to represent objects and actions (see Section 2.3) and 3. a "copula", derived from the lexical sign for 'PUT, PLACE', which is used as a nominal marker (Haviland 2013b: 250). Haviland's analysis of these strategies is rather exploratory and lacks more systematic description (in terms of form, frequency and morpho-syntactic distribution). However, it remains a crucial observation that the seeds for a noun-verb distinction can already be discernible in a language from the very beginning. This hypothesis is also supported by the systematic, contrastive use of handshapes for nouns and verbs by an individual homesigner in the US with no access to a conventional language model (Hunsicker and Goldin-Meadow 2013). Abner et al. (in press) show that the noun-verb distinction is so fundamental to human language that it can be observed already among Nicaraguan homesigners but that through intergenerational transmission and shared use among a larger signing community it becomes increasingly conventional and systematic in Nicaraguan Sign Language.

2.2 Size-and-Shape Specifiers (SASSes)

One possible device for noun-verb distinction that was pointed out by Tkachman and Sandler (2013) for ISL and ABSL is the use of Size-and-Shape Specifiers (SASSes) (Klima and Bellugi 1979; Supalla 1986) as nominal markers. SASSes constitute a specific sub-type of sign language classifiers, in which one or both hands depict the size, shape or outlines of an object, and which serve to "classify

a different aspect or dimension of the visual-geometrical structure of the noun referent" (Supalla 1986: 186). Supalla categorises SASSes into *static SASSes* (further broken up into first-, second- and third-level static SASSes, depending on which and how many phonological features are involved) and *tracing SASSes* (in which the hands, using several possible handshapes, outline the contours of a two- or three-dimensional object in the air). SASSes can fulfil different functions in sign languages and their frequent use in compounds has been reported for ABSL (Meir et al. 2010), Turkish Sign Language (TID) (Taşçı and Göksel 2016) or ASL (Vercellotti and Mortensen 2012).[1]

Tkachman (2012: 47) reports that in both ISL and ABSL, SASSes occur exclusively in combination with nouns and never with verbs and can therefore be considered a type of nominal marker. The verb seems to be the unmarked or "default" form whereas for nouns, a SASS describing salient characteristics of the object (long, round, small…) is attached to the sign, resulting in a compound-like construction (Tkachman and Sandler 2013: 269). Figure 1 presents an example from YMSL using the same strategy, as will be discussed in Section 3.[2]

Figure 1: YMSL (Nohkop): LIPSTICK.

1 There is disagreement in the literature regarding whether SASS constructions can adequately be described as genuine compounds or if they should rather be considered instances of affixation (the "compound vs. affix"-debate also exists in the spoken language literature, see e.g., Bauer 2004). Given that SASSes do not occur as free lexemes in the ABSL data set, Meir et al. (2010) suggest they may constitute an "early form of affixation in the language". This question is difficult to answer, especially in an early stage of description of emerging languages.

2 All figures and examples from the YMSL corpus marked with a camera symbol are available as supplementary video files in the eBook version of the volume at https://www.degruyter.com/view/title/523378.

This distinction, however, is not employed in a consistent and obligatory way in either ISL or ABSL. According to Tkachman and Sandler (2013), only 24% of the ISL nouns were combined with a SASS, and in ABSL, merely 15%. Interestingly, the items marked with a SASS were usually the same in both ISL and ABSL. This leads the authors to assume that the use of SASSes follows a semantic motivation, which holds across languages (ibid.: 25). Furthermore, both languages showed distinct patterns of SASS distribution: In ABSL, the use of SASSes is strongly lexically driven and some items trigger their use more strongly than others (e.g. "pita"). In ISL, it is more strongly signer-driven: certain signers prefer SASSes more than others (Tkachman and Sandler 2013: 269). However, given the noticeable but limited occurrence of SASSes in their data set, the authors "do not claim that the use of SASSes is a distinguishing feature either in ISL or in ABSL, at least not yet" (ibid.: 20).

The use of SASS classifiers as nominal markers was also observed by Haviland (2013a) for Zinacantán Family Homesign. Specifiers denoting the height of human referents or animals are very common in the gestural repertoire of hearing people in many Mesoamerican countries (Meo-Zilio and Mejía 1980; 1983; Le Guen et al., this volume; Horton, this volume; Safar, under review). In Zinacantán Family Homesign they are taken up and attached to a sign, which further identifies the referent. However, Haviland describes these specifiers only for animate entities, so they cannot be directly compared to the SASSes for objects described above.

2.3 Patterned iconicity

Other studies (Padden et al. 2013; 2015) suggest a common cognitive base in gesture and sign language along with modality-specific and language-specific differences in iconic strategies to distinguish objects from actions. The authors describe two main strategies for depicting the use of tools; both are iconic but in different ways. One possibility is that the hand represents a hand manipulating an object, e.g. a fist depicts a hand holding an (invisible) toothbrush (Figure 2a) – this is called a *handling* strategy. The second strategy is that the hand represents the object itself, e.g. an extended index finger for a toothbrush (Figure 2b) – this is referred to as the *instrument* strategy.[3] Both strategies are accompanied by a

3 Padden et al. (2013; 2015) also mention an *object* strategy, where the hand represents the object itself but without any movement indicating human agency. This strategy will not be further discussed in this chapter.

movement imitating the action of brushing one's teeth, but they differ in their choice of handshape.

Figures 2a and 2b: Examples of handling (a) and instrument (b) handshapes in YMSL.

In an elicitation task with 24 pictures of common hand-held tools, Padden et al. (2013) compared the iconic strategies used in three sign languages (ASL, ABSL and New Zealand Sign Language (NZSL)) with those used by hearing American and Bedouin gesturers who do not know any sign language. Gesturers as well as signers produced both instrument and handling forms, but the patterns of distribution of these strategies differed significantly. Non-signing gesturers, both American and Bedouin, generally preferred handling handshapes, but for certain objects they produced more instrument forms than for others, e.g. 'scissors' or 'cell phone' (ibid.: 297). Interestingly, two unrelated sign languages, ASL and ABSL, the former an institutionalised, established sign language, the latter a young village sign language, show a similar preference for instrument over handling handshapes for nouns related to tool use (65% instrument forms in ASL and 82% in ABSL). NZSL, on the contrary, displays the opposite pattern (67% handling forms), hinting that the preference of iconic strategy can differ cross-linguistically.

The study also proves that such a preference emerges early in a sign language, as demonstrated by the shift from more handling among Bedouin gesturers towards more instrument among ABSL signers. It might even be more consistent in a young language such as ABSL due to a lack of other systematic ways of noun-

marking (ibid.: 304). Padden et al. (2013) coined the term "patterned iconicity" to emphasise that the manner of iconic depiction is not random, but that specific strategies recur in specific contexts and that signers "combine iconic strategies in order to convey semantic class" (ibid.: 291) (see also Horton, this volume, for iconic patterns in Nebaj homesign systems).

In a follow-up study, Padden et al. (2015) showed pictures of tools (i.e. objects, to elicit nouns) and short video clips with a human actor using these tools (i.e. actions, to elicit verbs) to non-signing gesturers from the US and to signers of ASL. They found that gesturers have an overall preference for handling forms in both the picture and the video condition, but it is manifested more significantly in the video condition, meaning that actions elicit handling forms even more strongly than objects. ASL signers, on the other hand, favour instrument forms in the picture (i.e., object) condition. The video clips often elicited signed sentences from ASL signers with both a verb and noun response, with a tendency towards more handling forms in verbs and instrument forms in nouns (Padden et al. 2015: 89).[4]

It can be assumed that a common cognitive base exists among both gesturers and signers in the US, favouring handling forms for actions and instrument forms for objects, but that these forms take on different degrees of conventionalisation. Sign languages exploit iconic strategies present in gesture, but the pressure towards a more rule-driven use of iconic strategies is higher in sign language and thus "signers exploit the strategies for grammatical purpose" (ibid.: 91). This is not surprising given that in signed languages all lexical and grammatical information is conveyed via the visual-gestural channel, while in spoken languages, speakers do not need to rely on gesture to disambiguate parts of speech, because languages such as English have robust mechanisms to do so.

From the literature presented so far, we see that sign languages, regardless of their age and conditions of emergence, can develop multiple strategies to distinguish objects from actions. These strategies can interact in various ways, forming what Haviland (2013a: 345) calls a "part-of-speech conspiracy". But how does the expression of objects and actions relate to parts-of-speech?

4 In these cases, the authors used some other, possibly syntactic, criteria to determine which form is the noun and which one the verb, but they do not explain this further.

2.4 Objects and actions, nouns and verbs

A conceptual problem is that most previous studies (e.g. Tkachman and Sandler 2013; Haviland 2013a; Padden et al. 2015) have equated a distinction between *objects and actions* with a distinction between *nouns and verbs*. These two notions, however, are not synonymous: While the distinction between objects and actions is semantic, the noun-verb distinction is a grammatical one and much broader, as it applies to the whole lexicon. The distinctions can, of course, overlap, and semantic criteria (i.e. the class of nouns denotes persons, places or things, verbs refer to actions or events) play an important role in delineating the categories "noun" and "verb". However, in order to delimit part-of-speech categories, a range of additional grammatical criteria, such as distribution, syntactic functions and morphological characteristics, need to be taken into account (Schachter and Shopen 2007: 1f.). Another point worth mentioning is that previous studies we refer to in this chapter have not looked at the whole lexicon but rather at a specific subset of signs, namely hand-held tools and actions carried out with these tools (Padden et al. 2013; Padden et al. 2015) or similar concrete manipulable everyday objects, e.g. food items (Tkachman and Sandler 2013). In signed languages, these lexemes are usually iconic, being easily represented by specific handshapes, with their size and shape depicted by certain classifiers. It is possible that this particular sub-domain of a sign language's lexicon develops specific markers to distinguish objects from actions, but in order to claim that these markers serve a more general function of noun-verb distinction, other domains of the lexicon need to be investigated as well.

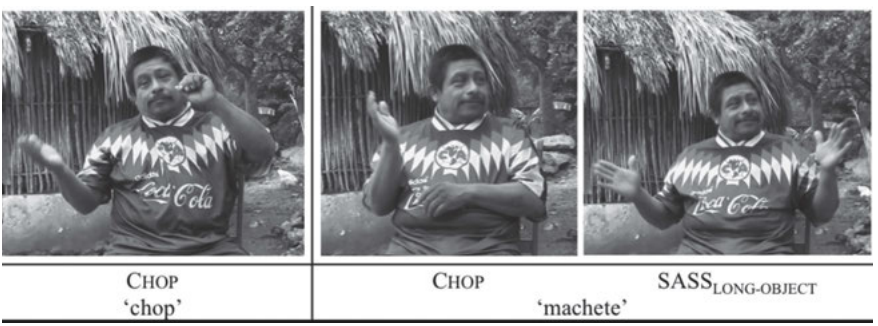
Schwager and Zeshan (2008) point out that there are methodological and theoretical challenges associated with identifying parts-of-speech in sign languages, because no clear criteria have been established yet. The authors suggest using a combination of semantic (language-independent), morphological and syntactic (language-specific) criteria. Still, in many cases, part-of-speech distinctions can be blurred, in spoken as well as in signed languages. For young, emerging sign languages where grammatical structures are still under way to being conventionalised and little of the grammar has been investigated yet, it is even harder to reliably identify parts-of-speech. In this early stage of description, we know too little about YMSL syntax and morphology and the full range of devices for noun-verb distinction is yet to be explored. In the remainder of this chapter, we will focus on two possible strategies: the use of SASSes as nominal markers (Section 2) and "patterned iconicity" (Section 3).

Our analysis of YMSLs will follow the same approach as previous studies and examine the distinction between objects and actions, mainly in the lexical domain of hand-held tools. In order to determine whether the object-action

distinction through the use of a SASS that we find in elicited data goes along with morphosyntactic patterns, we will look at the distribution of SASS-marked objects in conversational data (Section 3.2.3). This work is a first step towards the investigation of a noun-verb distinction beyond an object-action distinction in YMSLs.

3 Study 1: SASSes as nominal markers

No previous studies have investigated strategies of noun-verb distinction in YMSLs. During the course of our fieldwork we observed that signers frequently express an action as an unmarked form (Figure 3a), whereas for the corresponding object, a SASS that iconically depicts characteristic properties of the object, is attached to the sign (Figure 3b). Typically, there is a fast and smooth transition between the base sign and the SASS. This construction closely resembles what Tkachman and Sandler (2013) describe for ABSL.

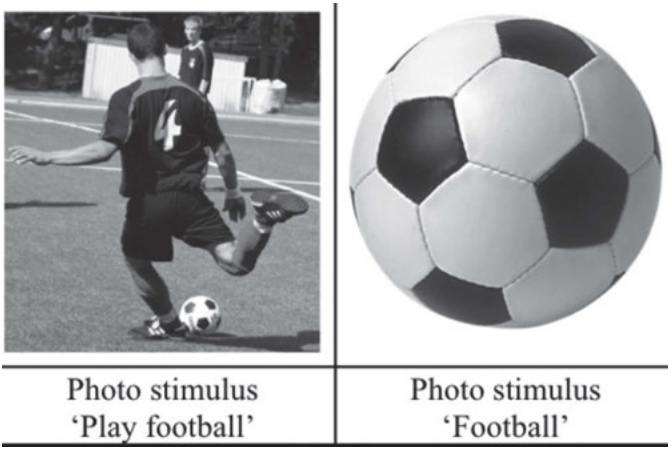


Figures 3a and 3b: Example of an action-object pair in YMSL from Chicán.

3.1 Method and participants

In order to provide an analysis of frequency, form and distribution of SASSes in YMSLs, we looked at semantically related object-action pairs using video recordings from three villages. Data were collected within a larger elicitation task documenting the YMSL lexicon, including items from various semantic fields, two of them being "activities" and "common objects". Two sets of photo stimuli were shown on a tablet to YMSL signers from Chicán, Nohkop and Cepeda Peraza. The participants directed their signed responses to one of three research

assistants, all hearing native signers of YMSL. One set of stimuli depicted objects in isolation and the other set the same objects being manipulated by a human actor (Figure 4).



Figures 4a and 4b: Example of photo stimuli used in the SASS study showing an object and a human actor manipulating the object.

Twenty-two signers participated in the task: 15 from Chicán (13 deaf, 2 hearing; 8 female; between 13 and 63 years old), 6 from Nohkop (4 deaf, 2 hearing; 4 female; 14–22 years old) and one female deaf signer from Cepeda Peraza (27 years old). In Chicán, signers from four different "interactional groups" (Le Guen 2012: 214–217) were included, i.e. signers who live together on a family compound and interact on a regular basis (see sociolinguistic sketch for YMSLs, this volume). Informed consent was obtained from all participants.

A total of 27 noun-verb pairs was elicited from each signer; 22 were used in the final analysis. They included 7 tools (machete, hammer, ax, knife, fork, scissors, broom), 4 furniture/household items (chair, hammock, washing board, griddle for making tortillas), 3 containers (cup, glass, calabash) and 8 other common items (toothbrush, hairbrush, hammock needle, lipstick, newspaper, pen, football, baseball) as well as their corresponding actions (chop with machete, wash clothes, brush teeth, weave hammock, etc.). The videos were transcribed

using the software ELAN (developed at the MPI for Psycholinguistics, Nijmegen, e.g. Crasborn and Sloetjes, 2008), and each item was coded for:[5]

- SASS (presence or absence)
- SASS type (round object, tall object, thin object, etc.)
- SASS hand configuration (one- or two-handed, handshape)
- SASS position (initial, medial, final or repeated)

Table 1: Participants' metadata (Study 1).

Signer ID	Hearing status	Gender	Age (date of recording)	Village	Interactional group (Chicán)
S01	Hearing	Female	18	Nohkop	
S05	Deaf	Female	44	Chicán	5
S06	Deaf	Female	61	Chicán	2
S07	Hearing	Female	27	Chicán	2
S08	Deaf	Female	18	Chicán	1
S09	Deaf	Male	13	Chicán	1
S10	Deaf	Male	53	Chicán	2
S11	Deaf	Male	63	Chicán	1
S14	Deaf	Female	45	Chicán	1
S15	Deaf	Female	48	Chicán	5
S18	Deaf	Male	17	Nohkop	
S19	Hearing	Male	14	Nohkop	
S20	Deaf	Female	19	Nohkop	
S21	Deaf	Female	15	Nohkop	
S22	Deaf	Female	22	Nohkop	
S26	Deaf	Male	17	Chicán	3
S27	Deaf	Female	22	Chicán	3
S28	Deaf	Male	53	Chicán	5
S29	Deaf	Female	23	Chicán	3
S32	Deaf	Male	28	Chicán	2
S34	Deaf	Female	27	Cepeda Peraza	
S35	Hearing	Male	15	Chicán	2

5 Given the high degree of lexical variation between and within Yucatec Maya signing communities, signers did not always use the same lexical signs for the same object; however, this did not affect our analysis, which was primarily concerned with whether and how signers employed SASSes.

3.2 Results

3.2.1 SASS: Form

Several types of SASSes occurred in the data set, depending on which visual aspect of of a referent the signer chose to highlight: long/wide object, tall object, round object, square object, small object, thin object, flat object, curved object, cylindrical object.

Both static SASSes – in which the distance between the hands or fingers depicts an object's size or shape – and tracing SASSes – in which the fingers or hands trace an object's outline in the air – were used. However, static SASSes (90.5%) were much more frequent than tracing SASSes (9.5%).[6] If we look at the results for each village separately, tracing SASSes were used more often by signers from Nohkop (22% *tracing* vs. 78% *static*) than by signers from Chicán (4% *tracing* vs. 96% *static*), and not at all by the signer from Cepeda Peraza.

Within the individual categories of SASSes, we encountered relatively little variation in form. Round objects such as a griddle or a calabash were consistently represented by two C handshapes. There was some minor phonetic variation between the depictions, e.g., a C vs. a baby-C handshape for round objects or two extended index fingers vs. two flat-5 handshapes for long/wide objects. Different signers did not necessarily represent the same object using the same type of SASS. A pencil, for instance, could be depicted using a static SASS for a long (Figure 5a) or a small object (Figure 5b) or a tracing SASS for a long and thin object (Figure 5c).

6 The distribution of SASS types is highly dependent on properties of the referent depicted. In a study on different "modes of representation" (Müller 2013) in pantomime, Ortega and Özyürek (2016) find that manipulable objects, e.g. tools, are much more likely to be represented by an *acting* mode of representation, whereas non-manipulable objects, e.g. buildings, are more likely to be depicted by *drawing* their outline in the air. The high proportion of manipulable objects in our elicitation materials might well be responsible for the scarcity of tracing depictions.

Figures 5a, 5b and 5c: Examples of different SASS types produced for the sign PENCIL.

3.2.2 SASS: Frequency

SASSes occurred exclusively in response to stimuli depicting objects and never in response to stimuli depicting actions, in our analysis we therefore concentrate on the responses to the stimuli depicting objects. In their responses, signers often did not name only the object in question but also provided a little description of where an object is found or in which situation it is typically used. If a signer repeatedly articulated a SASS in his or her response to one stimulus, it was only counted as one SASS response.

We collected a total of 484 responses to 22 stimuli from 22 participants. Out of these 484 responses, 46% of the signs depicting objects (n=221) included a SASS, and 54% (n=263) did not. We can therefore assume that SASSes in YMSLs function as nominal markers and that this strategy is used productively but not consistently. However, in order to claim that the object-action distinction that we find in elicited data is not purely semantic, we need to take into account additional grammatical criteria (see Section 2.4). To test the hypothesis that SASSes function as nominal markers, it will also be necessary to look at the syntactic distribution of SASS-marked signs in conversational data and examine whether object-action pairs are also distinguished morpho-syntactically.

3.2.3 SASSes: Syntactic distribution

So far, we have only described the use of SASSes on signs in isolation. In order to find out whether signs that refer to objects and signs that refer to actions are functionally equivalent to the parts-of-speech categories “nouns” and “verbs”,

we must look at their use in context. The following examples are taken from the YMSL corpus. The claim that SASSes function as nominal markers in YMSLs can also be supported by looking at their syntactic position.

The most common (basic) word order in YMSL is SV or SOV (Le Guen, 2019), as in the sentences (1) and (2). The verb stands in clause-final position.

(1) PRO1 TOMORROW WASH-CLOTHES
('Tomorrow, I will wash clothes.')

(2) WOMAN TWO MEAT CUT
('The two women are cutting meat.')

If we compare the distribution of verb forms and constructions including a SASS, we see that these forms appear in different positions in an utterance, can undergo different morphological modifications and co-occur with different parts of speech.


(3) LONG-TIME-AGO DRINK-ALCOHOL IX LONG-TIME-AGO DRINK(ITERATIVE)
('Before, he used to drink a lot.')


(4) PRO2 NEG UNDERSTAND, DRINK + SASS$_{\text{TALL-OBJECT}}$ TWENTY, TWENTY ONE
('You don't understand, one bottle costs twenty Pesos, twenty for one!")

(5) DRINK + SASS$_{\text{TALL-OBJECT}}$ QU-MARK
('Where is the soft drink?')

In (3), the verb DRINK stands (as prototypical in YMSL) in clause-final position and is inflected for iterative aspect ('drinking over and over again'). In (4) and (5) the noun DRINK+SASS$_{\text{TALL-OBJECT}}$ 'bottle' is followed by a numeral (in 4) and by an interrogative particle (in 5).

The same structure can be observed in examples (6) and (7).


(6) PRO1 CHOP PRO1 NEG, MOTHER IX TWO-OF-THEM CHOP
('I am not going to chop. [The boy] and his mother will chop.')


(7) MALE LOC-a FEMALE LOC-b, CHOP + SASS$_{\text{LONG-OBJECT}}$ a-GIVE-b
('There is a boy and a girl. The boy gives a machete to the girl.')

The verb CHOP first occurs in a negated, then in an affirmative clause in (6). In (7), the nominalised construction CHOP + SASS$_{\text{LONG-OBJECT}}$ is followed by the predicate GIVE (which, again, stands in clause-final position).

To give a more detailed account on the distribution of nouns and verbs in YMSLs, more fine-grained syntactic analyses of YMSLs are required. In this early stage of description of the language, where only a small part of the YMSL corpus is annotated and coded, it is not possible to provide an exhaustive analysis of

YMSL syntactic structure or a clear delineation of the part-of-speech categories "nouns" and "verbs". However, we can note from these examples that adding a SASS to a sign goes along with a change in syntactic position and co-occurrence with certain parts-of-speech, which supports the claim that SASSes function as nominal markers in YMSLs.

3.2.4 SASSes and type of object

The mere existence of SASSes on nouns in isolation does not sustain a generalisation that marking nouns with SASSes is obligatory. However, if we look more closely at which objects SASSes were used with, we can uncover some more fine-grained patterns. Figure 6 shows that some stimulus objects elicited more SASSes than others. The object most frequently marked by a SASS was 'calabash', on which all 22 participants added a SASS for a round object. Other objects that elicited a significantly higher number of SASS constructions than would be expected by chance were 'baseball' (20 responses) (Binomial Distribution Test, $p<.001$), 'football' (19 responses; $p<.001$), 'washing board' (18 responses; $p = .002$), 'griddle for tortillas' (18 responses; $p = .002$) and 'glass' (16 responses; $p = .01$). On the contrary, certain objects, such as 'fork' or 'ax' (5 responses; $p = .006$), 'chair', 'hammer', 'hairbrush' or 'lipstick' (4 responses; $p = .002$), and 'broom' (3 responses; $p<.001$) were significantly less frequently marked with SASSes. Not a single signer used a SASS for 'scissors'.

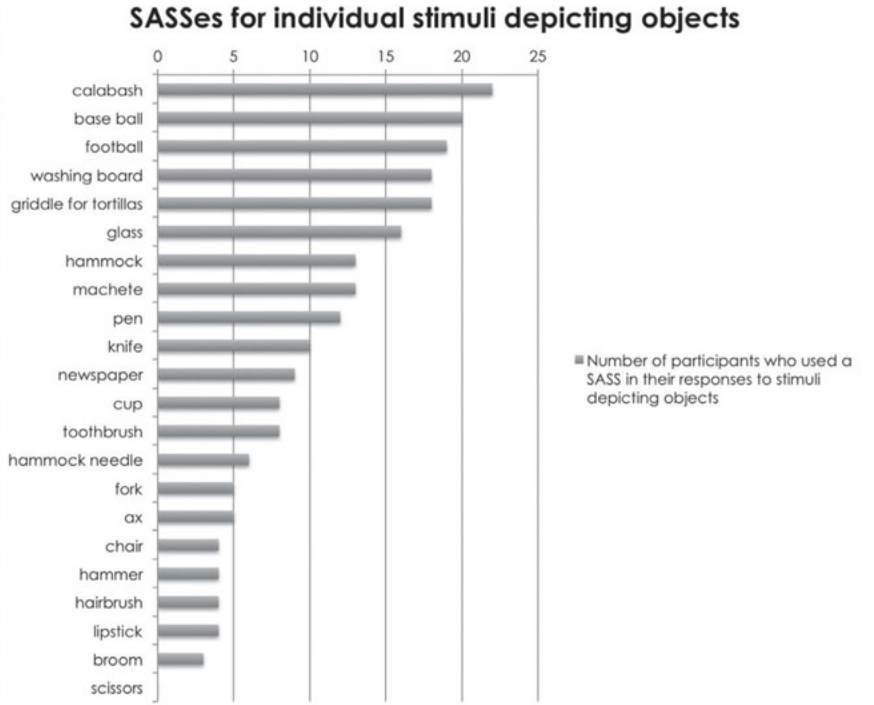


Figure 6: Number of participants (out of 22) who used a SASS in their responses to each object depicted in the stimuli.

3.2.5 SASSes among individual signers

Moreover, we can observe a significant amount of variation in the number of SASSes produced by individual signers, as shown in Figure 7.

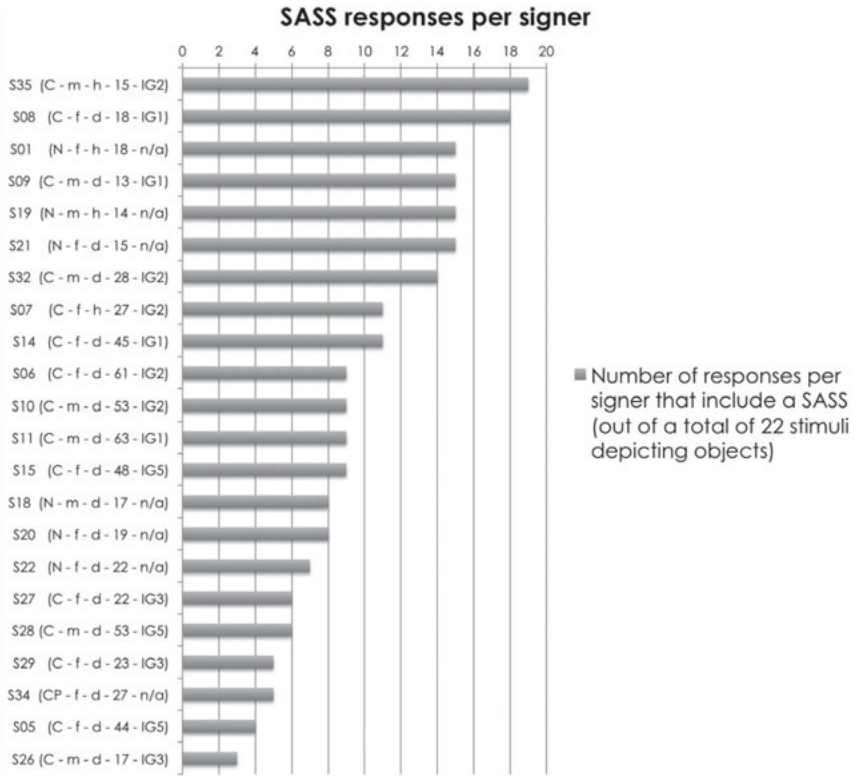


Figure 7: Number of responses per signer that include a SASS (out of a total of 22 stimuli depicting objects). The letters and numbers in brackets indicate the signer's location (C=Chicán, N=Nohkop, CP=Cepeda Peraza), gender (m=male, f=female), hearing status (d=deaf, h=hearing), age and interactional group (IG) in Chicán. S35, for instance, is a male hearing 15-year-old signer from interactional group 2 in Chicán.

Several signers used SASS constructions for more than half or half of the stimuli, namely S35 (19 responses), S08 (18 responses), S01, S09, S19, S21 (15 responses), S32 (14 responses), S07 and S11 (11 responses). The signers who used the lowest number of SASSes were S27, S28 (6 responses), S29, S34 (5 responses), S05 (4 responses) and S26 (3 responses). Apparently, the use of SASSes for marking objects is also a matter of individual preference – but it is not random and we can discern certain patterns. All of the signers whose results are in the upper range belong to the same "interactional groups" (Le Guen 2012: 216): S35, S08, S09, S32, S07, S14, S10 belong to interactional groups 1 and 2 in Chicán; S01, S19, S21 belong to the same interactional group in Nohkop. Contrary to this, three siblings from another nuclear family in Chicán (S26, S27, S29 from interactional group 3) used few SASSes. There is no statistical difference (Binomial Distribution Test) between

the average results from Chicán (45% SASS, 55% no SASS) and Nohkop signers (51.5% SASS, 48.5% no SASS). The one participant from Cepeda Peraza (S34) used fewer SASSes (22.7%). If we want to draw a comparison between villages, however, we need to keep in mind that the number of participants between the villages is not balanced due to the uneven size of their deaf population.

It is noticeable that in Chicán as well as in Nohkop, the participants who produced many SASSes include some of the youngest signers (S35, S08, S09 in Chicán; S01, S19, S21 in Nohkop) as well as three hearing bilingual signers (S35, S01, S19). No gender difference in the use of SASSes could be detected.

3.2.6 SASS: Position

Concerning the position of the SASS in relation to the base sign, it was not possible to recognise a clear pattern across all villages and each community has a distinct preference. In Chicán, the SASS is most frequently found in final position (43.2%), i.e., following the base sign, as for instance in WASH-CLOTHES + $\text{SASS}_{\text{WIDE-OBJECT}}$ ('washing board'). In 26.4%, it occurs in initial position, as in $\text{SASS}_{\text{WIDE-OBJECT}}$ + WASH-CLOTHES ('washing board'). In 20.3% of the cases, the base sign is repeated, with the SASS standing in the middle, e.g. CUT + $\text{SASS}_{\text{LONG-OBJECT}}$ + CUT ('knife'). In 8.8% of the cases, the SASS itself is repeated, such as $\text{SASS}_{\text{ROUND-OBJECT}}$ + DRINK + $\text{SASS}_{\text{ROUND-OBJECT}}$ ('calabash'). In a few cases (1.4%), the object was represented by a SASS only, such as $\text{SASS}_{\text{ROUND-OBJECT}}$ ('calabash'). In Nohkop, the SASS occurs most often in an initial position (29.4%), followed by medial (25.0%) and final position (22.1%). In 19,1% of the cases, the SASS is repeated and in 4.4%, the SASS is used on its own. The signer from Cepeda Peraza used very few SASSes overall and was thus not included in Figure 8.

In the cases where one or several elements of the construction are repeated, it becomes tricky to determine the more common position of the SASS. It could be informative to carry out a follow-up study, e.g. using grammaticality judgments, in order to find out more about the preferred position of the SASS. For now, the position of the SASS must be regarded as flexible in YMSL of Nohkop. In Chicán, the final position is preferred, but other positions are also permitted and common.

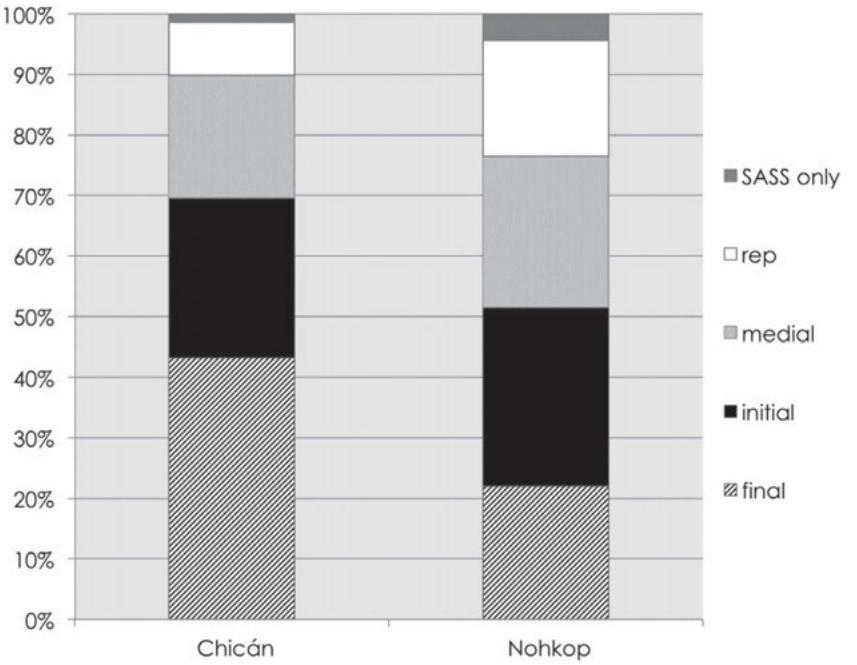


Figure 8: Position of the SASS.

3.3 Discussion

3.3.1 Frequency, form and position of SASSes

As our results demonstrate, the use of SASSes to distinguish objects from actions is not obligatory in YMSLs and not all objects are marked equally often with SASSes by all signers in our study. However, with an average of 46% (45% in Chicán, 51.5% in Nohkop, 22% in Cepeda Peraza), the use of SASSes as nominal markers is a frequent strategy employed by signers from all three communities.

It is worth making a critical comment about our methodology. Data for this study was collected within a larger lexical elicitation task and therefore, the stimuli for objects and actions were not presented in a randomised order as in Tkachman and Sandler's (2013) study. The fact that the participants saw a set of photos showing actions, followed by a set of photos of the corresponding objects, could influence the results of the task. We could expect the frequency of SASSes to be even higher in a condition where stimuli showing objects and actions are

mixed and signers would thus be more inclined to overtly disambiguate objects from actions. However, even under the condition of our task, where signers could omit overt part-of-speech marking because objects and actions were grouped together, we can see that YMSL signers still chose to use SASSes on almost half of the objects.

The frequency of SASSes in the YMSL study is much higher than in the results on ISL (24%) and ABSL (15%) reported by Tkachman and Sandler (2013). Possibly, ISL relies less on SASSes as nominal markers because the language prefers other strategies for expressing the noun-verb distinction, such as mouthing and manner of movement. As these features have not yet been investigated for YMSLs, we cannot draw any direct comparisons, but we can see from previous studies on other sign languages such as ASL (Supalla and Newport 1978), Russian Sign Language (Kimmelman 2009) and Austrian Sign Language (Hunger 2006), that sign languages exhibit cross-linguistic variation in their systems of noun-verb distinctions. It is likely that in one sign language, SASSes are the preferred strategy whereas another sign language relies more strongly on other features, such as duration or manner of movement. The different proportions of SASSes in YMSLs and ISL/ABSL could also have methodological causes, for instance the choice of stimuli used for elicitation.

Language age seems to play a role in the set of devices signers have at their disposal to convey a noun-verb distinction. Tkachman and Sandler (2013) assume that ABSL has not yet developed a fully consistent system of noun-verb distinction, in contrast to ISL, even though the languages are of roughly the same age. In ISL, however, the pressure to develop such a distinction may be higher because of the different sociolinguistic setting (institutionalised language, larger and more fragmented signing community) and this may promote more robust mechanisms for a noun-verb distinction than in ABSL. It might well be that in the long run, we will be able to observe increased conventionalisation and consistency also in YMSLs. Unfortunately, being at the same time emerging and endangered, YMSLs might not survive long enough to test such predictions.

In the YMSL data, some SASSes (e.g., those depicting long/tall/round objects etc.), exhibited relatively little cross-signer variation in form. Similar gestures for size and shape exist also among hearing Yucatec Maya and some of them, such as two 5 handshapes for long/wide objects, are highly conventionalised in gesture,[7] which might explain their frequent occurrence in the YMSL data (e.g. for WASHING-BOARD or MACHETE, see Figure 3b). From Tkachman and Sandler's (2013) study, it

7 Le Guen (p.c.) points out that this particular gesture is so conventionalised that it could be considered a "gestural classifier" in Yucatec Maya co-speech gesture.

is not clear what the full inventory of SASSes in ABSL and ISL looks like, but the ones described in more detail, e.g. the "STRAIGHT-OBJECT-SASS" in the ABSL sign for LIPSTICK (Tkachman and Sandler 2013: 270), where the extended index finger represents a lipstick, differ from YMSLs. SASSes in which the whole object itself is directly mapped on the hand or the fingers are rare in YMSLs. More common in YMSLs are SASSes where the distance between the hands or fingers depicts the size of the object, as in Figure 1.

Tkachman and Sandler (2013: 269) report that in SASS constructions in ISL and ABSL, the SASS usually stands in final position, following the sign for the object. This is also the preferred position for the SASS in Chicán, but other positions also occur with considerable frequency. In Nohkop, there is no fixed pattern and several positions (initial, medial, final) are permitted. Possibly, the higher number of deaf signers in Chicán and the fact that intergenerational transmission of the sign language has taken place might have caused a stronger structural conventionalisation of SASS constructions in Chicán than in Nohkop.

3.3.2 Variation in the use of SASSes

In YMSLs, the use of SASSes is both semantically driven – as in ABSL – and signer-driven – as in ISL.

There is a strong correlation between the frequency of SASSes and the type of object, similar to what Tkachman (2012: 54) calls "a hierarchy of semantic properties". Some objects trigger the use of SASSes more than others, e.g. 'calabash', 'griddle for tortillas', 'washing board', 'football', 'baseball' or 'glass', whereas signs for other objects, such as 'hairbrush', 'lipstick' or 'broom', are more likely to stand on their own. The object 'scissors' was never marked with a SASS. How can we explain these variations? Tkachman and Sandler (2013: 274) mention that in ISL and ABSL, "SASSes are added primarily to those nouns that are not transparent enough despite their iconicity". Others, which are more transparent, do not "need" a SASS. This explanation could also apply to YMSLs, where several of the high-ranked items in Figure 6 require disambiguation of the referent. For instance, the iconic sign DRINK could (as a noun) refer to different containers for liquids and the addition of a SASS can clarify whether the signer is talking about a glass or a calabash. Similarly, the sign for TORTILLA could describe the food itself or the griddle on which tortillas are typically prepared – the referent becomes clear only through specification by a SASS. While the assumption of a semantic hierarchy for SASS constructions related to potential ambiguity of the referent seems plausible, it is not the only possible explanation for the observed variation in the frequency of SASS marking on specific nouns. First of all, SASSes do not

completely resolve ambiguity but serve still as a rather schematic classification of referents (see, for instance, different depictions of PENCIL in Figure 5). Secondly, when seeing the signs for FOOTBALL, HAMMOCK or MACHETE, an interlocutor is not likely to hesitate between several possible referents; nevertheless, many signers highlighted these items with a SASS. It is possible that the shapes of some referents are more salient than others and the addition of a SASS has become obligatory or at least strongly preferred. Also, it is possible that some size-and-shape gestures are already strongly conventionalised among hearing Yucatec Maya and that these become more rapidly inscribed in the YMSL lexicon. Further comparative research on size-and-shape gestures and SASSes in (emerging) sign languages is needed to shed more light on this issue (see e.g. Tano and Nyst 2018; Safar, under review).

Another interesting dimension in the variation of SASSes are inter-signer differences. Tkachman and Sandler (2013) report that in ISL, the use of SASSes on nouns is a matter of individual preference. While this also holds for YMSLs, the variation is not random but actually displays some sociolinguistic patterns. First of all, it is remarkable that all the signers whose results are ranked in the upper half belong to the same interactional groups (see Figure 7). These signers communicate with each other on a daily basis and partly learnt sign language from each other. Therefore, it is not surprising that they resemble each other in their patterns of language use. Parallel to that, we can observe that the three siblings in Chicán, who belong to a different interactional group (interactional group 3) and are rather isolated from other deaf signers in the village, used the SASS strategy only to a minimal extent. The notion of "familylects" has been mentioned for ABSL by Sandler et al. (2011) and also in YMSLs – at least in Chicán – certain semantic fields exhibit variation related to family membership, e.g. numbers (Safar et al. 2018). It is plausible that this family-related variation goes beyond the lexicon and is also reflected on other linguistic levels. We propose that the use of SASSes as nominal markers is part of "familylects" in Chicán.

Moreover, it is worth noticing that the same individuals whose results stand out in this task also diverged from other signers in other studies (e.g. on the use of the signing space for transitive verbs (Le Guen and Safar, in prep.) or the marking of human referents by a person-classifier (Safar, under review)). One group of signers who relied strongly on SASSes are the youngest signers in Chicán, who learnt sign language primarily from deaf adults (S35, S08, S09, S32). It is possible that the increased use of SASSes as nominal markers among the younger generation of signers is a result of language transmission. The individuals who grew up with several deaf interlocutors and a rich spectrum of sign language input from deaf adults, restructure this input, and markers that were used optionally by linguistic models, become obligatory (see also e.g. Senghas 2003

on Nicaraguan SL) Another group of signers that draws the attention are hearing bilingual signers (S35, S01, S19, S07) all of whom used SASSes on half or more than half of the objects. It is possible that the increased use of SASSes as nominal markers in this group is induced by language contact with a surrounding spoken language (Yucatec Maya or Spanish). The fact that hearing YMSL signers speak languages that employ overt morphological and/or lexical noun-verb distinctions might lead them to apply such a distinction in YMSL more consistently than monolingual deaf signers.

The results on variation in SASSes for noun-verb distinction can give valuable clues on more general issues such as language evolution and grammaticalisation as well as sociolinguistic variation. However, these hypotheses need to be tested and confirmed with different types of data, including natural conversations.

3.3.3 SASSes in gesture and sign

What can be demonstrated with more clarity is the gestural origin of SASSes. Iconic gestures for size and shape of human and non-human referents are abundant among hearing Yucatec Mayas (Petatillo Balam 2015) and also among speakers of other Mayan languages, such as Akatek (Zavala 2000), and in Latin America in general (Meo-Zilio and Mejía 1980;1983). Some of these gestures refer to specific subclasses of entities and can thus be described as classificatory manual gestures (Zavala 2000; Le Guen et al., this volume; Safar, under review). This rich gestural environment constitutes an important resource of visual raw material for the development of sign languages in these communities (see also Le Guen et al., this volume; Horton, this volume) and in the case of SASSes, YMSLs directly incorporated the corresponding gestures without much semantic modification. Nyst (2016) shows that iconic devices for size-and-shape depiction differ across sign languages and that they are often rooted in culture-specific gestural habits of the surrounding hearing communities. Indeed, hearing Yucatec Mayas, when asked to describe the same set of photo stimuli in silent gestures, used almost identical handshapes for the same objects as YMSL signers.

In this example, we see that the gesturer in Figure 9, a hearing woman from the village Kopchen in Quintana Roo who does not know any sign language and has never been in contact with deaf people, and the deaf signer from Chicán in Figure 10 use the same hand configuration – two extended index fingers – to describe a knife. There is also an interesting difference between their depictions. Hearing non-signing gesturers tend to represent multiple features of the object in a more detailed manner – in this example, the gesturer depicts both the handle and the blade of the knife, followed by two different strategies of iconic depiction

of the cutting event (see Section 4). This level of detail was not encountered in any of the signers' productions. In YMSLs, SASSes are more generic and reduced. They do not always reflect the exact size or shape of a referent but point more generally to the class of objects the referent belongs to. Other studies have investigated how YMSL signers draw from gestural resources and further conventionalise them into signs (Le Guen 2012; Le Guen et al., this volume). In the case of SASSes, conventional gestures start to obtain a specific linguistic function, namely the noun-verb distinction. At the same time, they become reduced in form and take on an additional grammatical purpose that exceeds the exact iconic depiction of a referent (see also Safar, under review).

Figure 9: Description of stimulus picture of a knife by a hearing, non-signing Yucatec Mayan gesturer.[8]

Figure 10: Sign for KNIFE in YMSL of Chicán.

8 Lower case letters are used for the annotation of gestures and upper case letters for glossing YMSL signs.

3.3.4 Alternative strategies

The fact that SASSes are not always and obligatorily used for noun-verb distinction makes us suspect that YMSLs might have additional ways to do so. Indeed, several supplementary strategies were identified in the data from this study.

One possibility of marking nouns is a sign that can be glossed as PUT or PUT-ON-SURFACE. Haviland (2013b) pointed out a similar phenomenon for Zinacantán Family Homesign (see Section 2.1), and he describes the sign as "a clearly grammaticalized locative or copular element" (Haviland 2013a: 309), derived from the lexical sign PUT-ON-SURFACE. In YMSLs, this sign was used predominantly by certain signers and exclusively in reference to objects, as in Figure 11.

Figure 11: Description of the stimulus 'hairbrush' by a YMSL signer from Chicán.

Unfortunately, from the illustrations in Haviland's paper it is far from clear how exactly this "copula or light verb" differs from its locative use and Haviland does not explain in detail in what way it became "semantically empty" and grammaticalised. A more detailed comparison of the locative verb PUT and the "copula" PUT is desirable. For YMSLs, I would analyse the sign PUT following a noun as a locative construction describing the spatial arrangement of an object in relation to a surface of the type "A hairbrush is lying on a surface". PUT provides additional spatial information when the noun "hairbrush" stands in isolation.

Another strategy, which surfaced in this study, is the spatial modulation of verbs while the corresponding noun remains static. In Figure 12b, we see that the verb CUT-WITH-SCISSORS traces the path of scissors cutting a sheet of paper, whereas the noun SCISSORS in Figure 12a includes only hand-internal movement but no movement in space.

Figures 12a and 12b: Example for difference in movement in an object-action pair in YMSL of Nohkop.

This strategy has been described for other sign languages as a distinction in size of movement, e.g. for RSL or ABSL, where verbs typically include a larger movement component than nouns.

Despite their youth, YMSLs make use of several possible strategies indicating a noun-verb distinction. These might not be applied consistently, but they can interact in various ways, be used interchangeably or co-occur with SASSes. Future studies need to investigate these alternative strategies in more detail.

One further possibility of noun-verb distinction, which has been reported to exist in other sign languages will now be explored for YMSLs, namely differences in iconic strategies for depicting objects and actions.

4 Study 2: Patterned iconicity in YMSLs

We will now present a study that was carried out by Rodrigo Petatillo Chan and Olivier Le Guen,[9] who looked at differences in handshape for the depiction of objects and actions related to tool use. As outlined in Section 2.3, gesturers and signers can (among other strategies) employ *handling* or *instrument* handshapes

9 This study was presented by Rodrigo Petatillo Chan at the "1er Coloquio Internacional sobre Lenguas de Señas Emergentes de las Americas" in Mexico City (First International Workshop on Emerging Sign Languages of the Americas), 11 September, 2015.

for the depiction of objects and actions and possibly use this distinction systematically to convey a categorical difference between nouns and verbs. Following up on the results of Padden et al.'s (2013; 2015) work, the aim of this study was to find out whether and how YMSLs, young sign languages that emerged in micro-communities under a very important influence of co-speech gestures, exhibit similar patterns of iconicity.

The study has two parts: The first (Section 4.1) looks at the distribution of iconic strategies for tool depiction among YMSL signers from three communities and contrasts them with a group of Yucatec Maya hearing non-signers. The second (Section 4.2) compares the use of these strategies for the description of objects and actions.

4.1 Study 2a: Patterned iconicity in Yucatec Maya gesture and in YMSLs

4.1.1 Method and participants

A total of 32 participants were recruited for this study: a group of hearing non-signing Yucatec Maya gesturers and a group of YMSL signers from three communities. Data for the gesture group was collected from 11 participants from the village of Kopchen in Quintana Roo. The informants were between 9 and 55 years old (6 female) and have never been exposed to sign language or had contact with deaf people. Moreover, 21 YMSL signers were interviewed, including both deaf and hearing bimodal-bilingual signers: 12 from Chicán, 7 from Nohkop and 2 from Trascorral.

Table 2: Participants' metadata (Study 2).

Village	Deaf	Hearing	Female	Male	Total	Age range (date of recording)
Kopchen	0	11	6	5	11	9–55
Chicán	11	1	7	5	12	12–60
Nohkop	3	4	4	3	7	8–20
Trascorral	2	0	1	1	2	10–18

The stimulus materials for this task were taken from Padden et al. (2013: 293):[10] 24 photos of common hand-held tools in variable quantities (up to four) displayed on a neutral background. These objects included 4 clothing items (hat, jacket, gloves, pants), 3 cutlery items (fork, spoon, knife), 9 hand tools (broom, vacuum cleaner, scissors, rake, handsaw, screwdriver, paintbrush, hammer, mop), 4 hygiene articles (toothbrush, comb, hairbrush, hairdryer), 3 cosmetic products (mascara, nail polish, lipstick) and 1 other item (cell phone).

Figure 13: Example of a stimulus item from Padden et al. (2013) used for the handling/instrument study in YMSL.

Signers were asked to show the respective objects using YMSL signs and hearing non-signers were instructed to describe the objects in silent gesture, i.e. without speaking and using only their hands.

The data was transcribed in ELAN and signs and gestures were assigned to the following categories: *handling, instrument, other* or *nothing*. Responses in the category *other* included for instance pointing to or touching objects in the surroundings. In some cases, participants did not provide any response, which was coded as *nothing*.

4.1.2 Results

Both Yucatec Maya gesturers and YMSL signers made use of *instrument* as well as *handling* handshapes when they depicted tools (see Figure 14). For Padden et al.'s (2013) stimulus set of 24 tools, we can detect a slight preference for a *handling* strategy among the hearing non-signing Yucatec Maya from Kopchen (Binomial Distribution Test, $p = .03$) and a preference for an *instrument* strategy among all three groups of YMSL signers, which is significant only among signers from Chicán ($p<.001$). Hearing gesturers from Kopchen used *handling* handshapes in 50.4% of the cases, *instrument* in 46.6% and in 3% did not provide any response

10 We wish to thank Carol Padden and her team for sharing their stimulus materials.

at all (*nothing*). Signers from Nohkop used *instrument* handshapes for 51.7%, *handling* for 44.1% and *other* for 4.2% of the items. Here, we can identify a difference between deaf (56.9% *instrument*, 37.5% *handling* and 5.6% *other*) and hearing signers (47.9% *instrument*, 49% *handling* and 3.1% *other*) from Nohkop, but a Pearson's Chi-squared test with Yates' continuity correction proved it is not significant. Signers from Chicán used *instrument* handshapes in 60.8% of their responses, *handling* in 31.6%, *other* in 5.9% and *nothing* in 1.7%. In Trascorral, signers responded to 50% of items with *instrument* responses, 45.8% with *handling* and 4.2% with *other*. Figure 14 shows the results for all groups.

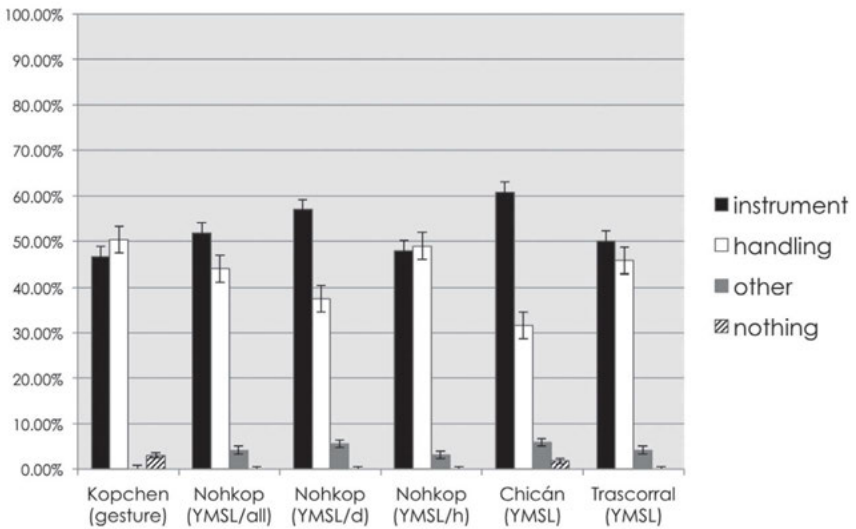


Figure 14: Percentage of *instrument*, *handling*, *other*, and *nothing* responses per group.[11] "d" indicates deaf participants, "h" indicates hearing signing participants, and "all" indicates data from deaf and hearing participants combined.

When looking in more detail at the preference of iconic strategy for individual objects, we discover differences according to the type of object displayed. Some tools are more likely to be represented by an instrument, others more likely by a handling strategy, irrespective of the participant's group affiliation. In both gesture and sign, the items 'scissors', 'mascara' and 'knife' were depicted by

11 The bars contain only one response per participant per stimulus. If a person used both an instrument and a handling strategy for the same stimulus item, only the first response was counted in the results.

instrument handshapes in more than 80% of the responses, whereas the items 'mop' or 'vacuum cleaner' were depicted by handling handshapes in more than 80% of the responses. In Figure 15, we notice that some items evoke more homogenous responses across all groups of participants. Other objects permit more flexibility and can select either strategy of depiction, for instance 'toothbrush'.

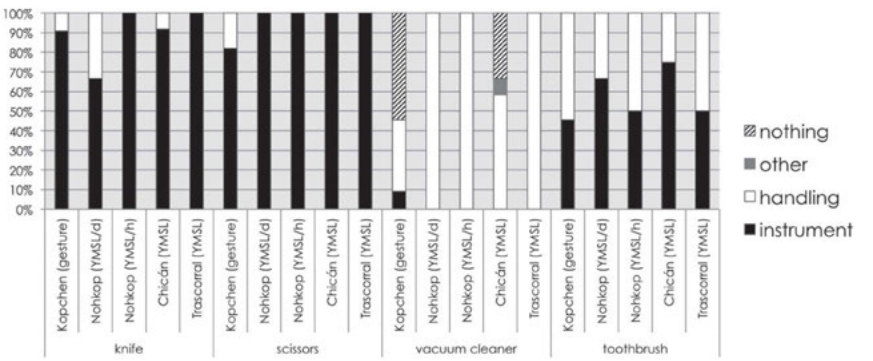


Figure 15: Percentage of response types for the items 'knife', 'scissors', 'vacuum cleaner' and 'toothbrush'. "d" indicates deaf participants, "h" indicates hearing signing participants, and "all" indicates data from deaf and hearing participants combined.

The correlation between iconic strategy and type of object is even stronger among YMSL signers than among Yucatec Maya gesturers. The item 'scissors', for instance, was represented by an instrument strategy by all YMSL signers and, in turn, no YMSL signer depicted 'vacuum cleaner' using an instrument handshape. Among the group of hearing gesturers, this item-related split was visible, but their responses were more mixed than those of YMSL signers – no stimulus elicited exclusively instrument or handling handshapes in gesture. In a few cases, the results diverge between gesture and sign for specific items: 'Rake', for example, was depicted by instrument by 95.2% of YMSL signers (results from all villages collapsed), while only 18.2% of the hearing gesturers chose the instrument strategy for this tool.

The categories *other* and *nothing* only contain responses for particular items and this holds for all groups of participants, i.e. gesturers and signers from different communities. The objects most frequently coded as *other* were clothes (7 responses for 'pants', 13 responses for 'jacket'), which were most likely to be represented by touching the respective piece of clothing on the participant's own body or (in few cases) by tracing its outline in the air. The items for which several participants did not provide any gesture or sign were 'hair dryer' (3 responses)

and 'vacuum cleaner' (10 responses) – objects, which are not completely alien but at least very uncommon in Yucatec Maya daily life.

4.1.3 Discussion

When interpreting the results of this study against the background of Padden et al.'s (2013) findings, two main points of interest arise: First, the preference towards either an instrument or a handling strategy is not as pronounced in any of the groups as in Padden et al. (2013). Second, the handling/instrument-split in Yucatec Maya gesture vs. YMSLs is much less striking than in the gesture/sign comparison among American and Bedouin participants.

Yucatec Maya gesturers show a slight but almost negligible preference towards handling handshapes for the depictions of tools, whereas signers from Nohkop, Chicán and Trascorral prefer the instrument strategy. In the responses from Chicán signers, the split between instrument (60.8%) and handling (31.6%) is strongest and comparable to the results from ASL signers in Padden et al. (2013) (65% instrument, 35% handling). Deaf signers from Trascorral show a weak preference towards an instrument strategy, but it is not significant and is based on data from only two individuals. YMSL signers from Nohkop, as a group, prefer instrument over handling, but if the group is further split into deaf and hearing bilingual signers, deaf signers' responses resemble more the ones from Chicán signers, while the ones from hearing signers look more like the responses from hearing gesturers from Kopchen. Given the limited number of participants in this micro signing-community, however, this difference cannot be considered significant.

In Padden et al.'s (2013) study, the split between instrument and handling was very pronounced among some groups: ABSL signers used 82% instrument and 23% handling handshapes and American hearing gesturers produced 83% handling and 17% instrument handshapes. Such a sharp instrument vs. handling contrast could not be detected for any of the Yucatec Maya groups.

Looking at the results as a whole, it seems that Yucatec Maya gesturers – in contrast to American and Bedouin gesturers who clearly favoured handling handshapes – do not have such a strong preference in terms of iconic strategy for the depiction of tools but use instrument and handling handshapes rather flexibly and interchangeably. YMSL signers, on the other hand, seem to have an overall preference towards an instrument strategy, which is most pronounced among signers from Chicán and deaf signers from Nohkop. Padden et al. (2013) propose that signers of different sign languages draw from semiotic resources available in their gestural environment and start to use them in a linguistic way, resulting

in patterns of iconicity that become embedded into the sign language lexicon. It seems that YMSLs from three communities have developed a similar tendency but to various degrees. It could be that differences in the generational depth and the sociolinguistic environment of the three communities play a role in the formation of iconicity patterns. The sign language in Chicán has developed over the course of three generations and involves the largest number of signers from different families. Possibly, this exercises more pressure to develop increasingly strategic means of iconic depiction and that in the other two communities, these patterns have not become as solidified (yet).

The mere comparison of iconic strategies across different participant groups, however, cannot sufficiently explain this phenomenon. Particularly striking in the results from Yucatec Maya gesturers and YMSL signers are the choices of iconic depiction according to properties of the referent. Among all groups of participants – hearing gesturers from Kopchen and deaf and hearing YMSL signers from all three communities – we can detect a clear correlation between the type of object and the choice of a handling or an instrument strategy. The stimulus items can be assigned to three categories: Items that are more likely to be represented by instrument handshapes in both gesture and sign, items that elicit handling handshapes with high frequency and items that can trigger either strategy. The item 'scissors', for instance, was represented by an instrument form by 100% of YMSL signers and by all but two Yucatec Maya gesturers (Figure 16a). This specific item 'scissors' also stands out stands out in Padden et al.'s (2013) results, where it was also depicted as instrument by all signers and the majority of gesturers, and it is also one of few instances of instrument depiction in NZSL corpus data (McKee, Safar and Pivac Alexander, in prep.). As Padden et al. (2013: 297) consider, this might be due to the existence of a widespread emblematic gesture for 'scissors' among hearing people (even though the game rock-paper-scissors, which the authors consider to be the source of this emblem, is not played among Yucatec Maya kids, and we do not know how common it is among the Bedouin). Another possible explanation could be that certain shapes naturally lend themselves more to instrument forms than others. Probably, we strive to try to map as much of an object's size and shape as possible on our hands in order to be as unambiguous as possible. For scissors, there is a strong iconic potential of the fingers to depict the size and shape of the blades of scissors. A handling handshape (Figure 16b) might not be transparent enough to be clearly recognised as a hand cutting with scissors and could also represent, for instance, tongs.

Figures 16a and 16b: Stimulus 'scissors' depicted by a YSML signer from Nohkop (left) and a hearing gesturer from Kopchen (right).

Remember that the object 'scissors' also stands out in the results of the SASS study (described in Section 3.2.4) because no signer marked it with a SASS.

Other items with a high rate of instrument forms among Yucatec Maya gesturers and signers, such as 'knife' or 'mascara', were also mentioned by Padden et al. (2013) for frequently triggering the instrument strategy. Interestingly, the item 'cell phone', which elicited mostly instrument forms among American and Bedouin gesturers, produced rather mixed results among Yucatec Maya gesturers and signers. This could be explained by the absence of an emblem for 'I'll call you!' (Padden et al. 2013: 297) among the Yucatec Maya. In these communities, cell phones were introduced only a few years ago and today, there is still no network coverage in Chicán and Kopchen. Landline phones are also scarce.

On the other side of the spectrum, certain items were generally more likely to be depicted by handling forms, such as 'broom', 'mop' or 'vacuum', irrespectively of who produced them. Some of these activities, for instance sweeping, are so frequently performed in Yucatec Maya everyday life, that respective gestures can be considered culturally conventionalised emblems, e.g. handling for 'broom'. The size of these objects could also play a role, and make them more suitable for an action-based depiction, because it is difficult to map the whole object onto the hand.

Items that show a split between instrument and handling preference across the different groups of participants include 'toothbrush', 'hairbrush' and 'screwdriver'. The connection between an object's form and the type of iconic representation has previously been discussed in sign language and gesture

research. In her work on Cut-and-Break events in Swedish Sign Language (SSL), Simper-Allen (2016) points out that certain tools favour specific handshape types in depicting verbs and Ortega and Özyürek (2016) demonstrate that properties of the object influence the mode of depiction even in pantomime. Future research on this issue could help us to answer the open questions of whether and how characteristics of the referent can predict the choice of iconic strategy, if universal tendencies exist in gesture and sign and to what extent they are language-specific. Among the Yucatec Maya, a link between the type of object and iconic patterning exists both in gesture and sign, but it is more pronounced in YMSLs than in Yucatec Maya silent gesture. Some preferences match with previous studies, some are distinct among the Yucatec Maya. We assume that a tendency towards a certain strategy of depiction can be explained by an interplay of characteristics of the object, i.e. iconic properties of the referent itself, and cultural conventions, i.e. the existence of emblems. Both constraints are present in gesture but become more relevant in an emerging sign language. When the visual modality is the sole mode of expression, iconic patterns take on another function and become more systematic, if not obligatory.

4.2 Study 2b: Patterned iconicity for objects and actions

4.2.1 Method and participants

Following up on this first study, we wanted to see if the preference of iconic strategy varies for the depiction of objects and actions. Additionally to Padden et al.'s materials, an additional set of stimuli depicting 14 common items of everyday use in Yucatec Maya villages was shown to participants, including objects such as 'machete', 'calabash', 'bucket' etc. As in the SASS study (see Section 3.1), the stimulus items were presented under two different conditions: depicting either the object alone or the same object in use by a human actor. With these stimuli, we elicited responses referring to either the object or the corresponding action.

From all the responses, a subset of 12 object-action pairs was selected and analysed for handling and instrument strategies. The limited amount of data for the analysis of object-action pairs is due to methodological reasons. Several items had to be excluded from the analysis because the stimuli used proved to be inadequate to this end. For instance, not all of the objects in Padden et al.'s stimuli set were paired with an equivalent action depiction in Petatillo Chan and Le Guen's task. The stimuli depicting local Yucatec Maya objects, on the other hand, were not all suitable for an analysis of handling and instrument strategies. They included items where handshapes depicting the manipulation of an object

and handshapes depicting the object itself were not easily distinguishable, such as in 'calabash/'drink from calabash'. Other items, such as 'washing board' (a big and not portable item made of concrete) or 'hammock' are not likely to be represented by handling or instrument strategies at all and they do not really fall into the category of "hand-held man-made artifacts ('tools')" (Padden et al. 2013: 287), where patterns of iconicity are most likely to surface. Finally, the 12 object-action pairs analysed for iconic strategies were the following: 'scissors/cut paper with scissors', 'broom/sweep', 'hairbrush/brush hair', 'fork/eat with fork', 'hammer/hammer in nail', 'knife/cut mango with knife', 'cell phone/talk on cell phone', 'toothbrush/brush teeth', 'lipstick/put on lipstick', 'nail file/file nails', 'machete/chop with machete', 'ax/cut tree with ax'.

The same informants as in study 2a also participated in study 2b (see Section 4.1.1), but the two signers from Trascorral were not included. This resulted in a total of 30 participants for study 2b (11 from Kopchen, 12 from Chicán, 7 from Nohkop).

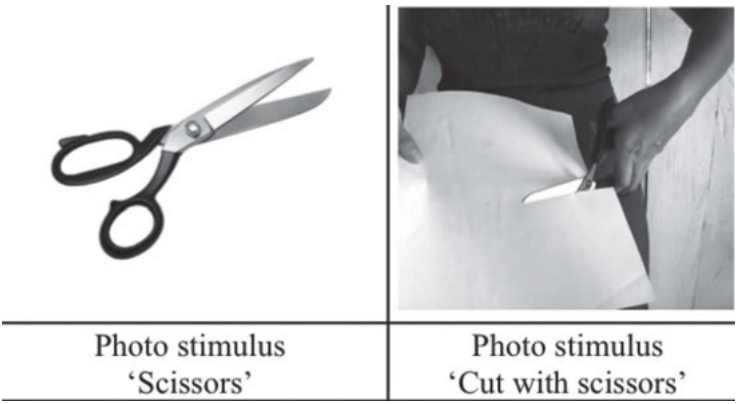


Figure 17: Example of an object/action pair from the stimuli used in the handling/instrument study.

4.2.2 Results

In the comparison of depictions of objects (Figure 18) and actions (Figure 19) by Yucatec Maya gesturers and YMSL signers, we see a similar tendency for both gesturers and signers, namely a preference for an instrument over a handling strategy for objects as well as actions. In this subset of the data, hearing non-signing gesturers from Kopchen used instrument forms in 56.8% and handling

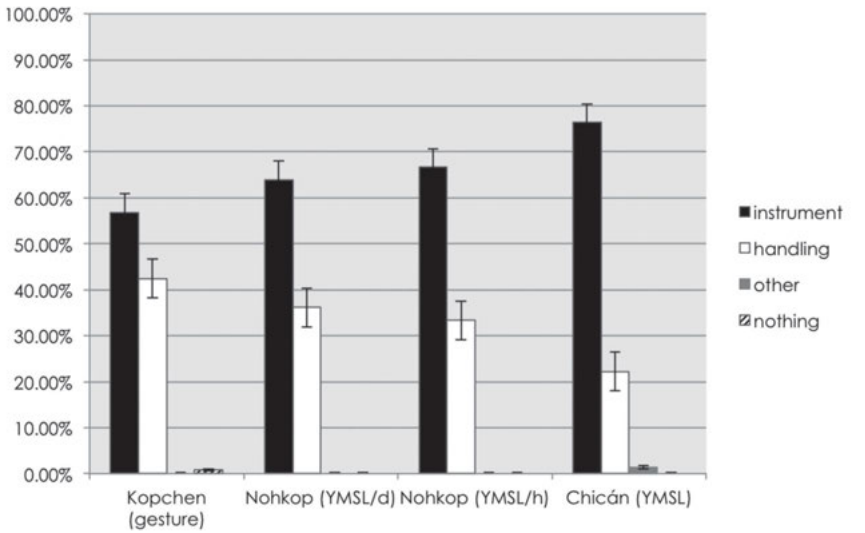


Figure 18: Handshape types produced in response to objects (subset of 12 stimuli). "Gesture" indicates hearing, non-signing participants; "d" indicates deaf participants, and "h" indicates hearing signing participants.

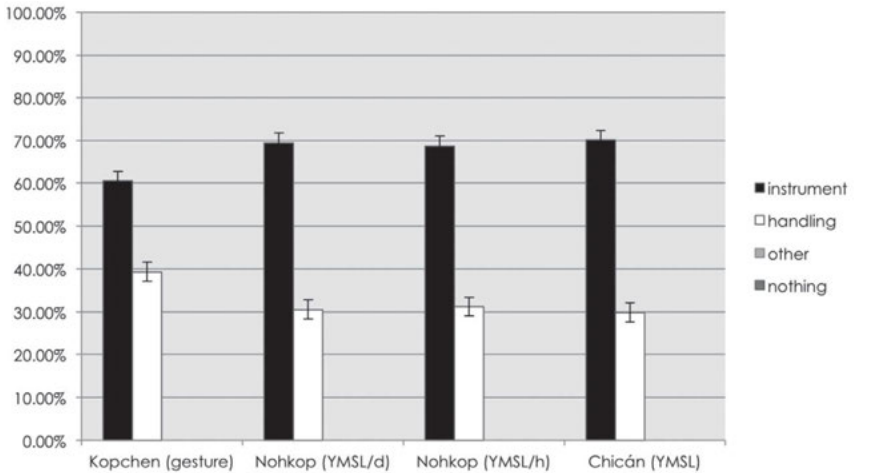


Figure 19: Handshape types produced in response to actions (subset of 12 stimuli). "Gesture" indicates hearing, non-signing participants; "d" indicates deaf participants, and "h" indicates hearing signing participants.

forms in 42.4% of the responses for representing objects alone. There is no significant difference (Binomial Distribution Test) in the responses from deaf (64% *instrument*, 36% *handling*) and hearing (66.7% *instrument*, 33.3% *handling*) signers from Nohkop. Again, the preference towards an instrument strategy in this task is most noticeable among signers from Chicán who used *instrument* in 76.4% and *handling* in 22.2% of their responses.

The category *other* contained only two responses from signers from Chicán (for the item 'cell phone') and only one participant from Kopchen did not provide any response for the item 'nail file'.

Responses to the stimuli depicting objects in use by a human actor showed the same pattern of a clear preference for *instrument* over *handling*. There is no significant difference between the results for each group. For the representation of actions, the gesture group from Kopchen used an *instrument* strategy in 60.6% of their responses and *handling* for 39.4%. Again, the responses from deaf (69.4% *instrument*, 30.6% *handling*) and hearing (68.8% *instrument* and 31.2% *handling*) signers from Nohkop were almost identical. Signers from Chicán employed an *instrument* strategy in 70.1% and a *handling* one in 29.9% of the cases. No responses were coded as *other* or *nothing*.

None of the groups exhibited a significant difference between objects and actions in the choice of iconic strategy.

As discussed above, the descriptions of human actions involving tools also varied according to the type of tool. The actions frequently depicted by an instrument strategy by all groups of participants were 'cut mango with knife' (100% in YMSL from Chicán and Nohkop as well as in gesture), 'cut paper with scissors' (100% in YMSL from Chicán and Nohkop, 81.8% in gesture) and 'chop with machete' (100% in YMSL from Nohkop, 91.7% in YMSL from Chicán, 81.8% in gesture). Items with a high rate of instrument responses in Chicán but not in Nohkop and Kopchen were 'eat with fork' (100% *instrument*), 'cut tree with ax' (100% *instrument*) and 'talk on cell phone (91.7% *instrument*). No items elicited a higher percentage of instrument responses in gesture than in sign.

4.2.3 Discussion

No evidence for a distinction of objects and actions by means of an instrument/handling opposition could be found among Yucatec Maya participants in this task. Unlike the US-American gesturers and signers in Padden et al.'s (2015) study, Yucatec Maya gesturers and YMSL signers do not alternate their iconic strategy in order to systematically distinguish objects from actions. Hence, we cannot make the claim that YMSLs employ such a distinction for a grammatical purpose to

mark different parts of speech. In the subset of 12 object-action pairs selected from the responses, there is an overall preference towards instrument for all groups – hearing gesturers from Kopchen and YMSL signers from Chicán and Nohkop – irrespective of whether they depicted the object alone or the related action.

Looking more closely, we also observe that the results for this subset of responses differ from the Yucatec Maya responses to the complete set of Padden et al.'s (2013) stimulus set (Study 2a) because the preference towards an instrument strategy is more pronounced for the twelve tools in study 2b. This is probably due to the specific stimuli selected for this sub-analysis. As we have argued above, the type of object plays a crucial role for the choice of iconic strategy. Presumably, the stimuli selected for study 2b include many of those with a general tendency towards instrument and the ones that naturally favour a handling strategy are underrepresented. In the comparison of object and action depictions, instrument handshapes are preferred for specific tools, no matter if a human agent is present or not, e.g. for 'scissors' or 'knife' equally as for 'cut with scissors' or 'cut with knife'. On the contrary, 'broom' as well as 'sweep' elicited more handling responses among both gesturers and signers. The bias in the selected stimuli might skew the results of this study. This stresses the importance of including a critical number of carefully selected stimuli for this type of experiment. In the description of emerging, previously undocumented village sign languages, the compilation of suitable elicitation materials is both crucial and challenging (see Safar, in prep., for discussion). The aim is to develop stimulus materials that ensure comparability with other studies, while being culturally appropriate in the specific communities of study. In the YMSL project we usually employ a combination of "standard" stimuli developed for sign language and/or psycholinguistic research, to which we add or adapt items to make them easily recognisable and meaningful to Yucatec Maya participants. For possible future research, a more comprehensive equivalent stimulus set to Padden et al.'s materials could be developed for YMSLs.

We must also consider the possibility that the use of video clips, as in Padden et al.'s (2015) study, instead of still images to elicit verb responses for actions involving tools might lead to different results in a replication of this study and evoke a higher number of handling handshapes. However, judging from preliminary results from a task in which YMSL signers were asked to describe video clips showing Cut-and-Break events (Bohnemeyer, Bowerman and Brown 2001), it seems unlikely that the choice of video vs. photo condition has a strong impact on the choice of iconic strategy.

What does the absence of an instrument/handling split for objects and actions mean in terms of a noun-verb distinction in YMSLs? For ASL, Padden et al. (2015) suggest that the recruitment and conventionalisation of iconic

patterns for a noun-verb distinction is a step from gestural to linguistic, from a more general cognitive to a language-specific phenomenon: "The presence of a systematic handling/instrument iconic pattern in a sign language demonstrates that a conventionalized sign language exploits the distinction for grammatical purpose, to distinguish nouns and verbs related to tool use" (Padden et al. 2015: 81). The absence of such a pattern in YMSLs can be interpreted in different ways: Maybe – due to their young age and/or the sociolinguistic environment – YMSLs are not (yet) "conventionalised sign languages" to the extent that ASL is. Maybe the lack of such a distinction in this particular task does not entail the complete absence of such a distinction in YMSLs and a different methodological approach (using a larger number of more diversified stimuli along with data from spontaneous discourse) might yield different results. Both hypotheses remain to be proven. For now, we suggest that YMSLs, unlike ASL, do not employ the instrument vs. handling strategy to convey a noun-verb distinction but instead has other strategies that take over this function.

The first exploration of iconic strategies among Yucatec Maya signers and gesturers shows that patterns of iconicity exist in both the gestural inventory and the sign language lexicon, but the question how and to what extent they become recruited as part of a linguistic system is more complex and will require careful reconciliation of somewhat diffuse findings and divergent interpretations by the analysis of more diverse data.

5 General discussion

5.1 From iconic co-speech gestures to a noun-verb distinction in YMSLs

In this chapter, we have explored the question if and how YMSL signers from different communities recruit iconic gestural resources present in their environment to express a distinction between nouns and verbs. Two strategies were examined: the use of SASSes and the use of iconic handshapes. Both have their roots in the gestural repertoire of hearing Yucatec Mayas, but they have become conventionalised in YMSLs in different ways and to a different extent. It is important to recognise that in comparing gesturers' and signers' production for actions and objects, we are not comparing the same phenomenon. As Padden et al. (2015: 81) suggest, there might be common cognitive bases in gesture and sign to differentiate objects from actions, but the functions of iconic patterns are not equivalent. Hearing gesturers, on the one hand, have another language

(in this case, Yucatec Maya and/or Spanish) at their disposal, by which they conceptualise the world, and co-speech gestures serve a purpose of emphasis and clarification. Deaf signers, on the other hand, are monolingual in YMSL and they are more likely to use iconic patterns as a matter of categorisation. While for hearing gesturers, the visual-manual modality is an additional channel to convey meanings, for deaf signers, it is the unique modality of expression. Because of that, deaf signers are under more pressure to be consistent in their production when they want to convey a distinction between objects and actions, and, presumably, nouns and verbs. With that in mind, we can see that hearing Yucatec Mayas are actually remarkably systematic in their production of iconic gestures, both SASSes and instrument/handling handshapes. SASSes display considerable conventionalisation in form already in gesture, with specific handshapes assigned to specific objects, e.g. a round object such as a calabash or a wide object such as a washing board. These gestural size-and-shape depictions, defined by cultural convention, can be readily picked up and incorporated into YMSLs. However, while the form of these size-and-shape depictions roughly stays the same, their function expands to a linguistic one. SASSes are no longer used for mere description but start to take on the grammatical purpose of noun-verb distinction. By the addition of a SASS, referents are assigned to distinct categories of objects (round, flat, tall etc.). Data from conversations shows that this is not a purely semantic classification, but the presence of a SASS also changes the syntactic position of a sign and its co-occurrence with other parts-of-speech – supporting the claim that SASSes can function as nominal markers in YMSLs. The use of SASSes for noun-verb distinction can thus be interpreted as an instance of grammaticalisation from co-speech gestures.

In terms of patterned iconicity, a similar path cannot be demonstrated. In contrast to Yucatec Maya co-speech gesture, it seems that YMSLs are developing an overall tendency towards instrument forms for the depiction of tools and tool use, which is most strongly pronounced among signers from Chicán. Like ASL and ABSL signers, they prefer to depict tools using action-based movements but handshapes that represent the instrument itself. From the results on ABSL, a young village sign language with a distinct instrument preference, Padden et al. (2013: 304) conclude that such a preference emerges in an early stage of a language and that the step from iconic gestures to patterned iconicity can occur within one or two generations. However, iconic patterns may not be present right from the very onset of sign language emergence, and there might be a need for a critical number of deaf signers involved for these patterns to take shape. YMSL in Chicán had more time and more signers to converge on a preferred linguistic strategy and to establish it in the community. YMSLs in Nohkop and Trascorral are used only by siblings of one family and they have not (yet) been subject to

intergenerational transmission. Other studies have provided evidence that an intergenerational evolution in certain domains of YMSL grammar is taking place (Le Guen and Safar, in prep.). Deaf signers from Chicán who already grew up with richer and more structured sign language input from deaf adults in their immediate surroundings start to use the signing space in a grammatical way that is not attested in the previous generation's signing. We also observe that in Chicán, SASSes have a more fixed position in the construction than in Nohkop, suggesting that a critical mass of deaf signers leads to more conventionalisation of structure. A similar process towards increasing systematicity and conventionalisation in iconic patterning, i.e. a distinct instrument preference, might be underway among signers from Chicán. From the results from Nohkop, we can also observe that the same instrument preference is incipient but not as robust as in Chicán.

No evidence for a systematic split between instrument and handling handshapes expressing a noun-verb distinction, as it has been demonstrated by Padden et al. (2015) for ASL, could be detected for YMSLs. Considering that ASL is an institutionalised, established sign language and YMSLs are young, emerging ones, it is possible that patterned iconicity as a means of noun-verb distinction takes time to become fully conventionalised in a language. This explanation seems to be unlikely, though, remembering that Haviland (2013a) mentions this strategy also for Zinacantán Family Homesign (with only one generation of deaf signers) and Hunsicker and Goldin-Meadow (2013) prove that it can be present even among individual homesigners. It is more likely that YMSLs differ from ASL and they do not recruit patterned iconicity to express a noun-verb distinction. In YMSLs, SASSes functioning as nominal markers can be used in conjunction with either instrument or handling handshapes, which supports the idea that the handshape alone does not carry the part-of-speech distinction. We have no reason to assume that a noun-verb distinction by means of an instrument/handling alternation is a universal mechanism that all sign languages will at some point adopt to ultimately pattern with ASL. Spoken languages exhibit striking variation in their ways of classifying parts of speech and there are many cases where parts of speech overlap and the distinction can be blurred. While the use of SASSes as nominal markers was not found to be a distinguishing feature in ABSL or ISL but proved to be pervasive in YMSLs, patterned iconicity might not be a distinguishing feature in YMSLs, as opposed to ASL.

5.2 Iconic properties of the object

That said, it does not mean that YMSL signers were unsystematic in their choice of iconic strategy, but that their organisation of iconic patterns follows a different

logic. In YMSLs, the type of object is a more reliable predictor for the choice of iconic strategy than the presence or absence of human agency. Gesturers and signers have similar intuitions regarding this division, but YMSL signers are more consistent in assigning handshape types to specific objects. There is very little inter-signer variation in this respect and high concordance between signers from Chicán, Nohkop and Trascorral, which shows that this correlation is pretty solid. It also contradicts the idea that non-signers or sign language learners have a general cognitive bias towards action-based depictions because it facilitates direct mapping onto their motoric schema (Ortega, Sümer and Özyürek 2014). Our results suggest that iconic gestures or signs can become conventionally established as either handling or instrument depictions. But *how* do these forms become canonically established? Do they become emblematic gestures by cultural conventions or is it the form of the object itself that favours a certain type of depiction because it is more salient and less ambiguous? To ask what comes first is a chicken-and-egg question and cultural and cognitive factors may as well interact and align. In case one strategy (instrument or handling) is already conventionally established across a community, it makes the use of another strategy less probable. The tendency towards one strategy is then likely to be carried over when the sign is used as another part-of-speech. In case there is no broader consensus (e.g. for 'toothbrush'), both strategies are permitted.

There is also a clear correlation between the type of object and the absence or presence of a SASS on YMSL nouns, which supports Tkachman and Sandler's (2013) notion of "a hierarchy of semantic properties". The nature of this hierarchy, however, is still far from clear.

The visual representation of objects may follow some universal tendencies, aiming for a depiction as unambiguous as possible. This can explain the striking similarities in the studies on SASSes and patterned iconicity between unrelated sign languages used in very different cultures and the remarkable parallels between gesture and sign. The growing body of research on modes of representation in gesture and sign languages of various ages and in distinct sociolinguistic settings could soon shed more light on the question to what extent patterned iconicity is driven by universal cognitive motivations and to what extent it is language-specific and culture-specific.

5.3 Variation among signers

The YMSL studies we presented stress the importance of taking into account sociolinguistic factors in the analysis of part-of-speech distinctions in emerging sign languages and give hints about the limits of their influence. Individual

variation between signers was high in Study 1 and low in Study 2. This could mean that in the case of SASSes for noun-verb distinction we are dealing with an already rather conventionalised linguistic structure and its use exhibits non-random sociolinguistic patterns of variation. In Chicán, the use of SASSes as nominal markers can be seen as part of familylects. The SASS strategy is most heavily employed within two (closely related) interactional groups, which have been the main environment of intergenerational transmission from deaf adults to deaf children in the village. These variables might be a driving force in the stabilisation of a strategy of a noun-verb distinction and also explain why the youngest deaf signers, who were socialised in these interactional groups, use this distinction more frequently than any other deaf YMSL signers. Language acquisition from deaf adults seems to promote the conventionalisation of a part-of-speech distinction.

Another sociolinguistic factor that deserves more attention is the impact of bilingualism, in particular whether the fact that hearing bimodal-bilingual signers know Yucatec Maya and Spanish – spoken languages that have morphological and syntactic strategies for noun-verb distinction – makes them more likely to overtly mark such a distinction in YMSLs. In the SASS study, bimodal-bilingual participants marked nouns with SASSes more consistently, which suggests that this is the case. However, further analyses need to test whether the influence of bilingualism is indeed significant and how it interacts with other social variables.

6 Conclusion

Two strategies of noun-verb distinction that were reported in previous studies were examined for YMSLs: Size-and-shape specifiers and patterned iconicity. While the use of SASSes as nominal markers proved to be a frequent strategy in three Yucatec Maya signing communities, the strategic use of handshape types for a part-of-speech distinction could not be attested in YMSLs. This is possibly due to the absence of this strategy, or possibly a result of methodological limitations. In the case of SASSes, iconic gestures for size and shape in the surrounding hearing communities are incorporated into YMSLs, where they start to take on a grammatical function on top of the descriptive function they fulfill in gesture. Striking in this study are the strong analogies between signing communities that have never been in contact. This provides evidence that similarities in YMSLs from different villages go beyond the lexicon and that they also resemble each other in more profound formational principles (see also Safar, under review). Moreover, we demonstrated that the use of SASSes for noun-verb distinction is

subject to sociolinguistic variation. As for patterned iconicity, the picture is more blurred. The preference towards one or the other iconic strategy is not random but motivated. It remains an open question, however, what exactly motivates this choice. YMSLs exhibit a general preference towards instrument over handling handshapes, but – at least in the small subset of data analysed – this preference does not vary for verb and noun referents. In YMSLs, the use of SASSes as nominal markers is both semantically driven and signer-driven. Iconic patterning, on the other hand, is largely influenced by the type of object.

In communities, where local sign languages are shared by deaf and hearing signers and emerge under a substantial and ongoing influence of Yucatec Mayan gestures, YMSL signers take up iconic gestural resources that are already present in their environment and start adjusting them according to language-specific constraints. There is an important common base in gesture and sign, which becomes subsequently more rule-driven in sign language. The sociolinguistic setting of the very community (community size, generational depth, number of deaf signers, networks of interaction) plays a crucial role in the development of a noun-verb distinction from iconic gestures.

The discussion of the results of this study has methodological implications and underlines how crucial it is to work with a critical number of diverse and carefully selected stimuli in order to obtain convincing results and to check the validity of elicited data in natural conversations.

The full range of strategies for noun-verb distinction in YMSLs has not been explored yet and further studies are required to elucidate this issue. From this first investigation, we have seen that the seeds for multiple strategies of noun-verb distinction are already present in very young languages, proving that languages are complex from the very beginning.

Acknowledgements

I (Josefina Safar) am thankful to Irit Meir, Benjamin Braithwaite and Marie Coppola for their insightful and constructive reviews. Also, I want to thank Johanna Mesch and Olivier Le Guen for their input during early stages of this chapter. Furthermore, I have greatly benefitted from discussions with my working group at the writing retreat in Saltsjöbaden and I thank in particular Bernhard Wälchli, Pernilla Hallonsten Halling and Max Wahlström for providing their perspectives. Thanks also to Gerardo Ortega for inspiring discussions and to Calle Börstell, Thomas Hörberg and Johan Sjons for their help with statistics.

References

Abner, Natasha, Molly Flaherty, Katelyn Stangl, Marie Coppola, Diane Brentari & Susan Goldin-Meadow (2019). The noun-verb distinction in established and emergent sign systems. *Language* 95(2). 230–267.

Bauer, Laurie. 2004. The borderline between derivation and compounding. In Wolfgang U. Dressler, Dieter Kastovsky, Oskar E. Pfeiffer & Franz Rainer (eds.), *Morphology and its demarcations: Selected papers from the 11th morphology meeting*, 97–108. Amsterdam/ Philadelphia: John Benjamins.

Bohnemeyer, Jürgen, Melissa Bowerman & Penelope Brown. 2001. Cut and break clips. In Stephen C. Levinson & Nick J. Enfield (eds.), *Manual for the field season 2001*, 90–96. Nijmegen: Max Planck Institute for Psycholinguistics.

Crasborn, Onno & Han Sloetjes. 2008. Enhanced ELAN functionality for sign language corpora. In Onno Crasborn, Thomas Hanke, Eleni Efthimiou & Inge Zwitserlood (eds.), *Proceedings of the 3rd Workshop on the Representation and Processing of Sign Languages: Construction and Exploitation of Sign Language Corpora*, 39–43.

Croft, William. 2000. Parts of speech as language universals and as language-particular categories. In Petra M. Vogel & Bernhard Comrie (eds.), *Approaches to the Typology of Word Classes*, 65–102. Berlin: De Gruyter Mouton.

Haspelmath, Martin. 2007. Pre-established categories don't exist: Consequences for language description and typology. *Linguistic Typology* 11. 119–132.

Haviland, John B. 2013a. The emerging grammar of nouns in a first generation sign language: Specification, iconicity, and syntax. *Gesture* 13(3). 309–353.

Haviland, John B. 2013b. Introduction: "Where do nouns come from?" *Gesture* 13(3). 245–252.

Hunger, Barbara. 2006. Noun/verb pairs in Austrian Sign Language (ÖGS). *Sign Language & Linguistics* 2(2). 71–94.

Hunsicker, Dea & Susan Goldin-Meadow. 2013. How handshape type can distinguish between nouns and verbs in homesign. *Gesture 13*(3). 354–376.

Johnston, Trevor. 2001. Nouns and verbs in Australian Sign Language: An open or shut case? *Journal of Deaf Studies and Deaf Education* 6(4). 235–257.

Kimmelman, Vadim. 2009. Parts of speech in Russian Sign Language: The role of iconicity and economy. *Sign Language & Linguistics* 12(2). 161–186.

Klima, Edward & Ursula Bellugi. 1979. *The Signs of Language*. Cambridge, MA: Harvard University Press.

Le Guen, Olivier. 2012. An exploration in the domain of time: From Yucatec Maya time gestures to Yucatec Maya Sign Language time signs. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and Linguistic Insights*, 209–250. Berlin: Mouton de Gruyter & Ishara Press.

Le Guen, Olivier. 2019. Emerging sign languages of Mesoamerica. *Sign Language Studies* 19. 375–409.

Le Guen, Olivier & Josefina Safar (in prep.). Intergenerational evolution of the use of signing space in YMSL.

Lois, Ximena & Valentina Vapnarsky. 2006. *Lexical Categories and Root Classes in Amerindian Languages*. Bern: Peter Lang.

McKee, Rachel, Josefina Safar & Sara Pivac Alexander (in prep.). Depicting signs in New Zealand Sign Language.

Meir, Irit, Mark Aronoff, Wendy Sandler & Carol Padden. 2010. Sign Languages and Compounding. In Sergio Scalise & Irene Vogel (eds.), *Cross-disciplinary issues in compounding*, 301–322. Amsterdam/Philadelphia: John Benjamins.

Meo-Zilio, Giovanni & Silvia Mejía. 1983. *Diccionario de gestos. España e Hispanoamérica, Volume 2.* Bogotá: Instituto Caro y Cuervo.

Meo-Zilio, Giovanni & Silvia Mejía. 1980. *Diccionario de gestos. España e Hispanoamérica, Volume 1.* Bogotá: Instituto Caro y Cuervo.

Micklos, Ashley. 2016. Interaction for facilitating conventionalization: Negotiating the silent gesture communication of noun-verb pairs. In Sean G. Roberts, Christine Cuskley, Luke McCrohon, Luis Barceló-Coblijn, Olga Feher & Tessa Verhoef (eds.), *The Evolution of Language: Proceedings of the 11th International Conference (EVOLANG11)*.

Müller, Cornelia. 2013. Gestural modes of representation as techniques of depiction. In Cornelia Müller, Alan Cienki, Silva Ladewig, David McNeill & Sedinha Tessendorf (eds.), *Body - Language - Communication: An International Handbook on Multimodality in Human Interaction*, 1687–1701. Berlin: De Gruyter Mouton.

Nyst, Victoria. 2016. The depiction of size and shape in gestures accompanying object descriptions in Anyi (Côte d'Ivoire) and in Dutch (The Netherlands). *Gesture* 15(2). 156–191.

Ortega, Gerardo & Aslı Özyürek. 2016. Generalisable patterns of gesture distinguish semantic categories in communication without language. In Anna Papafragou, Dan Grodner, Dan Mirman & John Trueswell (eds.), *Proceedings of the 38th Annual Meeting of the Cognitive Science Society (CogSci 2016)*, 1182–1187. Austin, Texas: Cognitive Science Society.

Ortega, Gerardo, Beyza Sümer & Aslı Özyürek. 2014. Type of iconicity matters: Bias for action-based signs in sign language acquisition. In Paul Bello, Marcello Guarini, Marjorie McShane & Brian Scassellati (eds.), *Proceedings of the 36th Annual Meeting of the Cognitive Science Society (CogSci 2014)*, 1114–1119. Austin, Texas: Cognitive Science Society.

Padden, Carol, Irit Meir, So-One Hwang, Ryan Lepic, Sharon Seegers & Tory Sampson. 2013. Patterned iconicity in sign language lexicons. *Gesture* 13(3). 287–305.

Padden, Carol, So-One Hwang, Ryan Lepic & Sharon Seegers. 2015. Tools for language: Patterned iconicity in sign language nouns and verbs. *Topics in Cognitive Science* 7(1). 81–94.

Petatillo Balam, Rebeca. 2015. Gestos espontáneos que acompañan el habla entre los hablantes de maya yucateco. José Maria Morelos, Mexico: Universidad Intercultural Maya de Quintana Roo BA thesis.

Safar, Josefina (under review). "When you were *that* little..." – From Yucatec Maya height-specifier gestures to YMSL person-classifier signs.

Safar, Josefina, Olivier Le Guen, Geli Collí Collí & Merli Collí Hau. 2018. Numeral variation in Yucatec Maya Sign Languages. *Sign Language Studies 18*(4), 488–516.

Safar, Josefina (in prep.). Lexical variation in Yucatec Maya Sign Languages: Methodological and ethical issues.

Sandler, Wendy, Mark Aronoff, Irit Meir & Carol Padden. 2011. The gradual emergence of phonological form in a new language. *Natural Language and Linguistic Theory* 29(2). 503–543.

Sapir, Edward. 1921. *Language: An Introduction to the Study of Speech*. New York: Harcourt, Brace and Company.

Schachter, Paul & Timothy Shopen. 2007. Parts-of-speech systems. In Timothy Shopen (ed.), *Language Typology and Syntactic Description. Volume 1: Clause Structure*, 1–60. Cambridge: Cambridge University Press.

Schwager, Waldemar & Ulrike Zeshan. 2008. Word classes in sign languages. Criteria and classifications. *Studies in Language* 32(3). 509–545.

Senghas, Ann. 2003. Intergenerational influence and ontogenetic development in the emergence of spatial grammar in Nicaraguan Sign Language. *Cognitive Development* 18(4). 511–531.

Simper-Allen, Pia. 2016. "Cut and Break"-beskrivningar i svenkst teckenspråk. Barns och vuxnas avbildande verbkonstruktioner. Stockholm: Stockholm University dissertation.

Supalla, Ted. 1986. The Classifier System in American Sign Language. In Colette Craig (ed.), *Noun Classes and Categorisation. Proceedings of a Symposium on Categorisation and Noun Classification*, 181–214. Amsterdam/Philadelphia: John Benjamins.

Supalla, Ted & Elissa L Newport. 1978. How many seats in a chair? The derivation of nouns and verbs in American Sign Language. In Patricia Siple (ed.), *Understanding language through sign language research*, 91–132. New York: Academic Press.

Swadesh, Morris. 1939. Nootka Internal Syntax. *International Journal of American Linguistics* 9. 77–102.

Tano, Angoua & Victoria Nyst. 2018. Tracing the emergence of Size and Shape Specifiers: Body-part SASS signs in a young and an old village sign language. *Sign Language Studies 18*(4), 517–545.

Taşçı, Süleyman & Aslı Göksel. 2016. The grammatical correlates of semantic dichotomies: Native Compounds in TİD. Paper presented at TISLR 12, Melbourne, 7 January.

Tkachman, Oksana. 2012. The Basic Noun-Verb Distinction in Two Young Sign Languages. Haifa: University of Haifa MA thesis.

Tkachman, Oksana & Wendy Sandler. 2013. The noun–verb distinction in two young sign languages. *Gesture* 13(3). 253–286.

Vercellotti, Mary Lou & David R. Mortensen. 2012. A classification of compounds in American Sign Language : an evaluation of the Bisetto and Scalise framework. *Morphology* 22. 545–579.

Zavala, Roberto. 2000. Multiple Classifier Systems in Akatek (Mayan). In Gunter Senft (ed.), *Systems of Nominal Classification*. Cambridge: Cambridge University Press.

Emmanuella Martinod, Brigitte Garcia and Ivani Fusellier

A Typological Perspective on the Meaningful Handshapes in the Emerging Sign Languages on Marajó Island (Brazil)

1 Introduction

This chapter presents the initial results of an on-going study on non-varying elements across Sign Languages (SLs), based on a crosslinguistic comparison of the meaningful handshape component of SL units. Of particular significance in this chapter is the inclusion of data from previously unstudied SLs, specifically SLs of the island of Marajó in Brazil. On Marajó Island, deaf people are slowly becoming a single community, as their various homesign systems and other communication forms and languages come into contact with each other.

1.1 The Sign Languages of Marajó

We conducted[1] our field studies in 2015 and again in 2017, each time spending a month on location. In between, we maintained contact with some of the signers through social media. In 2015, we met seven deaf signers, only six of whom, all women, were willing to be filmed. In 2017, we met again with three of them, and worked with four new signers we had not met before. One of the main difficulties has been to track the deaf people of Soure: since the end of the organized activities of the APADS, they no longer have a designated meeting place, some have moved away, and many have no professional activity that would give them visibility in the public sphere.

1 We prefer to use this term rather than "homesign systems" because of our approach of the SL's semiogenesis. In this approach, these systems are indeed considered as fully linguistic ones (the approach is detailed in section 2). In the rest of the text, the terms SLs and Homesign systems are used interchangeably.

https://doi.org/10.1515/9781501504884-005

From a typological perspective, there is no prior study of partially integrated adult homesigns, making this a particularly interesting context for crosslinguistic comparisons among SLs.

1.2 The choice to focus on meaningful handshapes

Handshape is one of the parametric components of SL units and thus can be considered as a phonological or a morphemic element. In the literature, where it is treated as a morphemic element, it is often termed *classifier handshape* and may either (i) iconically represent the shape of an entity, whether animate or not (*entity* or *instrument classifier*), or (ii) iconically represent an entity through its shape when handled (*handling classifier*) (Padden et al., 2013). Within the Semiological Model (cf. Section 2.2), the components of signs (whether they are lexical signs, or 'non-lexical'/ 'partially-lexical signs', elsewhere termed 'classifier constructions' or 'depicting signs') are considered as form-meaning constants, that is, as morphemes. Given the limitations of space, we cannot in this context provide the relevant argumentation (for detailed discussion, see e.g. Cuxac 2000, Cuxac and Sallandre 2007, Garcia et al. 2007). Furthermore, at this stage, our study of the Marajo SLs does not yet include statistical analyses of the distribution of configurations. Consequently, and to maintain scientific rigor, it seems more appropriate to use the term *meaningful handshapes* rather than *morphemic handshapes* in the rest of this chapter.[2]

Handshape is of particular interest from a typological perspective. In recent years, it has become the focus of research within a comparative perspective which sets out to define the specific tendencies of each SL or group of SLs. Recent studies have highlighted the difference between the handshapes used in SLs and those employed in the silent gestures of hearing non-signers (Schembri, Jones and Burnham 2005; Brentari et al. 2012, 2015; Sevcikova 2013; Cormier et al. 2012; Cormier, Smith and Sevcikova 2015). Although such studies on silent gestures have been criticized as artificial (Goldin-Meadow and Brentari 2017: 46), they can provide a useful baseline in this type of comparison. Indeed, these studies underline global differences in the handshapes used by deaf signers—homesigners included—and those used by hearing speakers. Furthermore,

2 In the literature on this topic, the terms classifier handshapes and morphemic handshapes seem to be interchangeable. However, several authors highlight the fact that handshapes of lexical units can also be morphemic (Boyes-Braem 1981, Brennan 1990, Johnston and Schembri 2007, Zwitserlood 2003).

a number of authors have concluded that SLs differ from each other in their specific handshape inventories, both with regards to phonological handshapes (Meier 2002; Velupillai 2012: 86; Schuit 2014: 5; Woodward 1982) and classifier handshapes (Velupillai 2012: 112; Zwitserlood 2003). However, as noted by Velupillai (2012), this hypothesis rests on a small number of SLs,[3] and its verification requires a large-scale cross-SL study, which is not yet in existence. Finally, recent work on SLs used by smaller signing communities and/or in non-Western regions (Nyst 2007, 2012 for AdaSL, Marsaja 2008 for KK and Zeshan 2003 for IPSL) has opened the possibility to examine characteristics specific to such SLs, e.g., a smaller inventory of handshapes. Here again, additional comparative research is needed to corroborate these observations or before any generalizations can be drawn.

1.3 Theoretical perspective

Given the sociolinguistic specificities of Marajó SLs and the geographical location, the study of these languages is likely to fuel the debate on the meaningful handshapes of SLs with different sociolinguistic characteristics. More generally, it allows us to examine the typological question of variance and invariance between SLs. Marajó SLs are rural SLs in an insular, relatively isolated situation. According to recent studies, so-called 'rural' SLs such as these could possibly be typologically distant from the most frequently studied SLs (De Vos and Zeshan 2012; De Vos and Pfau 2015).

Our study follows a particular theoretical framework—the *Semiological Model*—which incorporates the following components (the model is detailed in next section):

- An original proposal on the semiogenesis of SLs (Cuxac 1999; Fusellier-Souza 2006, 2012), which rests on the hypothesis that the SLs of the world share a significant structural core. This hypothesis is based on the assumption that all SLs are rooted in the same initial situation of emergence, rooted in perceptive-practical experience, essentially based on the universe of mental imagery.
- Because of these shared conditions for the emergence of every SL, this framework supports the hypothesis of a phylogenetic link between SLs such as Marajó SLs and national established SLs.

3 Velupillai lists the following SLs whose handshapes have been inventoried: ASL, NGT, AdaSL and ABSL for phonological handshapes; NGT and IPSL for meaningful handshapes.

– The hypothesis that SL units, whether *lexical* (established/frozen/fully lexicalized signs) or non-conventional (corresponding more or less to classifier constructions/depicting signs on the one hand, role shifts/constructed actions on the other hand), are composed of morphemic/meaningful elements (e.g. Cuxac 1999; Cuxac and Sallandre 2007; Garcia et al. 2007; Garcia and L'Huillier 2013; Sallandre and Garcia 2013).[4]

Given this framework, the question of variance and invariance among SLs is central to this study. This issue, which remained in the background of SL study for many decades, has come to the foreground in the early 2000s (Newport et al. 2000; Meier et al. 2002; Sandler and Lillo-Martin, 2006). We begin with the outline of our theoretical framework and the propositions which stem from it with respect to SL typology (section 2), and proceed with a review of the literature on our topic, meaningful handshapes. Next is a presentation of our research questions and hypotheses, and discussion of our methodology (section 3) and our findings (section 4). We conclude with a discussion of the findings in a wider perspective, emphasizing the relevance of the theoretical concepts used and the contribution of Marajó SLs to the typology of SLs in general (sections 5 and 6).

2 Theoretical framework and research questions

2.1 The Semiological Model

As noted above, our approach to SL linguistics follows the Semiological Model. This model has been developed since the 1980s, beginning with Cuxac's detailed analysis of large-scale corpora of discourse (e.g. Cuxac 1999, 2000; Cuxac and Sallandre 2007; Fusellier-Souza 2006, 2012; Garcia and Sallandre 2014). Corpus analysis, conducted from a functionalist utterance-oriented perspective, and integrating from the outset all manual and non-manual parameters, allowed

4 We will not go into the debate on whether the parametric components of SLs and homesigns, are phonological, or into the more general question of the duality of patterning as a universal property of language (see Cuxac 2004; Meir 2012; Occhino 2017; Eccarius and Brentari 2007; Brentari et al 2012; Coppola and Brentari 2014; Ladd 2012; Blevins 2012; de Boer et al 2012; a.o.). In this context, the term phonological is used in the strictest sense as used by the cited authors, without intending any theoretical judgement of our own, particularly not with respect to the Marajó SLs.

Cuxac to highlight the significant portion of highly iconic constructions[5] in the discourse and, in particular, to show that they are based on a small set of fully linguistic structures, known as *transfer structures* or *highly iconic structures* (see Figure 1).[6] Transfer structures can generate unlimited *transfer units* (TUs). These share a common formal marker—the signer breaking eye contact with the addressee. The handshape in these units is termed *proform* (Cuxac 2000) as it is considered to depict a particular visual form.[7]

Figure 1: Examples of units from each of the main transfer structures. The first image shows a personal transfer (PT) where the signer embodies a 'horse' (roughly translated as 'the horse gallops'). The second image shows a situational transfer (ST), where the dominant hand shows the motion of a mobile entity, against a fixed locative reference point, represented by the non-dominant hand (roughly: 'the horse jumps over the fence'). The third image illustrates a transfer of shape and size (TSS) where the non-dominant hand represents a narrow elongated shape, and the motion of the dominant hand shows the shape (roughly 'a tail in plume') (Sallandre and Garcia 2013: 161).

These three structures are considered to be the structural result (on a phylogenetic scale) of the repeated implementation of a particular semiological intent of the signer (the illustrative intent), whose goal is not only to tell, but to tell while showing. This possibility of showing, i.e., to structurally exploit the (imagistic)

5 See Emmorey (2003) on the diverse terminology for these constructions. On the theoretical distinctions between the term transfer structures, used in the Semiological Model, and the terms more commonly used in the literature, see Garcia and Sallandre 2014.

6 The three major transfer structures are personal transfer, situational transfer, and transfer of shape and size. For detailed descriptions and argumentation, see the works cited above, in particular Cuxac and Sallandre 2007.

7 The proform of the Semiological Model corresponds, *mutatis mutandis*, to what is known in the literature as classifier handshape or meaningful/morphemic handshape.

iconicity as a way of producing linguistic meaning, is made available by the visuo-gestural modality. We assume that, since this modality is the only one which can be activated in deaf communication—whereas hearing communication is bi-modal,[8] SLs have developed a *linguistic* structuring of iconicity, that is, a grammar of iconicity. This idea requires that the description of human languages, SLs and Spoken Languages (SpLs) alike, and the forms they may produce, be based on the semiology of the channel (see also Johnston and Ferrara 2012, among others). It also means accepting figurativeness among the possible modes of human language manifestation and full linguistic expression. In this chapter, we cannot go into the details of the empirical and semiogenetic argumentation supporting this model. We refer the reader, in particular, to Fusellier-Souza (2006); Cuxac and Sallandre (2007); Cuxac and Antinoro Pizzuto (2010); Garcia and Derycke (2010), and, for a perspective on the Semiological Model in a wider context of the research literature, Garcia and Sallandre (2014). We will limit our discussion to highlighting only those aspects of the model that are indispensable for the purpose of this chapter.

Transfer structures, considered central in this approach, are expected to exist in all SLs, including emergent SLs/homesign systems.[9] This assumption of a strong structural core among SLs enables us to account for the exceptional exolinguistic skills of deaf signers who use non-related SLs, that is, their facility in communicating with each other despite not sharing a language. The systematic comparative analysis of diverse national SLs in recent studies strongly supports the hypothesis of a shared cross-SL structural core formed primarily of transfer structures (Antinoro Pizzuto et al. 2006;[10] Sallandre et al. 2016b).[11]

8 In contrast, strictly hearing communication, which has recourse to both modalities simultaneously (audio-phonetic and visuo-gestural), would not have reached such level of structurisation, as the two semiotic modalities—saying and showing—are divided between the two communicative modalities (as illustrated by coverbal gestures). Limitations of space prevent us from further developing the argumentation of this semiogenetic scenario, but see Cuxac (2008) and Fusellier-Souza (2012).

9 With regard to emergent SLs, see Fusellier-Souza (2006; 2012) for the analysis of three distinct SLs of deaf Brazilian adults along these lines.

10 This study involves LIS, LSF, and ASL.

11 This study involves LSF, LIS, LSR, VGT and JSL.

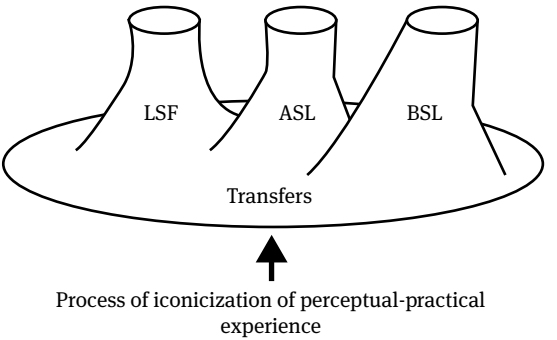


Figure 2: The shared structural core of SLs (following Cuxac and Antinoro Pizzuto 2010).

In this approach, lexical units (LUs) are considered to be less central in SL. LUs vary between SLs and their mode of meaning production is convention, which is one of the two modes of telling available in SL. Thus, the two types of units, LUs and TUs, determined by the gaze, alternate or intertwine continuously in SL discourse regardless of discursive type or genre, monological or dialogical (see in particular Sallandre and Garcia 2013, Garcia and Sallandre 2014).

The model establishes an initial scenario shared by all SLs created by deaf people, from those developed ontogenetically by isolated deaf adults in interaction with a hearing environment (Fusellier-Souza 2004, 2006)—equivalent to adult homesigns found in the literature—through SLs used in a village by a micro-community of deaf signers (Jirou-Sylla 2008)—to SLs used more extensively. According to this scenario, any SL, once it meets the communicative needs of its users, is considered a complete and functional language system.

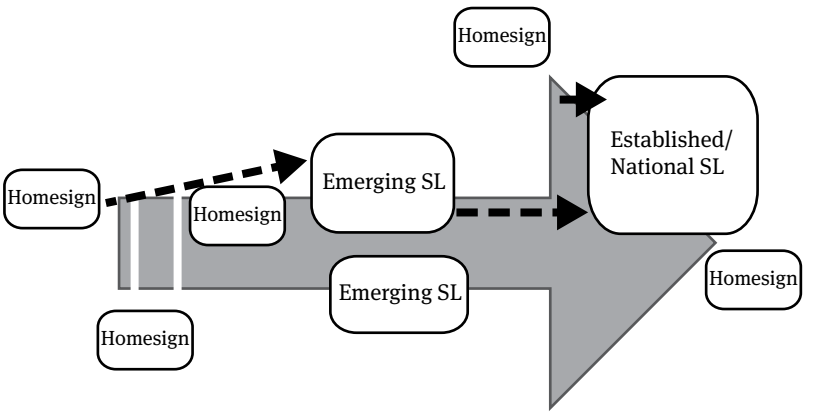


Figure 3: The phylogenetic/ontogenetic development of SL (Garcia and Martinod 2017).

The SLs used on Marajó Island, which we had the opportunity to study, are unusual due to the fact that deaf (home)signers recently began to meet each other. Their cultural context, rural Brazil, is quite comparable to the three SLs described by Fusellier-Souza (2004, 2006, 2012). They are notable, however, in that exchanges among Marajó signers have already begun, whereas the SLs described by Fusellier-Souza are practiced by a single deaf individual in interaction solely with their hearing relatives.

In the Semiological Model, transfer units are assumed to be compositional. The fact that they are iconic does not mean that the choice of components is free of constraint (see Cuxac and Sallandre 2007 for examples). On the contrary, every formal parameter of their composition is part of a paradigm of meaningful components, a large set, but limited all the same. Thus, in LSF, Cuxac inventoried 38 possible forms just for the handshape of transfer structures, corresponding to 70 different morphemes (Cuxac 2000: 102–130, see appendix).

In accordance with various authors studying other SLs (e.g., Friedman 1977 or Fernald and Napoli 2000 for ASL, Brennan 1990 for BSL, or Johnston and Schembri 1999, 2007, Johnston 2016 for Auslan, Occhino 2017 for ASL and LIBRAS, and Meir et al. 2012 more generally), we argue that in LSF, components of LUs also overwhelmingly consist of form-meaning constants, that is, of morphemes (or at least, meaningful elements, see note 9). These form-meaning elements are not directly involved in the production of the general conventional meaning of the LU. However, many studies tend to corroborate their meaningful/morphemic status. Thus, the analysis of lexical coining in LSF, based on a subcorpus of 300 recent LUs extracted from a large dialogic corpus between deaf signers (the Creagest corpus, Garcia and L'Huillier 2011), has shown that regular meaningful sub-components of LUs or TUs are used directly in the creation of new LUs (Garcia and L'Huillier 2013). For example, the handshape  used in TUs to represent a thin elongated shape (Cuxac 2000) is found in the LSF LU TO MEET [SE RENCONTRER] (Figure 4) where two such thin elongated entities approach one another, or in the LU PENCIL [STYLO] (Figure 5), where it again conveys the idea of 'thin elongated shape', which represents, in this case, a pencil.

Furthermore, the constant back and forth in LSF discourse between the two modes of telling, governed by the gaze, means that any LU used in the iconic mode of saying (*saying while showing*), could at any moment deconventionalize, thus reactivating the meaningful value of its components. These can be then iconically modified, generating a new global sense. Such delexicalisation is constant in discourse (see also Johnston and Ferrara 2012 for Auslan), therefore corroborating the (latent) morphemic status of sub-LU components (Garcia and L'Huillier 2013; Sallandre and Garcia 2013). All this leads us to consider the

(numerous) sub-LU and sub-TU components as an integral part of LSF lexicon (see also Johnston 2012, 2016).

Figure 4: LSF LU TO MEET (beginning and end of the sign).[12]

Figure 5: LSF LU PENCIL.

According to the model, the semiogenesis of emerging SLs (and hence, of all SLs) is anchored to the same starting point. The deaf child isolated in a hearing environment realizes the first units by using "the cognitive and cultural means available to him and basing his creative process on similarities. [...] The child expresses in gestural form those salient elements in the world that enabled him to distinguish one thing from another, that is the elements at the basis of his first categorizations" (Cuxac 2005: 209, translation Dana Cohen).[13] The assumption is that as the channel used distinctly prefers a figurative representation (affordance), these creations would be iconic "despite the signer", i.e. without the child intentionally aiming to create units that are iconic.

As these first units are iconic, each of their components contributes to this iconicity and therefore carries meaning. Any signer, as a human being interacting with the outside world, shares with any other human being a common base of world experiences, perceptive and practical, and has the same physiological and cognitive capacities to implement these in gestural form. So, the morphemic/meaningful components are assumed to be rooted in common human perceptual-practical experience, and consequently at least some of them are likely to be identical across SLs, regardless of their geographical origin and state of development. Thus, our hypothesis is that some of the cross-SL invariance, based on the initial iconicization of human perceptual-practical experience, could be identified at the level of the sub-components of SL units (sub-TU as well as sub-LU).

12 Source for Figure 4 and Figure 5: French-LSF online dictionary Elix.

13 Original text: "(...) en quelque sorte les moyens du bord cognitifs et culturels dont il dispose et [il] base son processus créatif sur des ressemblances. [...] Il met en gestes ce qui, dans le monde, lui a permis de distinguer ceci de cela, et qui est à la source de ses premières catégorisations.".

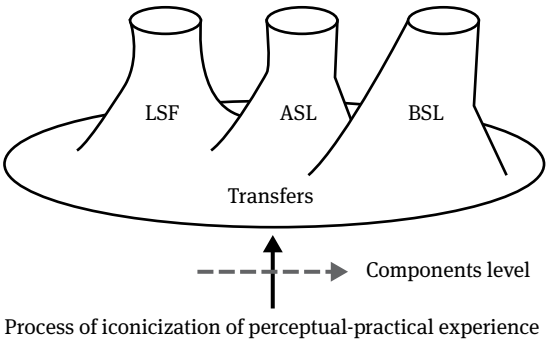


Figure 6: The shared structural core of SLs (Garcia and Martinod 2017) after a schema excerpt from Cuxac and Antinoro Pizzuto (2010).

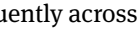
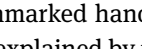
2.2 The literature on meaningful handshapes/classifier handshapes

SL linguistics sought in recent years to examine the relationship between SL and gesture (cf. section 1). Overall, these studies aim to better define *gesture*, both in SL and in SpL, consequently frequently comparing SL with the coverbal gestures of non-signers. To do this, "silent gestures" are produced under controlled settings by hearing people who are asked to convey meaning through the visual-gestural modality alone.

We must first emphasize, alongside Goldin-Meadow and Brentari (2015: 46), that gestures produced under such circumstances are not the same as gestures produced daily by speakers of a SpL. The type of gesture requested in such situations from speakers who have already mastered a spoken language is produced independently of any vocal production, and therefore is not, by definition, coverbal gestures. Such gestural productions, as they are not 'natural', are also probably influenced by the speakers' SpL. Nevertheless, these silent gestures represent a powerful tool for determining to what extent homesign systems differ from hearing people's productions.

Either way, studies show that these productions are not as complex as homesigns, even though homesigners do not get the input of any prior language. The complexity of homesigns is particularly evident when examining handshape. According to Goldin-Meadow and Brentari (2015: 52), the handshapes used by signers differ from those used in these silent gestures produced by hearing non-signers. The authors state that handshape contrasts with other manual components of the gesture, that is motion, orientation and location, as the latter

seem to be generally shared with coverbal gestures by hearing non-signers. These two types of production are compared in some studies (Schembri, Jones and Burnham 2005; Brentari et al. 2012; Sevcikova 2013; Cormier et al. 2012; Fenlon et al. 2018), always on the basis of the silent gestures described above. Their findings tend to highlight differences in the pattern of handshapes used by signers (of various SLs) and the ones used by hearing non-signers. The handshape inventory of signers seems to be more restricted compared to that of hearing non-signers describing an object through the visual-gestural modality alone. These authors conclude that signers' handshapes are drawn from a closed conventionalized set, unlike handshapes used by hearing non-signers. These studies seem to suggest that a distinction should be drawn between handshapes used by (home)signers and those used by hearing non-signers.

Indeed, homesigners' productions do seem to correlate more with signers of established SLs than with hearing people in this respect. Brentari et al. (2012) highlights the surprising linguistic characteristics of homesigns compared to the gestures produced by hearing non-signers. These results highlight the linguistic complexity of homesigns, which stands in relatively clear opposition with hearing gesture. Some handshapes seem to recur frequently across SLs:  (Kendon 1980: 21 for an adult homesign, Johnston 1989 for Auslan, Martin-Dupont 1989 for LSF). They correspond to the subset of unmarked handshapes, according to Battison (1978):  . This may be explained by their articulatory ease and strong perceptual salience (see Cuxac 1996: 314; Fusellier-Souza 2004: 170). Aside from these handshapes, several authors agree that SLs differ from each other in their handshape inventories. Phonological handshapes vary in number (see Meier 2002; Velupillai 2012: 86; Schuit 2014: 5; Woodward 1982). There is some agreement in the literature with respect to classifier handshapes: although used in all SLs described so far (Schembri, 2003), there would be variations in number and type (Velupillai 2012: 112; Zwitserlood 2003). Two types of classifier handshapes should be found in all SLs, according to the literature, especially in recent works: entity classifiers[14] and handling classifiers[15] (Padden et al. 2013; Brentari et al. 2013; Coppola and Brentari 2014; Goldin-Meadow et al. 2015). These two types are also the most frequent classifiers (Velupillai 2012; Schuit 2014). For Johnston and Schembri (1999), handling classifiers should show little variation across SLs (1999: 121). In contrast, the handshapes they refer to as *proforms*[16]

14 Handshape that iconically represents the shape of an entity, whether animate or not.

15 Handshape that iconically represents an entity through its shape when handled.

16 The meaning of proform for these authors is different than in the Semiological Model (see 2.1 above).

(which correspond to entity classifiers) show much more variation (see also Pfau 2010).

Finally, the handshapes used in classifier constructions would be more numerous than those used in lexical signs (Johnston and Schembri 1999: 126). We note, however, that this statement is based on the fact that, according to their approach, the degree of aperture for these handshapes is contrastive. Since any change of aperture corresponds to a change of meaning, thus constituting a new handshape, the resultant number of handshapes distinguished is high.

To date, there is no large-scale cross-SL study dealing with morphemic/meaningful handshapes that could confirm or deny these assertions (Velupillai 2012). Our contribution is aimed to at least partially fill in this gap.

Some authors also highlight differences in handshapes across SLs, on the one hand, between SLs where the size of the signer's community differs (national SLs, rural SLs, homesign systems) and on the other between Western national SLs vs. non-Western SLs. Among the differences cited, De Vos and Pfau (2015) mention the smaller inventory of phonological handshapes in non-Western rural SLs compared to national SLs. Nyst (2012) notes that signers of Adamorobe SL (AdaSL), used in a village in Ghana, tend to use an entity classifier to describe a given entity as a whole: "AdaSL has an unusual iconic feature, as it rarely depicts the outline of entities. Where possible, the articulator stands for the entity as a whole, rather than tracing its outline" (2012: 562). Nyst attributes this original feature to the influence of the cultural coverbal gestures of the region. Hearing non-signers seem to resort to coverbal gestures more frequently to directly embody an entity: the entity classifier. In contrast, relatively few entity classifiers are used in YSL (Bauer 2013, 2014), KK (Marsaja 2008) and IPSL (Zeshan 2003). All three are SLs mainly used in rural areas, distant from each other both geographically and sociolinguistically.[17] Finally, Nyst (2007: 58) mentions handshapes with relaxed fingers in a micro-community using AdaSL. She attributes this difference to the influence of coverbal gestures of the hearing signers, who have a lax articulation as well (2007: 209).

2.3 Summary

We summarize the different hypotheses found in the literature through a comparison with the tenets of the Semiological Model. First, many studies

17 The so-called "IPSL" appears to include several SLs used in different regions. See Johnson and Johnson (2016) for an insight into the situation.

suggest that (in contrast to the handshapes used by hearing non-signers asked to gesture without speech) handshape inventories in national SLs and homesigns present some common structural properties: the use of iconicity, and a tendency for more complex finger layouts in entity classifiers than in handling classifiers. This would point to a SL-specific operation and supports our assumption of a shared structural core for SL.

Next, each SL should have its own inventory of phonological handshapes, and all SLs seem to use classifier handshapes (Schembri 2003). In this chapter, we will focus on the latter even if we consider they are linked to the genesis of the former. Classifier handshapes are frequently categorized into two types, the handling classifier and the entity classifier, corresponding to the iconic device implemented to represent a referent. Handling classifiers, according to some authors, show little variation across SLs, in contrast to entity classifiers. In the Semiological Model, these types correspond to iconic devices of the gestural transposition. Cuxac (2000) lists three such devices:[18] shape representation (*reprise de forme*, corresponding more or less to the entity classifiers; for instance:  for a hooked shape), handling representation (*saisie de forme*, corresponding to handling classifiers and some size and shape specifiers (SASS); for instance:  for a thin and flexible shape), size representation (*reprise de taille*, corresponding to some SASS; for instance:  to indicate the actual height of a shape).[19] No study in the Semiological framework to date has found that any one of these devices is more likely to vary across SLs. However, there is, to our knowledge, no quantitative study showing the contrary. Finally, recent studies on both national SLs and rural SLs in non-Western regions enables us to consider features specific to these SLs (De Vos and Pfau 2015). One of these features is having smaller phonological handshape inventories, or even a small number of entity classifiers, which counters our hypothesis of a shared cross-SL set of components. However, work by Fusellier-Souza (2004, 2006) on three adult homesigns supports our hypothesis. Her work highlights the presence of many common elements between the homesigns studied and a national SL (LSF), found at different levels of analysis. Thus, from the level of meaningful components, she finds the same three iconic devices used in the constitution of

18 Various classifications have been proposed (Mandel 1977, followed primarily by Nyst 2007; Taub 2001) employing different terminologies. We mention the most common terms in parentheses for the reader's convenience.

19 Note that the same handshape may be used by multiple processes. A closed fist, for example, could be associated with the meaning 'spherical form' via a form representation process, or with the meaning 'thin elongated shape' via the handling representation process.

the handshape semantic values (2004: 178) in addition to a common core of 17 identical morphemic/meaningful handshapes (2004: 171–174).

2.4 Research questions and hypotheses

Our overall aim is to assess more precisely what is invariant across SLs. Given the very broad issue, we focus the current study on a comparative analysis of regular meaningful handshapes in various SLs: LSF, TID, NGT, BSL, IUR, and three homesign systems used in the center of Brazil and KK.[20]

The hypothesis underlying this question rests on Arnheim (1969), who argues that percepts (perception units) are authentic concepts and that concept formation begins with shape perception (Arnheim 1969: 35). Accordingly, visual perception participates in the development of thought, and language facilitates the stabilization of the inventory of visual concepts (1969: 246–252). Our starting point in the study of how these visual concepts are realized in SL is Cuxac's inventory of 49 form concepts for LSF (2000: 97–130).[21] We are primarily interested in the iconic devices evident in meaningful handshapes. Are the three devices described by Cuxac (2000)—shape representation, handling representation, and size representation—found in the other SLs examined? The mere observation of these three devices operating identically in several SLs would allow us to hypothesize that invariance is present from this level.

Secondly, we qualitatively examine the types of meaningful handshapes used in each SL. We identify whether cultural differences or the size of the signing community are correlated with the number of types, as proposed in some studies. As noted above, the following assumptions are found in the literature: 1) entity classifiers would exhibit high variance across SLs, and limited usage in SLs of small communities; 2) handling classifiers would exhibit low variance across SLs, and 3) size and shape specifiers would exhibit the possibility of atypical use linked to the coverbal gestures of the surrounding culture. Would our data from diverse SLs confirm these assumptions? Finally, we highlight a potential common core of form-meaning components in all SLs examined.

20 The choice of SLs is discussed in section 3.5.

21 See appendix. We are aware of the inherent limitations of this inventory elaborated on the basis of a (necessarily limited) corpus of discourse in a specific SL, LSF in this case. Yet, it is valuable to have such a list. This study remains an initial contribution that awaits further refinement.

3 Methodology

3.1 Location of fieldwork: Ilha de Marajó, Brazil

Marajó is an island located to the northeast of Brazil, in the delta of the Amazon and the Rio Tocantins. It is the largest island surrounded by freshwater in the world (401,00 km^2, the size of Switzerland). Its Western half is virtually inaccessible tropical rainforest. We took advantage of the rich flora and fauna to create stimuli suited to the signers' environment. The population subsists mainly on fishing, agriculture, and buffalo livestock. The buffalo inspired the sign for MARAJÓ, which is formed with both hands coming from the temples, with 𝄢 representing the buffalo horns.

Figure 7: The sign MARAJÓ.[22]

A river shuttle making two trips daily connects the island to the city of Belém on the continent. The fare (7 reais) is a fairly substantial sum for the poorest inhabitants of the island. Some take the journey despite its cost to seek temporary employment in Belém, but most never leave Marajó (Carliez 2013; Formigosa 2014; Carliez, Formigosa and Cruz 2016).

A high rate of deafness was informally observed, but we have no precise data on the number of deaf people on the island. This is partly due to the island culture that is very protective of the deaf people and tends to isolate them from the rest of

22 All figures and examples from Marajó SLs marked with a camera symbol are available as supplementary video files in the eBook version of the volume at https://www.degruyter.com/view/title/523378.

the population. A previous survey was conducted by a group of students from the UFPA, but their results were unfortunately lost in a fire on the premises of the UFPA. The initiative described in 1.1 began in 2009, led by Professor Maria Luizete Carliez of the UFPA. The goal was to bring the deaf people out of their isolation, primarily by enabling meetings among them. Since then, a local association, *Amis Marajó*, organized some community activities with a dozen of the island's deaf people.

Martinod (ongoing PhD.) visited Soure, the capital of Marajó, for fieldwork in July 2015, and again in March 2017. With the help of a hearing native man (Claudio Pamplone) who is familiar with the deaf community of Soure, she met eleven deaf people, and filmed ten of them.[23] She also met regularly with four hearing families with a deaf member.

Concerning the education level of the participants, it is important to highlight that no accommodation of any kind was made for the deaf individuals during classroom activities, rendering them inaccessible. Thus, it is not surprising that actual education levels of these individuals are not equivalent to the grade levels of the classes they attended.

LIBRAS proficiency is quite heterogenous among the participants. Table 1 shows that two of them are fluent in LIBRAS (Raquel and Suzana), three have had some contact with LIBRAS in a formal setting (Erica, Araceli and Silvia) and two have had no contact with LIBRAS (Edilene and Neilo). The use of LIBRAS in family context has not been reported and it seems that deaf individuals communicate with their hearing family members using several homesigns.

Table 1: Metadata of the seven participants.

Signer	Age	Family	Education level	Activities	Extra information
Erica	32	Lives with hearing parents and two hearing daughters	Roughly a 4th grade level (schooled with Raquel, Araceli and Silvia)	Cleaning, laundry, babysitting	– Her parents work in a buffalo slaughterhouse. – In 2006, she received hearing aids that she never used. – Took some LIBRAS lessons in 2006, but stopped. Took it up sporadically in 2016. – Her mother listens to the news on the radio and tells her some stories.

23 Seven of them were selected for the present study.

Table 1: (continued)

Signer	Age	Family	Education level	Activities	Extra information
Raquel	30	Lives with her hearing mother and her hearing son	Roughly a 4th grade level	Works in a nail salon with hearing clients	– Often goes to Belem in order to visit her partner. – Due to these trips, she has a good knowledge of LIBRAS and is proud of it.
Araceli	32	Lives with parents and two hearing brothers	Roughly a 4th grade level	Laundry	– No children. – In 2006, received hearing aids that she never used. – Took some LIBRAS lessons in 2006, but stopped.
Silvia	32	Lives with hearing parents	Roughly a 4th grade level (remained alone in the back of the class)	Cleaning, cooking, manicure	– Took some LIBRAS lessons in 2006, but stopped.
Suzana	16	Lives with mother, brothers and sisters, all hearing	Still in school, equivalent to 8th grade	School	– Grew up in the State of Amapá, where she has learned LIBRAS. – She is the neighbor of Neilo (another deaf participant).
Edilene	27	Lives with six brothers and sisters, all hearing	Equivalent to 4th grade	Cleaning	– Lived in Belém, on the continent, but never met other deaf people in the city. – Never took lessons in LIBRAS.
Neilo	30	Lives with hearing family	Never went to school	Worked as a fruit seller	– Never took lessons in LIBRAS

Among the signers in our corpus, only Erica and Araceli participated actively in the meetings since the beginning (2007). The others joined a few years later, some only joining occasionally, often due to the remoteness of their homes. On the other hand, one signer, Suzana, is a special case since she grew up in a different state of Brazil where she had already participated in a signing community. Suzana and Raquel are the only ones to be fluent in LIBRAS.

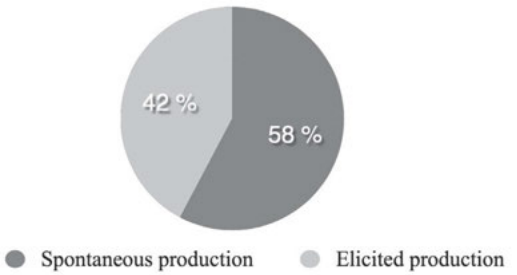


Figure 8: The Martinod Corpus (2015, 2017) of Marajó SLs, divided by data type.

3.2 The corpus of Marajó SLs (Martinod 2015, 2017)

Our corpus consists primarily of elicited productions based on relatively short storyboards, cartoons or still images (drawings) representing the flora and fauna of the island. Some of the storyboards and videos used as stimuli had already been used in previous studies (Cuxac et al. 2002 on LSF; Jirou-Sylla 2008 on the SL of the micro-community of M'bour in Sénégal; Fusellier-Souza 2004 on three Brazilian adult homesigners and on LIBRAS; Antinoro Pizzuto et al. 2006 on LSF, ASL and LIS; Sallandre et al. 2016a on LSF, LIS, RSL, VGT, and JSL). The aim was to allow later comparison of the data collected with the corpora established by these authors. Other stories came from a well-known Brazilian comic strip about the adventures of a young peasant, Chico Bento, whose daily life is not unlike rural life in the Northeast.

We had to restrict the data analyzed for this study to a manageable amount, in order to assess the degree of variation across signers. We chose to focus on the narrative register, since it is generally richer in transfer units and is therefore likely to contain the entire range of units and structures in a given SL (Sallandre 2003 on LSF, Antinoro Pizzuto et al. 2008 and Sallandre et al. 2016b).[24] We have therefore selected the productions obtained from two storyboards, The Fooled Bull and The Hammock, previously used by Jirou (2000) and Fusellier-Souza (2004). These stories in particular echo the cultural environment of Marajó, where buffalo are very common and hammocks are found in every family.

24 For Sallandre (2003: 268-270) on LSF and Antinoro Pizzuto et al. (2006: 487) on LIS and ASL, transfer units make up respectively 69.1%, 79% and 76% of all units in narratives of this type. In this context, we will not elaborate on the subtypes, categorised according to type of transfer. However, Sallandre et al. 2016 observed that 60% of the signs produced in each studied SL were personal transfers.

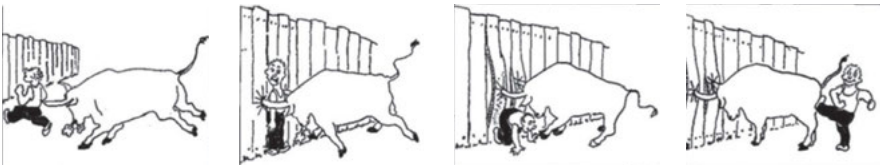


Figure 9: Story *The Fooled Bull*.

The narratives were produced by six signers. Production conditions are directly attributable to the field conditions: availability of signers, family permission, and signer personality. In fact, some signers were more comfortable in front of the camera, since facing another signer raises fears of negative judgments on their SL, blocking relaxed production (see Martinod 2017 on the linguistic ideologies in Soure). Others were more comfortable and signed without embarrassment in front of another deaf signer. Specifically, Edilene, Neilo, and Suzana narrated to the camera directly; Araceli and Silvia narrated to another deaf person; and Erica narrated to a hearing interlocutor.

3.3 Annotation

Annotation was done using the ELAN[25] software. Our goal was to establish an inventory of handshapes along with their semantic value(s). We therefore developed the following annotation scheme (Figure 10). *SL unit* corresponds to segmentation, its representation is indicated in *Gloss of unit*. *Type of unit* indicates the classification into lexical unit, transfer unit or, for some cases, indistinct type.[26] *Gaze direction* indicates orientation of the signer's gaze: toward the interlocutor on the signer's own hand(s) or toward a meaningful location. Then, we focus on the meaningful handshape component for the dominant hand (*Hd of D.h*) and for the non dominant hand (*Hd of non dom.h*). Handshapes are glossed in a specific tier. Finally we indicate which iconic device is used to convey meaning: shape representation, size representation or handling representation.

25 Software developed at the Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands (http://tla.mpi.nl/tools/tla-tools/elan/). See Crasborn and Sloetjes (2008).

26 In the Semiological Model, eye gaze is the main clue to distinguish between UL (eyes are oriented toward the addressee) and UT (eyes are oriented toward the hands or toward a meaningful location). However, the gaze direction may not always be clearly defined, depending on the image quality and the camera angle.

Annotations focus on handshapes — handshape, associated semantic value, and iconic device implemented. But we also needed to know in what mode of saying each handshape was employed, i.e., a lexical unit or a transfer unit. It was therefore important to also note the direction of the gaze, which is a formal marker distinguishing the two. Annotation has been checked by a deaf signer of LIBRAS, Ellen Formigosa, who comes from the North of Brazil and is thus familiar with the cultural context of this region.

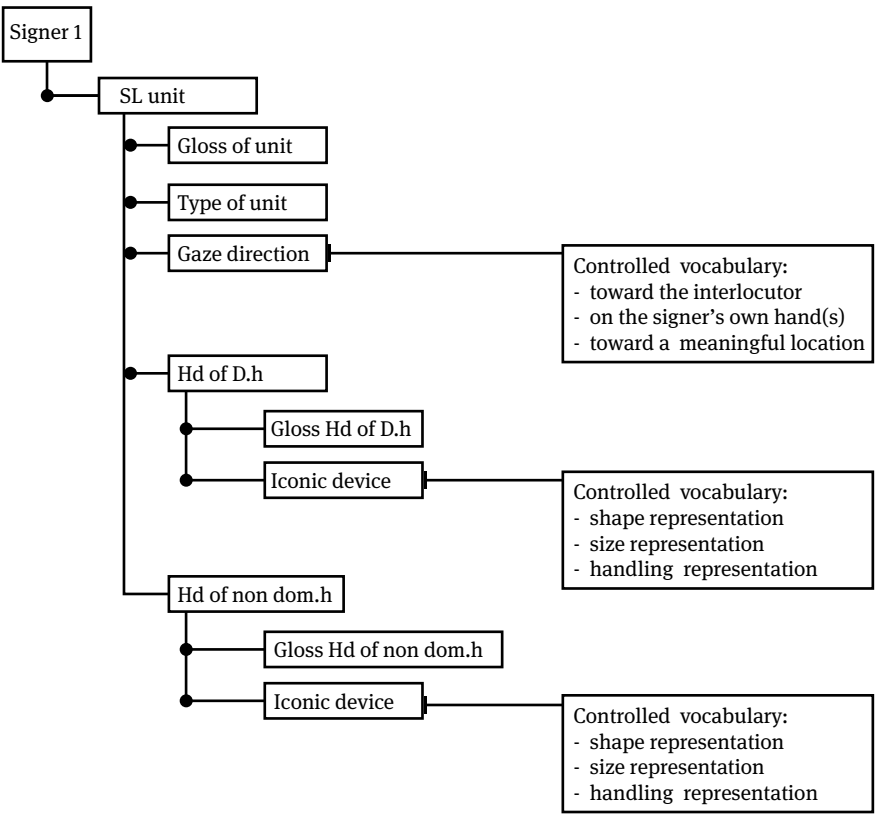


Figure 10: Annotation scheme used (ELAN).

3.4 Comparison with other SLs

The inventory of meaningful handshapes established for the Marajó SLs was compared with inventories of the other SLs. We first checked the literature for inventories of morphemic/meaningful handshapes, i.e. handshapes described

as form-meaning constants, in multiple national SLs and in SLs used by smaller communities, both from various geographical regions (see Figure 11). In most studies, these are referred to as the *classifier inventory* of the SL in question. Others use the term *inventory of highly iconic handshapes* (Cuxac 2000 on LSF), and even *inventory of morphosemantic values handshapes* (Fusellier-Souza 2004 for the three Brazilian homesigns). These are, therefore, only handshapes used in what we call TUs. However, several authors listing such inventories noted that a large part of the morphemic/meaningful handshapes used in the SLs examined can also be attested in the lexicon (for instance Brennan 1990: 37–93 and 135–169). Thus, Zwitserlood (2003: 259) reports that 1,312 of 1,688 NGT signs have at least one meaningful component. In 1,090 of these signs, the morphemic/meaningful component was the handshape (see section 2 regarding the hypothesis advanced in our theoretical model on this issue).[27]

This first task was not completed without difficulty. First, such inventories are only rarely available, as most handshape inventories list them as phonological units. Second, existing morphosemantic inventories, established in the literature for the handshapes of classifier constructions, are often incomplete, as already noted by Zwitserlood (2012: 163). In most cases, there were only a handful of examples listed, chosen to illustrate a specific point.

Eventually, our study relied on the complete inventories for the following SLs: LSF (Cuxac 2000), TID (Kubuş 2008), NGT (Zwitserlood 2003), BSL (Brennan 1990), IUR (Schuit 2014), three homesigns of Central Brazil (Fusellier-Souza 2004), and KKSL (Marsaja 2008, De Vos 2012). This comparison is completed by the original data on the Marajó SLs collected in Soure (Martinod 2015, 2017). All of these inventories were established from data collected in a comparable way: elicitation using quite similar material (videos and pictures) and spontaneous discourse.[28]

Finally, the graphic representations adopted by the authors were very heterogeneous, ranging from drawings to screen captures of a video corpus, to specific codes established by the author. For instance, Kubuş's (2008: 101–102) used photos to represent handshapes whereas Fusellier-Souza's (2004: 171–174) used alphabetic characters combined with a specific font. Consequently, we had to identify meaningful handshapes shared by several SLs and represent them with

27 The same point was highlighted previously by several authors whose inventories do not fall within our study: e.g. Johnston and Schembri (2007: 284); Boyes-Braem (1981); Van der Kooij (2002).

28 We are aware that our comparison would have been more precise had we established all inventories ourselves following identical methodology. However, it was impossible for us to gather enough signers of such diverse SLs. We hope to be able to establish such analysis in the future.

a common font in order to homogenize the representation. Then, homogenization of semantic values was made on the basis of Cuxac's (2000: 97–130) detailed 49 form concepts (e.g., 'a flat or flattened shape' depicted through this handshape in LSF:).[29] Each time an author referred to one of these specific form concepts using other words or a specific object, we replaced it with the corresponding form concept from Cuxac (2000): for example 'flat blade' in Brennan (1990) became 'flat shape / surface'.

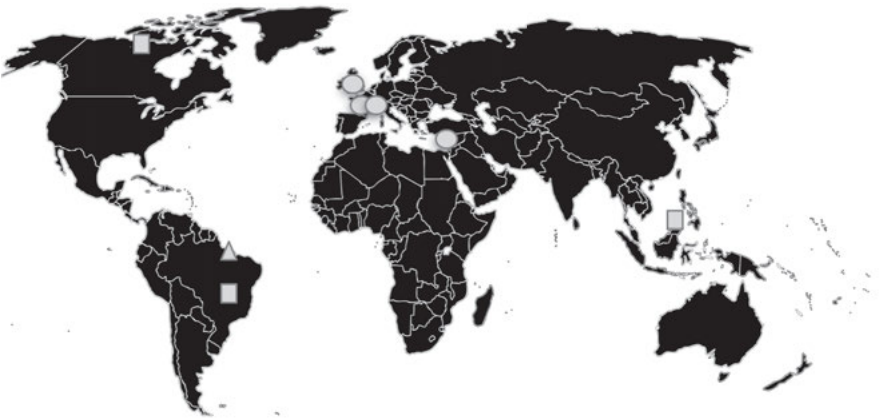


Figure 11: Geographic locations of the sign languages whose handshape inventories were used in the study.[30]

Although this set of SLs was selected for practical reasons of availability in the literature, it nevertheless meets the criteria for a substantial initial study of cross-SL invariance. These SLs come from geographically distinct and distant areas, which are frequently culturally distant as well, and which are used by signers from communities of different sizes.

29 See appendix.

30 Circles correspond to inventories of national SLs; squares: inventories of micro-community SLs; triangles: inventories of Marajo SLs.

4 Results

4.1 Marajó data

4.1.1 Expression of the three most common form concepts

The most recurrent form concepts in our corpus (see Table 2) owe their frequency to the nature of the stimuli employed. The referents that could be related to the concepts studied are listed below:

- Handshapes of a 'thin and elongated shape' are used to refer to i) the ropes of the hanging hammock, used to categorize the referent 'hammock' conceptually, ii) a man, or iii) a leafless tree; all three seen as thin, elongated forms.
- Handshapes of a 'flat shape' referred to i) a wall, ii) the ground, or iii) the foliage of a tree from its general shape in profile, i.e., without volume, or iv) the hammock, this time in motion (i.e. when falling to the floor).
- The concept of 'shape with two lateral extensions' always appeared in reference to the horns of a bull, metonymically referring to the animal itself.

Table 2: Handshapes used to represent the three most common form concepts.[31]

Thin and elongated shape	Flat shape	Shape with two lateral extensions
		
		
	forearm + 	 x2
 (lax shape)	forearm + 	 x2
	forearm + 	 x2
forearm + 		
forearm + 		
		
 (shape in motion)		

31 The marking 'x2' indicates simultaneous realization of the handshape on both hands.

Note that every form concept appears to be conveyed by several handshapes, all using the form representation device. This multiple gestural expression could be due to our onomasiologic methodology (i.e. starting from concepts towards linguistic expression). Had our starting point been the handshapes themselves (the gestural expression in language), we would have expected different results. It may be interesting to undertake such a study at a later point. The fact that we have not observed the use of handling representation or size representation in our selected corpus can be explained by our choice of data. It must be noted that both types were observed in our larger corpus (see Figure 12), particularly in spontaneous discourse. This confirms that these iconic devices are not absent in the SLs from our corpus. We opted not to extend our selected corpus once analysis has been carried out, since the initial guideline for limiting the corpus was to prefer the diversity of signers over the diversity of stimuli. We revisit these iconic devices in section 4.2, where we compare inventories of various SLs.

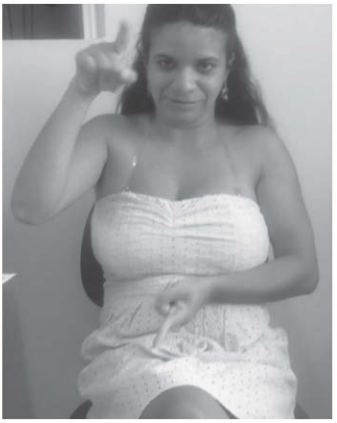



Figure 12: An example of a handling representation (a thin form: the stem of a flower) and an example of a size representation (the height of a bottle).

4.1.2 Results by signer

In this section, we look at the variation across signers for each of the three most recurrent form concepts. We also examine the different forms produced by the same signer (see Table 3).

Table 3: Meaningful handshapes used by each signer.[32]

Thin and elongated shape	Erica	Araceli	Silvia	Suzana	Edilene	Neilo
	   (loose form)	    forearm + 	  forearm + 	-	 (loose form) 	 

Flat shape	Erica	Araceli	Silvia	Suzana	Edilene	Neilo
	 	  forearm + 	  forearm +  forearm + 		 	

Shape with two lateral extensions	Erica	Araceli	Silvia	Suzana	Edilene	Neilo
	 x2  x2  	 x2 	 x2  x2	 x2	 x2	

The signers use several handshapes for each form concept representation (generally at least two possible handshapes). Furthermore, in each form concept expression, one handshape seems to be preferred by most of the signers.

32 'x2' in some cells indicates a two-handed symmetrical use of the handshape.

4.2 Comparison of concepts with identical forms in other SLs

4.2.1 Representation of form

Our inventories allow us to examine the range of meaningful handshapes used for the same form concepts/percepts in multiple SLs. We also examine handshape variations within the same SL. Table 4 below shows how SLs convey each form concept through form representation.

Table 4: Meaningful handshapes of represented forms used in each SL.

Thin and elongated shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
							

Flat shape	LSF	TID	NGT	BSL	IUR	KKSL	Ind. SLs Brazil
							

Shape with two lateral extensions	LSF	TID	NGT	BSL	IUR	KKSL	Ind. SLs Brazil
	 x2	 x2		 x2			

As in 4.1.2, for each form concept, one meaningful handshape appears to be the invariant one (on the first line). Concerning the noteworthy exception of IUR for the form concept 'shape with two lateral extensions', we can only mention the fact that the main referent usually reported in other inventories as corresponding to this shape (an airplane) was absent in this one, perhaps because it is an unusual object in this area.

4.2.2 Handling a form

We now consider variations for the same form concepts. This time, our focus is on forms conveyed through handling representation.

Table 5: Meaningful handshapes for handling representations in each SL.

Thin and elongated shape	LSF	TID	NGT	BSL	IUR	KKSL	Ind. SLs Brazil
							

Flat shape	LSF	TID	NGT	BSL	IUR	KKSL	Ind. SLs Brazil
		-			-		-

Shape with two lateral extensions	LSF	TID	NGT	BSL	IUR	KKSL	Ind. SLs Brazil
	-	-	-	-	-	-	-

The inventories indicate that all SLs in our study convey a 'shape with two lateral extensions' using a representational form rather than a handling representation.

5 Discussion

5.1 Shared iconic devices

First, both representational and handling representations were attested in every one of the examined SLs. Some form concepts seem to favour, by their very nature, the use of one device over another (as is precisely the case with 'shape with two lateral extensions'above). In contrast, few items employed size representation, except for the inventories in Cuxac (2000) for LSF and Fusellier-Souza (2004)

for the three Brazilian homesigns.[33] However, this gap does not necessarily indicate that the use of size representation is marginal or absent in the other SLs, but rather that this device was not one of the elements examined in the source works. The use of this device is evident in the Marajó corpus (see Fig. 12), confirming our assumption that it is likely in use in other SLs despite its absence from the inventories. Our methodology does not allow us to assess the possible preference of some SLs for handling handshapes (handling representations) or entity handshapes (representational forms) in specific contexts, as has been proposed by Padden et al. (2013). However, we can calculate the possibilities of gestural expression through each iconic device within a single SL, to determine whether one of the devices is more productive. This issue is discussed in the next section, where we come back to the hypotheses formulated in the literature (see section 2.2).

5.2 Reconsideration of hypotheses on classifier handshapes

5.2.1 Hypothesis 1: Few entity classifiers (representational forms) in non-established SLs

We have compared the different inventories in order to verify this prediction. Our calculation is based on the number of form-meaning elements. Thus, if the same handshape has two distinct meanings, it is counted as two distinct form-meaning elements. For example, in LSF, the handshape  can convey either a flat shape or —associated with a specific movement and the palm oriented toward the floor— a group of moving thin and elongated shapes. We therefore considered the handshape  as associated to two different semantic values, i.e., two entity classifiers. The same decision was made when a single form concept/percept in our inventory was conveyed by two different handshapes, e.g., Schuit (2014: 128):  and  for 'long, thin entity'. In this way, we established the number of entity classifiers (that is, the handshapes using a representational form device to express their meaning) in each SL (national or not) for which we have a usable inventory (see Table 6).

Two of the non-established SLs we examined—KK and IUR—are used beyond a family circle. These are the two non-established SLs with the smallest number of entity classifiers compared to the homesigns from the center of Brazil. We see that KK and IUR (SLs used beyond the family context) display less entity

33 For instance, to represent the handling of a 'long cylindrical shape of small circumference'.

classifiers than the homesigns from the center of Brazil. One might be tempted to conclude on this basis that the existence of an extended community of deaf and hearing signers gives rise to fewer entity classifiers. Yet, the amount of entity classifiers increases variably when we examine national SLs like BSL or LSF, although data collection was done following a relatively similar methodology (via picture stimuli and/or recording of natural data).[34] Consequently, the influence of the size of the signing community on the number of entity classifiers is yet to be determined. However, comparison does at least enable us to weigh the claim that non-established SLs should present fewer entity classifiers.

Nevertheless, it is important to clarify that a high number of entity classifiers does not necessarily indicate a higher number of form concepts/percepts represented in a given SL. In fact, the number of entity classifiers in inventories depends on the methodology used. Thus, Cuxac's (2000) list of concepts formulated for LSF includes fine conceptual distinctions which could have been treated as a single concept elsewhere. This is the case for the distinction between 'cylindrical shape' and 'elongated cylindrical shape of small circumference'. Such distinctions do not mean that LSF can convey more form concepts than other SLs, but simply that the author of the inventory resorted to finer conceptual distinctions.

Table 6: Quantity of entity classifiers in multiple SLs.

Non-established SL	Number of entity classifiers	Established SL	Number of entity classifiers
KK	12	BSL	63
IUR	11	LSF	36
Homesigns from the center of Brazil	19	NGT	17
		TID	11

5.2.2 Hypothesis 2: Entity classifiers are highly variable across SLs

As shown above, a form concept may correspond to one or more options in terms of handshape. However, the margin of variation remains limited by the constraint of the iconic resemblance between handshape and conveyed shape. For each of the three form concepts in our Marajó corpus, there seems to be at least one invariant gestural form across SLs that begins to take hold in Marajó.

34 We have little information on the criteria used in Marsaja (2008) for KK and Schuit (2014) for IUR. Unfortunately, we could not discuss with the authors in time for this chapter.

Indeed, it seems that some concept-form associations (morphemic/meaningful handshapes) in the Marajó SLs are used by all or most signers. These are  for a narrow-elongated shape, for a flat shape, and double for a shape with two lateral extensions. Below we consider the choices made in the various SLs for four other form concepts listed by Cuxac (2000: 97–130).

Table 7: Variation of entity classifiers across SLs.

Two-dimensional rectangular shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
					-	-	-

Two-dimensional round shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
				-		-	

Tubular shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
		-					

Spherical shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
		-					

Two of the seven form concepts we checked can be conveyed by the same handshapes in all the SLs examined. The other five show a few different handshapes across SLs. Four of these handshapes are the same in five of six SLs, and only one form concept, two-dimensional rectangular shape, is conveyed by the same handshape in only three SLs, while three of seven SL inventories make no mention of this concept. This means either the SLs in question have no handshape

to convey some forms, or we are again confronted with a methodological issue in the establishment of these inventories; we return to this issue in section 6.

It would also be interesting to examine how the use of entity classifiers differs in context. We know, for example, that in LSF, the representation of a two-dimensional rectangular form employs (among others) a double handshape  , or a double handshape  (Cuxac 2000: 124–127).

In context, the first is preferred when the entity is fixed (e.g. a painting), while the second is preferred if the entity is mobile (e.g. a window). It would therefore be expected to observe in other SLs such specialization related to other parameters, where a specific handshape would lend itself better than another to the parameter 'motion'.

5.2.3 Hypothesis 3: Little variation in handling classifiers (handling representations) across SLs

At first glance, variation between handling classifiers might seem low. In fact, even if referents involved can be held differently (e.g., handling a pen vs. handling a bowl), the handling perspective does not lend itself to infinite variation, given that most people have two hands with ten fingers. Let us now consider the degree of variation in the SLs examined for two additional forms, taken from our reference inventory.

Table 8: Variation of handling classifiers across SLs.

Tubular shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
		-					

Spherical shape	LSF	TID	NGT	BSL	IUR	KK	Ind. SLs Brazil
		-					

Note, for example, that conveying a held thin elongated shape, a tubular shape, or a spherical shape, would generally give rise to several handshapes within a same SL and across SLs (see tables 5 and 8). Yet, for the conveying of a held thin elongated shape, we find that two handshapes (and) are shared in more than half of the SLs examined. It seems, therefore, that variation within a single SL and across SLs allows for as many manipulation options as made possible by the form. Indeed, the signer can choose to show different ways of handling a thin elongated shape based on properties of the referent concerned (e.g., rigidity, length, degree of finesse). Except for certain forms that are difficult to evoke from a handling perspective, (e.g., the shape with two lateral extensions), the different form concepts are represented by at least two different handshapes (and often more) in the SLs reviewed. In general, we do not find little variation in handling classifiers across our SLs. Consequently, our inventory comparison does not agree with this prediction.

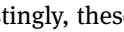
5.3 A shared core of meaningful handshapes in the examined SLs

Table 9 shows the handshapes that appear to be most common in our sample of SLs for the concepts examined (shape representations and handling representations combined).

Table 9: Common regular meaningful handshapes in our SL sample.

Form concept	Most frequent handshape through our sample of SLs
Thin and elongated shape	
Flat shape	
Shape with two lateral extensions	
Tubular shape	
Spherical shape	
Two-dimensional rectangular shape	
Two-dimensional round shape	

These meaningful handshapes would constitute a cross-SL common core. Some of these are also considered the most common phonological handshapes shared

across SLs:  (Johnston 1989: 64) or Battison (1978) (see section 2.2).[35] Interestingly, these forms are, for the most part, the same as those described in Eccarius and Brentari (2007) as the basic classifier handshapes across DSGS, HKSL, and ASL—three unrelated SLs. In particular, they conform nicely to the HKSL set:  and  . Our analysis shows that these handshapes are not only strongly present across SLs, but also have the same meaning.

5.4 Handshapes and the choice of salient features

Although there seems to be a shared core of form-meaning components across SLs, entity classifiers may have a variable aspect as well. But, it is essential that variation would not affect the association between a specific percept (form concept) and a handshape, but rather the link between a prominent feature selected for a referent and a specific gestural unit, that is, in the case of lexical signs or signs which are going to be lexicalized.

Interestingly, several metalinguistic discussions between signers in our extended corpus focused on the choice of meaningful handshapes using the shape representation device in referring to a specific referent. Yet, these discussions do not seem to indicate instability in the representation of any concept form. Rather, they reveal lexical instability, i.e. that signers must choose a prominent feature of the referent, a physical characteristic that would be used in the SL unit. We discuss two such cases below.

We have seen several cases where two signers argue over the appropriate handshape—the choice of the most salient feature to represent the generic lexical concept. The competing handshapes in these cases were all entity classifiers, each iconically related to the referent, but reflecting a different mental image. Thus, Figures 13 and 14 show signers debating the handshape for lexical unit GOOSE. The debate focused on the number and shape of the fingers involved since one signer's (Erica's) choice of handshape  , denotes a rounded shape, like the beak of a parrot, while the handshape used by her interlocutor (Raquel),  , denotes a more elongated shape, like the beak of a goose. In both cases, there is an iconic link with the respective chosen form concept (the shape of the animal's beak). The difference is that Erica simply conveys that the animal in question has a beak, without distinguishing in her SL between the shape of a parrot's beak (Figure 16) and the beak of a goose (Figure 14). In Raquel's system, there is a distinction between the two forms (a 'flat shape, more elongated than wide'

35 The handshape is not reported in our corpus, but this could be due to source materials.


Figures 13 and 14: GOOSE by Raquel (left) and Erica (right).


Figures 15 and 16: PARROT by Raquel (left) and Erica (right).

vs. 'shape with a pointed end'). In this sequence, Raquel justifies the choice of handshape by explaining to Erica that if it had been another type of bird, such as a parrot, she would have used another handshape:  (the same as Erica, see Figure 15). So, Erica conveys the animal through percept representation 'shape with a pointed end'. The fact that Raquel regularly travels to the mainland and meets other deaf people, signers of LIBRAS, may account for this difference.

We also noted situations where signers hesitate over the choice of a handshape and, in some cases, end up producing both successively. This is illustrated in Figures 17 and 18, where Erica uses a handshape conveying the flattened snout of a pig and then chooses to produce another handshape, conveying the shape of the pig's tail. Situations like this were observed frequently, both in front of the camera and among interlocutors in a group.


Figure 17 and 18: Two variants of PIG by Erica.

Signer hesitations followed by an additional handshape can be attributed to the fact that the signers are unaccustomed to the somewhat 'school-y' exercise of data elicitation. Some signers show more hesitations than others, but these also show the flexibility of signers who can easily switch from one handshape to another to

make themselves understood. Finally, it seems clear that variation across signers in Marajó is primarily due to the ease with which they employ varied prominent features of the same referent to ensure comprehension.

The number of handshapes used in referring to the same entity in spontaneous conversations can be impressive. Variation of this type is a sign of highly creative signers and a search of iconic precision in the description of certain forms. It shows the negotiation that takes place in a group of signers. This negotiation seems to occur for TUs and could eventually result in the stabilization of a LU. Thus, the image of a high-heeled shoe produced units that employed handshapes that focus on the length and slenderness of the high heel which may cause the wearer to fall:  (prominent feature 1), on its sharpness, which sinks into the ground:  (prominent feature 2), or the elegance of the overall shape of the shoe:  where the tips of the index and thumb are supported on the palm (prominent feature 3).

Our corpus did not allow us to evaluate the influence of cultural gestures that would enable us to corroborate Nyst's (2007) observations concerning their role on the formation of SASSes. However, we noted that five of our seven signers used relatively few loose handshapes in articulatory terms. The exception is Suzana. This may be due to the fact that she grew up in another region, whereas Brazilians from the State of Pará are known for their relaxed nonchalance (Serre, 2002), related to the traditional way of life of the *caboclos*,[36] the inhabitants of the Amazon basin.

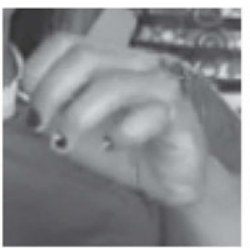




Figure 19: Examples of loose handshapes.

36 This is the name used for the mixed ancestry descendants of white Europeans and natives living in the Northeast of Brazil (see Tiphagne, 2005).

5.5 Limitations of the study

As noted earlier, our reference point was Cuxac's (2000) regular meaningful handshape inventory, consisting of 49 highly generic concepts referring to percepts, which was developed following the analysis of large-scale corpora of LSF discourse, specifically focusing on transfer structures. The inventory supports Cuxac's hypothesis that the emergence of all SL originates in a process of iconicization based on perceptual-practical experience (see section 1.3). As noted above, the inventories found in the literature for other SLs are not based on the same approach (with the exception of Fusellier-Souza 2004). Their authors assume other theoretical positions and established their inventories with different research objectives and methodologies.[37] We return to these theoretical differences in section 6. Consequently, more consistent cross-SL results would require the establishment of an inventory of meaningful/morphemic handshapes based on a corpus study for each of the SLs in question. Such a study should also consider the different formational parameters, since handshape is only one of the parametric components of a gestural unit, each making its contribution to the meaning. Given the methodology of the current study and the inventories at our disposal, it is difficult to take into account these other components. For that reason, our study is not intended to provide a generalization. Our main goal is to pave the way for research that would, in our opinion, provide significant advances for SL typology.

6 Conclusion

6.1 Contribution of the theoretical framework from a typological perspective

The analysis of inventories in light of the hypotheses of the Semiological Model allows us to consider meaningful handshapes as the result of iconicization of the perceptual-practical experience of deaf people. Other approaches appear to consider handshapes as iconic representations of diverse classes of referents (e.g., cars, planes), focusing on the link between a given handshape and the

37 Brennan (1990) differs from the other authors cited. Her work is also based on a large-scale discourse corpus, intended to provide precise descriptions of the different semantic values of handshapes.

generic class. In the Semiological Model, these handshapes, so-called *proforms*, depict a highly generic "shape" (reflecting a percept). In other words, a proform iconically conveys a generic form percept of 'shape with two lateral extensions' or 'flat shape', rather than directly designating the category 'aircraft' in the first case or the category 'car' in the second. Some authors have a relatively similar conception: e.g., Slobin's (2003) concept of *property marker*, or Brennan (1990, 2005), who mentions types of generic forms in the categorization of handshapes (SASS, instrument, handling, amplitude).

Our approach, assigning importance to form concepts rather than to classes of referents, thus provides a perspective on meaningful handshapes that allows us to address these regardless of specific cultural contexts. If a specific handshape is taken to categorize precise referents in each SL, how can it be compared to the semantic value of the same handshape in a SL practiced in another region, where the first referent would not be part of the signers' daily lives? Specific cultures find significance in the Semiological Model in the way our conceptualizations are developed. It is however assumed that at least some of these percepts are shared by all people, as they stem from a perceptual-practical experience that is uniquely human—that of bipedal individuals who perceive and act upon the world through a body with the same physiological and biological characteristics.

Finally, our theoretical model supports the hypothesis of a phylogenetic link between SLs such as the Marajó SLs and national established SLs. This view provides the justification for our comparative intent to study variation across SLs through the prism of the Marajó SLs. In our framework, the study of SLs used by deaf people who are gradually becoming a community brings us closer to the initial processes of iconicization and conventionalization. This perspective opens a window to the variation across signers in the selection of salient features of referents. It also allows us to observe the various possibilities envisaged by signers for the translation of percepts they intend to convey into gesture. From this perspective, Marajó can be considered an observatory, demonstrating processes of variation that operate on a larger scale and over a longer period among the SLs of the world.

Yet, we are conscious of the need to complete and reinforce our analysis and results through a systematic study of the distribution of configurations, particularly in our corpus of Marajó SLs (cf. the methods developed by Brentari et al. 2012; Coppola and Brentari 2014; and Goldin-Meadow et al. 2015).

6.2 Variation among signers in the community

The deaf inhabitants of Marajó live in a complex sociolinguistic situation. The signers in our corpus have relatively diverse profiles. Their homesigns, which have become more integrated over the years, reveal mechanisms of negotiation and adjustment among signers. This essential metalinguistic negotiation, illustrated in the choice of meaningful handshapes, stems from the ongoing process in which individual SLs get into contact with each other. This process seems to progress at different speeds for different deaf individuals depending on their degree of interaction with other deaf signers. The events organized in 2007 on the island excluded some of the deaf islanders, who were living in more remote areas and were not known at the time to the organizers.

This situation, where signers with different profiles get together, does not seem exceptional. On the contrary, we have known for over a decade (Zeshan 2008)[38] that all over the world, deaf people living at home develop SLs along different parameters (e.g., size of signer community, proportion of deaf to hearing people, influence of a national SL). The case of Marajó reminds us that these SLs also follow the population movements of signers, carrying with them sociolinguistic histories marked by the exchanges they have had, frequently or not, with other hearing or deaf people, perhaps with signers of national SLs. All these elements raise difficulties in our attempt to define a signer community. The use of a common SL is an intuitive criterion that seems relevant. However, in our day and age, marked by population movements and the massive use of social media and smartphones, this criterion is not sufficient, not even in remote rural areas. These developments promote more instantaneous communication between individuals and enable more varied exchanges. Some signers are well travelled and have developed great adaptability to communicate with deaf and hearing people, as is the case of Suzana. Such adaptability also characterizes Erica, who, although she has always lived in Soure, is used to interacting with many hearing people as well as more or less isolated deaf islanders. And what about the others, such as Neilo or Edilene, who meet other deaf islanders only occasionally due to the remoteness of their homes? They can use the same LUs as the other signers, although some parametric components may be modified. Is this sufficient to include them in the signer community of Soure?

It seems to us that the situation on Marajó, a contact situation involving homesigns, a national SL, and an emerging SL, merits attention in the

38 The first descriptions of homesigns of adult signers date to the early 1970s: Kuschel (1973, 1974); Macleod (1973), then Kendon (1980).

consideration of SL typology, as it reflects the evolving multilingual reality of deaf signers in some regions of the world.

Acknowledgements

We would like to thank Dana Cohen[39] for the English translation and Ellen Formigosa[40] for helping in the data annotation process. Our gratitude also goes to the deaf signers involved in the corpora collected on Marajó Island. Lastly, we extend our thanks to anonymous reviewers. Any remaining errors are our own responsibility.

39 UMR 7023 SFL (Structures formelles du langage) (CNRS/University of Paris 8).
40 UFPA.

Appendix

List of form concepts (following Cuxac 2000: 97–130)

1. Generally flat shapes
Flat shape / surface
Flat shape when its length is greater than its width
Flat shape with an edge
Contour of a flat shape
Flat surface, part of which showing some width

2. Generally round shapes
Two-dimensional round shape
Round shape with volume
Tubular shape (round, narrow and long)
Cylindrical shape (round, wide and short)
Long cylindrical shape of small circumference
Circular shape
Circular two-dimensional shape (disc)
Hemispherical shape
Rounded base shape in the beginning of its deployment
Roughly spherical shape presented with volume
Roughly spherical shape presented from the surface
Small, flat and circular shape, whether supported or not
Small, flat and circular shape with varying sizes on a gradient
Small spherical shape presented from the surface
Small spherical shape presented with volume
Flattened or crushed shape
Shape in tweezers

3. Generally triangular shapes (pointed)
Small pointed shape
Shape with a pointed end
Elongated shape with a pointed end deployed and presented with volume
Elongated shape with a pointed end, at the end of deployment, presented only from the surface

4. Generally rectangular shapes
Oblong or rectangular shape
Two-dimensional square or rectangular shape
Three-dimensional square or rectangular shape

5. Generally narrow shapes
Elongated and narrow shape
Single slender and elongated shape
Two elongated slender shapes
Four slender elongated shapes
Multiple elongated slender shapes
Two elongated slender shapes folded
Four elongated slender shapes folded
Very narrow elongated shape
Stringy shape
Elongated, slightly curved shape
Hooked shape
Shape with hooked extensions/protrusions

6. Shapes with extensions
Contour of elongated shape whose sides are approximately parallel
Two long, slender and parallel shapes
Global shape with two protrusions remaining parallel in the extension of the shape
Global shape with two lateral, non-parallel extensions
Shape with claws
Shape with a slight projection on a flat background
Shape of directed flowing liquid
Shape, a part of which has a lateral extension, or the extension itself

References

Antinoro Pizzuto, Elena & Micaela Capobianco. 2008. Is pointing « just » pointing? Unraveling the complexity of indexes in spoken and signed discourse. *Gesture* 8(1). 82–103.

Antinoro Pizzuto, Elena, Paolo Rossini, Marie-Anne Sallandre & Erin Wilkinson. 2006. Deixis, anaphora and highly iconic structures: Cross-linguistic evidence on American (ASL), French (LSF) and Italian (LIS) signed languages. In Ronice Müller de Quadros (ed.), *Sign languages: spinning and unraveling the past, present and future. TISLR9, forty five papers and three posters from the 9th Theoretical Issues in Sign Language Research Conference, Florianopolis, Brazil*. 475–495. Petrópolis, Brazil: Editora Arara Azul. https://editora-arara-azul.com.br/site/ebook/detalhes/18

Arnheim, Rudolf. 1969. *Visual thinking*. Berkeley: University of California Press.

Battison, Robbin. 1978. *Lexical borrowing in American Sign Language*. Silver Spring, MD: Linstock Press.

Bauer, Anastasia. 2013. The use of signing space in a shared sign language of Australia. *Sign Language & Linguistics* 17(2). 259–266.

Bauer, Anastasia. 2014. *The use of signing space in a shared sign language of Australia* (Sign Language Typology 5). Berlin: de Gruyter Mouton & Ishara Press.

Blevins, Juliette. 2012. Duality of patterning: Absolute universal or statistical tendency? *Language and Cognition* 4(4). 275–296.

Boyes-Braem & Penny Kaye. 1981. *Features of the handshape in American Sign Language*. Berkeley, CA: University of California dissertation.

Brennan, Mary. 1990. *Word formation in BSL*. Stockholm: Stockholm University dissertation.

Brennan, Mary. 2005. Conjoining word and image in British Sign Language (BSL): An exploration of metaphorical signs in BSL. *Sign Language Studies* 5(3). 360–382.

Brentari, Diane, Marie Coppola, Laura Mazzoni & Susan Goldin-Meadow. 2012. When does a system become phonological? Handshape production in gesturers, signers, and homesigners. *Natural Language & Linguistic Theory* 30(1). 1–31.

Brentari, Diane, Marie Coppola, Ashley Jung & Susan Goldin-Meadow. 2013. Acquiring word class distinctions in American Sign Language: Evidence from handshape. *Language Learning and Development* 9(2). 130–150.

Brentari, Diane, Alessio Di Renzo, Jonathan Keane & Virginia Volterra. 2015. Cognitive, cultural, and linguistic sources of a handshape distinction expressing agentivity. *Topics in Cognitive Science* 7(1). 95–123.

Carliez, Maria Luizete Sampaio Sobral. 2013. Collecte des LS des sourds de Soure (Île de Marajó) et de Fortalezinha: Un parcours méthodologique (2008–2013), University of Paris 8 [Manuscript].

Carliez, Maria Luizete Sampaio Sobral, Ellen Formigosa & Eder Barbosa Cruz. 2016. Accessibilité et égalité des chances aux micro-communautés des sourds brésiliens: Vers la reconnaissance des langues des signes pratiquées par les sourds de Soure (Île de Marajó) et Fortalezinha-PA et Porto de Galinhas-PE. MOARA–*Revista Eletrônica do Programa de Pós-Graduação em Letras* [*Electronical Journal of the Graduate Program in Literature*] 1(45). 128–143.

Coppola, Marie & Diane Brentari. 2014. From iconic handshapes to grammatical contrasts: Longitudinal evidence from a child homesigner. *Frontiers in Psychology: Language Sciences* (5). 1–23.

Cormier, Kearsy, David Quinto-Pozos, Zed Sevcikova & David Schembri. 2012. Lexicalisation and de-lexicalisation processes in sign languages: Comparing depicting constructions and viewpoint gestures. *Language & Communication* 32(4). 329–348.

Cormier, Kearsy, Sandra Smith & Zed Sevcikova Sehyr. 2015. Rethinking constructed action. *Sign Language & Linguistics* 18(2). 167–204.

Crasborn, Onno & Han Sloetjes. 2008. Enhanced ELAN functionality for sign language corpora. In Nicoletta Calzolari, Khalid Choukri, Bente Maegaard, Joseph Mariani, Jan Odjik, Stelios Piperidis & Daniel Tapias (eds.), *Proceedings of LREC 2008, Sixth International Conference on Language Resources and Evaluation*. 39–43.

Cuxac, Christian. 1996. *Fonctions et structures de l'iconicité des langues des signes. Analyse descriptive d'un idiolecte parisien de la langue des signes française*. Paris: University of Paris 5 dissertation.

Cuxac, Christian. 1999. The expression of spatial relations and the spatialization of semantic relations in French Sign Language. *Language Diversity and Cognitive Representations* 3. 123–142. Amsterdam: John Benjamins.

Cuxac, Christian. 2000. *La langue des signes française (LSF): Les voies de l'iconicité*. *Faits de Langue* 15. Paris: Ophrys.

Cuxac, Christian, Annelies Braffort, Annick Choisier, Christophe Collet, Patrice Dalle, Ivani Fusellier, Gwenaëlle Jirou, Fanch Lejeune, Boris Lenseigne, Nathalie Monteillard, Annie Risler & Marie-Anne Sallandre. 2002. Corpus LS-COLIN, https://cocoon.huma-num. fr/exist/crdo/meta/crdo-FSL-CUC021_SOUND.

Cuxac, Christian. 2004. Phonétique de la LSF: Une formalization problématique [LSF phonetics: A problematic formalization]. *Silexicales – La Linguistique de la LSF: Recherches actuelles* 4. 93–113.

Cuxac, Christian. 2005. Des signes et du sens. *Aux origines des langues et du langage*. 196–211. Paris: Fayard.

Cuxac, Christian & Marie-Anne Sallandre. 2007. Iconicity and arbitrariness in French Sign Language: Highly iconic structures, degenerated iconicity and diagrammatic iconicity. In Elena Antinoro Pizzuto, Paola Pietrandrea & Raffaele Simone (eds.), *Verbal and signed languages: Comparing structures, constructs and methodologies*, 13–33. Berlin: Mouton de Gruyter.

Cuxac, Christian. 2008. Langues des signes et gestuelle co-verbale: Pour un programme commun de recherches. *Cahiers de Linguistique Analogique* 5. 181–228.

Cuxac, Christian & Elena Antinoro Pizzuto. 2010. Émergence, norme et variation dans les langues des signes: Vers une redéfinition notionnelle. *Langage et société* 131(1). 37–53.

De Boer, Bart, Wendy Sandler & Simon Kirby. 2012. New perspectives on duality of patterning: Introduction to the special issue. *Language and Cognition* 4(4). 251–259.

De Vos, Connie. 2012. *Sign-spatiality in Kata Kolok: How a village sign language in Bali inscribes its signing space*. Nijmegen: Radboud University dissertation.

de Vos, Connie & Roland Pfau. 2015. Sign language typology: The contribution of rural sign languages. *Annual Review of Linguistics* 1(1). 265–288.

de Vos, Connie & Ulrike Zeshan. 2012. Introduction: Demographic, sociocultural, and linguistic variation across rural signing communities. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights,* 2–23. Berlin: Mouton De Gruyter & Ishara Press.

Eccarius, Petra & Diane Brentari. 2007. Symmetry and dominance: A cross-linguistic study of signs and classifier constructions. *Lingua* 117(7). 1169–1201.

Emmorey, Karen (ed.). 2003. *Perspectives on classifier constructions in sign languages*. Mahwah, NJ: Erlbaum.

Fenlon, Jordan, Kearsy Cormier & Diane Brentari. 2018. The phonology of sign languages. In S. J. Hannahs & Anna R. K. Bosch (eds.), *The Routledge handbook of phonological theory*, 453–475. London: Routledge.

Fernald, Theodore B. & Donna J. Napoli. 2000. Exploitation of morphological possibilities in signed languages: Comparison of American Sign Language with English. *Sign Language & Linguistics* 3(1). 3–58.

Formigosa, Ellen. 2014. Variation linguistique de la Libras: Quels enjeux pour l'enseignement de la LS aux Sourds Brésiliens? Paris, France: University of Paris 8 Mémoire de Master 1 Didactique des Langues étrangères. U.F.R de Sciences du Langage.

Friedman, Lynn A. 1977. *On the other hand: New perspectives on American Sign Language*. New York: Academic Press.

Frishberg, Nancy. 1987. Home sign. In John Vickrey Van Cleve (ed.), *Gallaudet encyclopedia of Deaf people and deafness* 3. 128–131. New York: McGraw-Hill.

Fusellier-Souza, Ivani. 2004. *Sémiogenèse des langues des signes: Étude de langues des signes primaires (LSP) pratiquées par des sourds brésiliens*. Paris: University of Paris 8 dissertation.

Fusellier-Souza, Ivani. 2006. Emergence and development of signed languages: From a semiogenetic point of view. *Sign Language Studies* 7(1). 30–56.

Fusellier-Souza, Ivani. 2012. Multiple perspectives on the emergence and development of human language: Bernard Comrie, Clive Perdue and Dan Slobin. In Marzena Watorek, Sandra Benazzo & Maya Hickmann (eds.), *Comparative perspectives on language acquisition: A tribute to Clive Perdue (*Second Language Acquisition 61), 223–244. Bristol: Multilingual Matters.

Garcia, Brigitte, Annelies, Braffort, Dominique Boutet & Patrice Dalle. 2007. Sign Language (SL) in graphical form: Methodology, modelisation and representations for gestural communication. *Actes du IIe Congrès International ISGS (International Society for Gesture Studies) Corps en Interaction*, organisé par le laboratoire ICAR. Lyon, ENS, 15–18 juin 2005.

Garcia, Brigitte & Marc Derycke (eds.). 2010. Sourds et langues des signes: Norme et variations. *Langage et Société* 131. Paris: Éditions de la Maison des sciences de l'homme.

Garcia, Brigitte & Marie-Thérèse L'Huillier. 2011. *Corpus de dialogues en LSF entre adultes sourds*. Projet Creagest, Agence Nationale de la Recherche. http://sldr.org/voir_depot.php?lang=fr&id=926.

Garcia, Brigitte & Marie-Thérèse L'Huillier. 2013. Discursive and morphological processes in the formation and the stabilisation of lexematic units in French Sign Language (LSF). Paper presented at *Theoretical Issues in Sign Language Research (TISLR11)*, University College London, 10–13 July 2013.

Garcia, Brigitte & Marie-Anne Sallandre. 2014. Reference resolution in French Sign Language. In Patricia Cabredo Hofherr & Anne Zribi-Hertz (eds.), *Crosslinguistic studies on noun phrase structure and reference* [Syntax and semantics series 39]. 316–364. Leiden: Brill.

Garcia, Brigitte & Emmanuella Martinod. 2017. Ancrage perceptif et invariant dans les langues des signes, langues de sourds. In Elżbieta Biardzka, Magdalena Dańko, Greta Komur-Thilloy & Fabrice Marsac (eds.), *Écho des Études Romanes* 13. 73–88. Université de Bohême du Sud de České Budějovice et Institut de langues et littératures romanes.

Goldin-Meadow, Susan & Diane Brentari. 2015. Gesture, sign and language: The coming of age of sign language and gesture studies. *Behavioral and Brain Sciences*. 1–82.

Goldin-Meadow, Susan, Diane Brentari, Marie Coppola, Laura Horton & Ann Senghas. 2015. Watching language grow in the manual modality: Nominals, predicates, and handshapes. *Cognition* 136. 381–395.

Jirou, Gwenaëlle. 2000. Analyse descriptive du parler gestuel de Mbour (Sénégal). Paris: University of Paris 8 MA thesis.

Jirou-Sylla, Gwenaëlle. 2008. Description d'une langue des signes informelle en dehors du milieu institutionnel. Analyse lexicale du parler gestuel de Mbour (Sénégal). *Les Cahiers de Linguistique Analogique* 5. 135–180.

Johnson, Russell J. & Jane E. Johnson. 2016. Distinction between West Bengal Sign Language and Indian Sign Language based on statistical assessment. *Sign Language Studies* 16(4). 473–499.

Johnston, Trevor A. 1989. *Auslan: The sign language of the Australian deaf community*. Sydney: University of Sydney dissertation.

Johnston, Trevor A. 2012. Lexical frequency in sign languages. *Journal of Deaf Studies and Deaf Education* 17(2). 163–193.

Johnston, Trevor A. 2016. Auslan corpus annotation guidelines. Sydney: Macquarie University, manuscript [https://www.academia.edu/29690332/Auslan_Corpus_Annotation_Guidelines_November_2016_revision_].

Johnston, Trevor & Lindsay Ferrara. 2012. Lexicalization in signed languages: When is an idiom not an idiom. In *Selected Papers from UK-CLA Meetings* 1. 229–248. UK: United Kingdom Cognitive Linguistics Association.

Johnston, Trevor & Adam Schembri. 1999. On defining lexeme in a signed language. *Sign Language & Linguistics* 2(2). 115–185.

Johnston, Trevor & Adam Schembri. 2007. *Australian Sign Language (Auslan): An introduction to sign language linguistics*. Cambridge: Cambridge University Press.

Kegl, Judy A. & Ronnie Bring-Wilbur. 1976. When does structure stop and style begin? Syntax, morphology, and phonology vs. stylistic variation in American Sign Language. *Papers from the Regional Meeting. Chicago Linguistic Society* 3. 376–396.

Kendon, Adam. 1980. A description of a deaf-mute sign language from the Enga province of Papua New Guinea with some comparative discussion. Part III: Aspects of utterance construction. *Semiotica* 32(3–4). 245–314.

Kendon, Adam. 2000. Language and gesture: Unity or duality? In David McNeill (ed.), *Language and Gesture*, 47–63. Cambridge: Cambridge University Press.

Kubuş, Okan. 2008. *An analysis of Turkish Sign Language (TİD) phonology and morphology*. Ankara, Turkey: Middle East Technical University dissertation.

Kuschel, Rolf. 1973. The silent inventor: The creation of a sign language by the only deaf-mute on a Polynesian island. *Sign Language Studies* 3(1). 1–27.

Kuschel, Rolf. 1974. A lexicon of signs from a Polynesian outlier island: A description of 217 signs as developed and used by Kagobai, the only deaf-mute of Rennell Island. *Psykologisk Skriftserie* 8. 285–290.

Ladd, D. Robert. 2012. What is duality of patterning, anyway? *Language and cognition* 4(4). 261–273.

Liddell, Scott K. 1995. Real, surrogate, and token space: Grammatical consequences in ASL. In Karen Emmorey & Judy Reilly (eds.), *Language, gesture and space,* 19–41. Hillsdale, New Jersey: Erlbaum.

Liddell, Scott K. 2003. *Grammar, gesture, and meaning in American Sign Language*. Cambridge: Cambridge University Press.

MacLeod, Catriona. 1973. A dead man's sign language—its nature and position relative to spoken languages. *Linguistics* 11(101). 72–88.
Mandel, Mark. 1977. Iconic devices in American sign language. In Lynn Friedman (ed.), *On the other hand: New perspectives on American Sign Language*, 57–107. New York: Academic Press.
Marsaja, I. Gede. 2008. *Desa Kolok: A deaf village and its sign language in Bali, Indonesia*. Nijmegen: Ishara Press.
Martin-Dupont, Xavier. 1989. Les relations d'actance en Langue des Signes Française. Paris: University of Paris 5 MA thesis.
Martinod, Emmanuella. 2013. Une analyse linguistique de quelques systèmes gestuels pratiqués par des sourds isolés sur l'île de Marajó. Paris: University of Paris—École Normale Supérieure Ulm MA thesis.
Martinod, Emmanuella. 2015. Corpus de langues des signes individuelles pratiquées sur l'île de Marajó (Brésil). UMR 7023 SFL (University of Paris 8 et CNRS).
Martinod, Emmanuella. 2017. Corpus de langues des signes individuelles pratiquées à Soure (Brésil). UMR 7023 SFL (University of Paris 8 et CNRS).
Martinod, Emmanuella. 2017. Idéologies linguistiques des pratiques langagières de sourds en milieu rural: l'île de Marajó. Presentation at the Colloque franco-latino-américain de recherche sur le handicap (IIIème édition), Porto Alegre, Brazil.
McNeill, David. 2000. *Language and gesture*. Cambridge: Cambridge University Press.
Meier, Richard P. 2002. Why different, why the same? Explaining effects and non-effects of modality upon linguistic structure in sign and speech. In Richard. P. Meier, Kearsy Cormier & David Quinto-Pozos (eds.), *Modality and structure in signed and spoken languages*, 1–10. Cambridge: Cambridge University Press.
Meier, Richard P., Kearsy Cormier & David Quinto-Pozos (eds.). 2002. *Modality and structure in signed and spoken languages*. Cambridge: Cambridge University Press.
Meir, Irit. 2012. Word classes and word formation. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 77–112. Berlin: Mouton De Gruyter.
Meir, Irit, Assaf Israel, Wendy Sandler, Carol A. Padden & Mark Aronoff. 2012. The influence of community on language structure: evidence from two young sign languages. *Linguistic Variation* 12(2). 247–291.
Newport, Elissa L. & Ted Supalla. 2000. Sign language research at the millennium. In Karen Emmorey & Harlan L. Lane (eds.), *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*, 103–114. Mahwah, NJ: Erlbaum.
Nyst, Victoria, Kara Sylla & Moustapha Magassouba. 2012. Deaf signers in Douentza, a rural area in Mali. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights* (Sign Language Typology 4), 251–276. Berlin: Mouton De Gruyter & Ishara Press.
Nyst, Victoria. 2007. *A descriptive analysis of Adamorobe sign language (Ghana)*. Leiden: Netherlands Graduate School of Linguistics dissertation.
Nyst, Victoria. 2012. Shared sign languages. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 552–574. Berlin: Mouton de Gruyter.
Occhino, Corinne. 2017. An introduction to embodied cognitive phonology: Claw-five handshape distribution in ASL and Libras. In *Complutense Journal of English Studies* 25. 69–103.
Padden, Carol A., Irit Meir, So-One Hwang, Ryan Lepic, Sharon Seegers & Tory Sampson. 2013. Patterned iconicity in sign language lexicons. *Gesture* 13(3). 287–308.

Sallandre, Marie-Anne. 2003. Les unités du discours en Langue des Signes Française. Tentative de catégorisation dans le cadre d'une grammaire de l'iconicité. Paris: University of Paris 8 Vincennes-Saint Denis dissertation.

Sallandre, Marie-Anne, Alessio Di Renzo & Robert Gavrilescu. 2016a. Various types of personal transfers (constructed actions) in seven sign languages. Poster presented at Theoretical Issues in Sign Language Research (TISLR12). Melbourne, Australia, 4–7 January.

Sallandre, Marie-Anne, Alessio Di Renzo, Robert Gavrilescu & Alexandre Daniel. 2016b. Embodiment and discourse cohesion in five sign languages. Presented at the 7th Conference of the International Society for Gesture Studies (ISGS), Paris, July.

Sallandre, Marie-Anne & Brigitte Garcia. 2013. Epistemological issues in the semiological model for the annotation of sign language. In Laurence Meurant, Aurélie Sinte, Mieke Van Herreweghe & Myriam Vermeerbergen (eds.), *Sign language research, uses and practices, Crossing views on theoretical and applied sign language linguistics* (Sign Language and Deaf Communities 1), 159–177. Berlin & New York: Mouton De Gruyter.

Sandler, Wendy & Diane Lillo-Martin. 2006. *Sign language and linguistic universals*. Cambridge: Cambridge University Press.

Schembri, Adam. 2003. Rethinking 'classifiers' in signed languages. In Karen D. Emmorey (ed.), *Perspectives on classifier constructions in sign languages*, 3–34. Mahwah, NJ: Erlbaum.

Schembri, Adam, Caroline Jones & Denis Burnham. 2005. Comparing action gestures and classifier verbs of motion: Evidence from Australian Sign Language, Taiwan Sign Language, and nonsigners' gestures without speech. *Journal of Deaf Studies and Deaf Education* 10(3). 272–290.

Schuit, Joke M. 2014. *Signs of the arctic: Typological aspects of Inuit Sign Language*. Amsterdam: Universiteit van Amsterdam dissertation.

Sevcikova, Zed. 2013. Categorical versus gradient properties of handling handshapes in British Sign Language (BSL). *Evidence from handling handshape perception and production by deaf BSL signers and hearing speakers*. London: University College London dissertation.

Slobin, Dan, Nina Hoiting, Marlon Kuntze, Reyna Lindert, Amy Weinberg, Jennie Pyers, Michelle Anthony, Yael Biederman & Helen Thuman. 2003. A cognitive/functional perspective on the acquisition of "classifiers". In Karen D. Emmorey (ed.), *Perspectives on classifier constructions in sign languages*, 271–296. Mahwah, NJ: Erlbaum.

Taub, Sarah F. 2001. *Language from the body: Iconicity and metaphor in American Sign Language*. Cambridge: Cambridge University Press.

Tiphagne, Nicolas. 2005. Entre nature et culture, les enchantements et les métamorphoses dans le monde caboclo de l'Est de l'île de Marajó: invention et discours sur l'autre, prémisses d'une identité. Paris: University Paris 7 Diderot dissertation.

Van der Kooij, Els. 2002. *Phonological categories in Sign Language of the Netherlands: The role of phonetic implementation and iconicity*. Utrecht: LOT.

Velupillai, Viveka. 2012. *An introduction to linguistic typology*. Amsterdam: John Benjamins.

Woodward, James. 1982. Beliefs about and attitudes towards deaf people and sign language on Providence Island. In *How you gonna get to heaven if you can't talk with Jesus? On depathologizing deafness*, 51–74. Silver Spring, MD: T.J. Publishers.

Yau, Shun-Chiu. 1992. *Création gestuelle et débuts du langage: création de langues gestuelles chez des sourds isolés*. Editions Langages croisés, Paris: Centre de recherches linguistiques sur l'Asie Orientale. Ecole des Hautes Etudes en Sciences Sociales.

Zeshan, Ulrike. 2003. Indo-Pakistani Sign Language grammar: A typological outline. *Sign Language Studies* 3(2) 157–212.

Zeshan, Ulrike. 2008. Roots, leaves and branches–The typology of sign languages. In Ronice Müller de Quadros (ed.), *Sign languages: spinning and unraveling the past, present and future. TISLR9, forty five papers and three posters from the 9th Theoretical Issues in Sign Language Research Conference, Florianopolis, Brazil.* Petrópolis, Brazil: Editora Arara Azul. https://editora-arara-azul.com.br/site/ebook/detalhes/18

Zwitserlood, Ingeborg E. P. 2003. *Classifying hand configurations in Nederlandse Gebarentaal (Sign Language of the Netherlands)*. Utrecht: Netherlands Graduate School of Linguistics dissertation.

Zwitserlood, Ingeborg E. P. 2012. Classifiers. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 158–186. Berlin: Mouton De Gruyter.

Ben Braithwaite

Emerging sign languages in the Caribbean

1 Introduction

Nyst (2012: 568) suggests that, in order to get a clearer understanding of how factors such as incidence of deafness and sociolinguistic setting affect the structure and emergence of signed languages, we should "compare communities that resemble each other to a great extent, and differ only in one or two respects." This chapter[1] argues that the Caribbean provides an exceptionally good opportunity to draw such comparisons, and to isolate various different critical factors. It describes some of the rich variety of sign languages which haves emerged across the region over the last two centuries, including several languages which have not previously been discussed in the research literature. It shows that there are kinds of emerging sign languages which have barely been considered in previous research, and argues that looking at these phenomena across the region can lead to insights into the various ways in which geography, history, incidence and causes of deafness, the establishment of deaf schools, and language contact can influence the emergence of new languages.

The Caribbean has been defined in a variety of overlapping ways (Girvan 2001). Some definitions are based on geography, to include the islands in the Caribbean basin, or, more broadly, all areas with a Caribbean coast. Some definitions are political, including, for example, the member states of CARICOM. Some are historically rooted, in terms of the development of sugar plantations from the 18th Century. Other definitions are based on shared language and culture, to include the region's Creole-speaking territories. For this chapter, I adopt Best's (1971) view of the Caribbean, which includes the islands of the Greater and Lesser Antilles, 'the Guianas' (Guyana, Suriname and French Guiana), and the coastlands surrounding the Caribbean Sea, including various island groups with political

1 Most of the work on which this chapter is based was collaborative. I am indebted to the deaf and hearing people around the region who have generously shared their insights, time and hospitality. I am grateful to co-researchers, including Lily Kwok and Rehana Omardeen (South Rupununi), Kristian Ali (Grand Cayman and the Bay Islands), Kimone Elvin (Grand Cayman, the Bay Islands, San Andres and Providence), and especially Ian Dhanoolal (Trinidad and Tobago, Guyana, Grand Cayman, the Bay Islands, San Andres, and Providence).

https://doi.org/10.1515/9781501504884-006

connections to the mainland, but historical, cultural and linguistic connections to the Antilles, such as San Andres and Providence of Colombia, the Bay Islands of Honduras, and the Corn Islands of Nicaragua. The map in Figure 1 shows the Caribbean. Places which are of particular interest in this chapter are labeled.

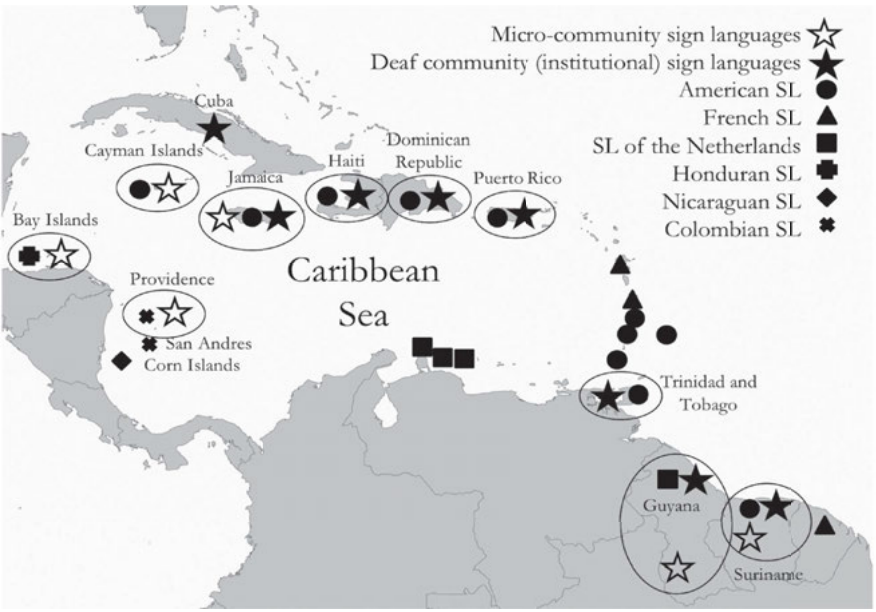


Figure 1: Map of the Caribbean.

The field of sign language linguistics is still in its infancy in the Caribbean, and the academic literature on Caribbean sign languages is somewhat limited. This chapter draws both on what previous literature exists, and also on my own fieldwork in Trinidad and Tobago, Guyana, the Bay Islands, the Cayman Islands, Jamaica and Providence.

Emerging sign languages are usually classified into two types.[2] The first type, called variously village sign languages (e.g. Zeshan, 2011), rural sign languages (e.g. de Vos and Pfau 2015), shared sign languages (e.g. Nyst 2012) or micro-community sign languages (e.g. Fenlon and Wilkinson 2015), emerge in small communities in which there is a high incidence of deafness, usually genetically inherited. The second type, called Deaf community sign languages (e.g. Meir,

2 Though this volume makes more fine-grained distinctions (see Introduction).

Sandler, Padden, and Aronoff 2010), institutional sign languages (this volume), or macro-community sign languages (e.g. Fenlon and Wilkinson 2015), typically emerge when deaf children are brought together by the establishment of a deaf school. The Caribbean has several examples of each type.

For ease of reference, Table 1 summarizes some basic information about rural deaf populations and micro-community sign languages discussed in the chapter.

Table 1: Rural deaf populations and micro-community sign languages in the Caribbean.

Location	Incidence of deafness	Indigenous signed language	Other sign languages
Saint-Barthélemy, France	2.59% (Bonaïti et al. 1986)	Not known	American Sign Language
Grand Cayman, Cayman Islands, UK	Previously 11/3945 (Doran 1952). Currently not known, but certainly much lower.	Old Caymanian Sign Language	American Sign Language, Jamaican Sign Language
Little Cayman, Cayman Islands, UK	As high as 7/95 in 1921 (Doran 1952). Currently not known.	Not known	Not known
Roatan, Bay Islands, Honduras	Not known	Bay Islands Sign Language (visual and tactile modalities)	Honduran Sign Language
Guanaja, Bay Islands, Honduras	Not known	Bay Islands Sign Language (visual and tactile modalities)	Honduran Sign Language
Macano Peninsula, Margarita, Venezuela	Incidence of Usher Syndrome 76/100,000, much higher in some villages (Keogh et al. 2004)	Not known	Not known
South Rupununi, Guyana	Not known	South Rupununi Sign Language	American Sign Language
Kajana, Suriname	Estimated at 10/1,500 (van den Bogaerde, 2006)	Kajana Signs	No
Providence, Colombia	17/5,000 (Lattig et al 2008)	Providence Island Sign Language	Colombian Sign Language

Table 1: (continued)

Location	Incidence of deafness	Indigenous signed language	Other sign languages
Bequia, St Vincent and the Grenadines	Estimated 10/5,000	Not known	American Sign Language, Signing Exact English (SEE-II)
Top Hill / Junction, Jamaica	Not known	Jamaican Country Sign / Konchri Sain	American Sign Language, Jamaican Sign Language
Corn Islands, Nicaragua	Estimated 17/6,626	Not known	Nicaraguan Sign Language

Table 2 summarizes some basic information about some of the institutional sign languages mentioned in the chapter.

Table 2: Some Caribbean institutional sign languages.

Country / territory	Institutional sign language	Establishment of the first deaf school	Contact with sign languages from abroad
Trinidad and Tobago	Trinidad and Tobago Sign Language	1943 (Braithwaite, Drayton & Lamb 2011)	British Sign Language, American Sign Language
Jamaica	Jamaican Sign Language	1939 (Braithwaite et al. 2016)	British Sign Language, American Sign Language
Cuba	Cuban Sign Language	1819 (Echevarría & Rodríguez 2009)	American Sign Language
Haiti	Haitian Sign Language	1945 (Parks 2011)	American Sign Language
Dominican Republic	Dominican Republic Sign Language	1967 (Gerner de Garcia 1990)	American Sign Language
Suriname	Surinamese Sign Language	1946 (Kusters 2006)	Sign Language of the Netherlands
Guadeloupe	French Sign Language	1839 (Irvine 2016)	

Section 2 describes various rural communities in the Caribbean in which there is a high incidence of deafness, either currently, or in recent generations.

Section 3 discusses what is known about the emergence of sign languages in these communities. Section 4 provides an overview of the development of deaf education across the Caribbean, and discusses what is known about the emergence of signed languages from deaf schools in the region. Section 5 makes some observations about the role of language contact in the emergence of various Caribbean sign languages. Section 6 concludes.

2 Deafness in the Caribbean

Genetic deafness is not unusual in island communities, and a high proportion of the village sign languages which have been studied to date, have emerged on islands. In Nyst's (2012) review of shared signing communities, 5 out of a total of 13 are located on islands (Bali, Grand Cayman, Providence Island, Jamaica and Martha's Vineyard). It is perhaps not surprising, therefore, to find that deafness is quite common in a predominantly insular region like the Caribbean. This section describes how the unique history and geography of the Caribbean region has given rise to a remarkable number of communities in which there is an unusually high incidence of deafness. Some of the communities mentioned here have been discussed previously in the sign language linguistics literature, while others have received attention from linguists only very recently or not at all.

2.1 Communities with high rates of deafness

2.1.1 Providence Island, Colombia

The deaf population of Providence Island is one of the better-known cases. When Washabaugh published his book on sign language in Providence Island in 1986, there were 19 deaf people, in a total population of around 3,000. More recently, Lattig et al. (2007) found that that number had dropped to 17, while the total population of Providence has increased to around 5,000. Lattig et al. also identify two distinct bases of genetic deafness in Providence, Waardenberg's Syndrome, and an independent non-syndromic genetic cause. Recent field research indicates that there have been no new cases of Waardenberg's Syndrome since the time of Washabaugh's research in the 1970s and 1980s, but at least five new cases of non-syndromic deafness.

2.1.2 Top Hill / Junction, Jamaica

Another well-known deaf population is found in the villages of Top Hill and Junction in the St Elizabeth Parish of Jamaica. Dolman (1986) claims that there were 200 or more deaf people living in the area. Recent research indicates a steep decline in the numbers: according to Cumberbatch (2015), there are 50 signers of the community's indigenous sign language, while Gayle (2016) estimates 40 deaf signers.

2.1.3 Cayman Islands, UK

Doran (1952), using census data, reported that there has been a very high incidence of deafness in the Cayman Islands since at least 1891. According to the 1921 census, 7 of the total population of 95 people in Little Cayman were deaf, 7 of 1,213 in Cayman Brac, and 11 of 3,945 in Grand Cayman, including a very high concentration of deaf people in the community of Prospect (8/346 in 1911). The most recent statistics reported in Doran (1952) indicated that in 1943, 27 of the total population of 6,670 in the Cayman Islands were deaf. Three decades later, Washabaugh (1981a) knew of 18 deaf people living in the biggest of the Cayman Islands, Grand Cayman, while the total population had grown to at least 11,000. Since that time, the population of the Cayman Islands has continued to grow extremely quickly, reaching around 55,000 in 2015 according to census data, as a result of massive levels of immigration associated with the rapid development of the tourism and the financial services industries. Usher Syndrome is present in the population of Grand Cayman, leading to deaf-blindness in several instances.

2.1.4 Bay Islands, Honduras

The Bay Islands belong politically to Honduras, but have much in common culturally, linguistically and historically to Creole-speaking Caribbean neighbours. The three biggest islands, Utila, Roatan and Guanaja, have a total population of around 100,000, most of these living in Roatan. As in the Cayman Islands, Usher Syndrome is known to exist in parts of the Bay Islands. I took part in a field trip to the Bay Islands in 2016, with co-researchers Ian Dhanoolal, Kimone Elvin and Kristian Ali. We found a high incidence of Usher Syndrome in the village of French Harbour in Roatan. Across an extended family living both in French Harbour and on the island of Guanaja, we met 6 deaf members, four

of whom where deaf and blind. Beyond this family there appeared to be a high incidence of deafness in various other parts of these islands.

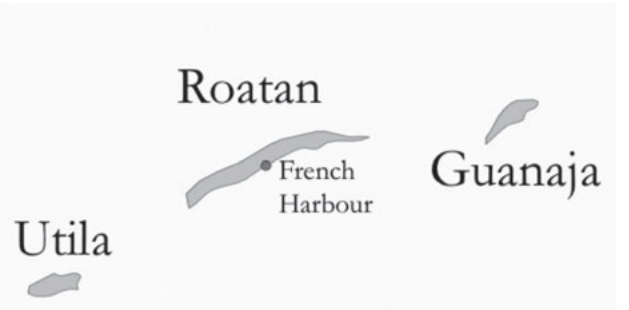


Figure 2: Map of the Bay Islands.

2.1.5 Corn Islands, Nicaragua

Kegl (p.c.) indicates that there are around 17 deaf people, as well as many more who are hard of hearing, in the Corn Islands, Nicaragua, out of a total population of 6,626 according to a census of 2005.

2.1.6 Saint-Barthélemy, France

In Saint-Barthélemy, Bonaïti et al. (1986) conducted audiological assessments of 1,430 people, which represented around 70% of the total population aged at least 3, and found 37 people to be severely deaf. Deafness was found to be non-syndromic, and they concluded that it was a result of a single recessive gene, which had been present in the population since settlement by a small number of French families in the eighteenth century.

2.1.7 Margarita, Venezuela

Keogh et al. (2004) Venezuela. Methods: Numerous visits were made to the isolated island community over a 4-year-period. During these visits, it became apparent that a significant number of individuals complained of problems with hearing and vision. Socioeconomic assessments, family pedigrees and clinical histories were recorded on standard questionnaires. All individuals underwent thorough

otolaryngologic and ophthalmologic examinations. Twenty milliliters of peripheral venous blood was obtained from each participant. A Genome-wide linkage analysis study was performed. Polymorphic microsatellite markers were amplified by polymerase chain reaction and separated on polyacrylamide gels. An ABI 377XL sequencer was used to separate fragments and LOD scores were calculated by using published software. Results: Twenty-four families were identified, comprising 329 individuals, age range 1–80 years, including 184 children. All families were categorized in the lower two (least affluent studied 329 people in the Macano Peninsula of Margarita Island, Venezuela, and found that 15 had congenital hearing loss associated with Usher Syndrome. The total incidence of Usher Syndrome was found to be 76/100,000. In one village, the incidence of Usher Syndrome was as high as 5 people out of a total population of 706 (782/100,000).

2.1.8 South Rupununi, Guyana

Deafness among the Wapishana living in the Southern Rupununi region in the south of Guyana was commented on nearly a century ago by Farabee (2009: 170), who mentioned that he had met 7 deaf Wapishana people. Brothwell (1967: 39) also refers to a high incidence of deafness among both the Wapishana and their Rupununi neighbours, the Macushi, ascribing this to inbreeding. Over the course of two short research trips in 2015, I met 9 deaf people living in the region, and heard of several more.

2.1.9 Kajana, Suriname

Across the border from Guyana, in Suriname, van den Bogaerde (2006) estimates that there are around 10 deaf people living in the Saramaka communities in the region of Awarradam, of a total population of around 1,500 to 2,000.

2.2 Non-genetic factors

Disease and environmental factors may also lead to high levels of deafness. One environmental factor associated with hearing loss is mercury poisoning. Evidence of mercury poisoning has recently been found in Suriname (Peplow and Augustine 2007), French Guiana (Fréry et al. 2001), and Guyana (Roopnarine 2006), as a result of gold mining activities, though there is currently

very little information about the extent to which this may have led to increased levels of deafness in these populations.

One of the major historic causes of congenital deafness in the Caribbean, as elsewhere, is Maternal Rubella Syndrome. The Caribbean has been particularly susceptible to rubella epidemics. Widespread vaccination across the region only succeeded in largely eradicating Maternal Rubella Syndrome around the turn of the 21st century (Castillo-Solórzano et al. 2003). There were major epidemics in the early 1980s and mid-1990s, decades after the last great rubella epidemic in the United States in 1964–5 (Hinman, Hersh, and de Quadros 1998). In addition to the lack of vaccination, "[p]ersons living on islands or in rural areas are more likely to be susceptible [to rubella outbreaks] than people in urban areas; up to one-half of adults of childbearing age in these settings are susceptible." (Hinman et al. 1998). Rubella outbreaks have had a profound effect on the demographics of many deaf communities in the region, creating very large 'bulges' in particular age ranges. Rubella epidemics have had a major impact on the spread of deaf education in the Caribbean, as discussed further in section 4. On small islands, rubella epidemics could conceivably lead to rates of deafness approaching those found in communities with genetic deafness. One possible such example is Bequia (St Vincent and the Grenadines) where, despite a population of only around 5,000, the deaf population was sufficiently large that a small deaf school was established in 1982. A former principal of the school estimated that there were around 10 deaf people in Bequia in 2015 (Jacobs p.c.).

2.3 Causes and connections

The large number of communities with high incidences of deafness can be explained in terms of the particular history and geography of the Caribbean. Islands tended to isolate populations, especially before the era of widespread air travel, resulting in small gene pools and high levels of endogamy. In such circumstances, genes for deafness can spread quickly throughout the population (see, for example, Bonaïti et al. (1986) on Saint-Barthélemy).

In some of these cases, the presence of genetically inherited deafness is a result of founder effects, that is, genes for deafness were present in a small population of settlers from which the majority of the population was descended. Bonaiti et al. (1986) show that this is very likely to have been the case in Saint-Barthélemy.

While isolation was certainly one reason for the large numbers of deaf people in parts of the Caribbean, connectedness is also important, and some of these deaf populations may be related to each other. Holm (1989: 481) states that eighty

percent of the population of the Bay Islands is descended from people who came from the Cayman Islands beginning in the first third of the 19th century. Usher Syndrome is present in both populations. Indeed, the family in which Usher Syndrome is found in the Bay Islands trace their ancestry to the Cayman Islands.

Caymanians also settled in Providence Island and the Corn Islands during the nineteenth century (Wilson and Buettner-Janusch 1961). It therefore seems quite possible that genes for (non-syndromic) deafness in Providence also came from the Cayman Islands. Several families in Providence have relatives in the Corn Islands, and Kegl (p.c.) indicates that the deaf people in the Corn Islands are aware of deaf people living in Providence. Given the long history of movement between Jamaica, Grand Cayman, Providence and the Corn Islands, it is possible that there are family connections between deaf people in all these places. Woodward (1991: 344) raises the possibility that "indigenous sign languages from the Caribbean" may have been brought to Limon in Costa Rica.

Social factors have also played an important role in the prevalence of deafness in these communities. Genetic deafness appears to have been particularly high in places in which there were significant numbers of white settlers, who often deliberately avoided interracial partnerships, resulting in high levels of consanguinity in white communities, and encouraging the spread of genetic deafness. Doran's (1952) account of demographics in the Cayman Islands notes that the areas in which there were the highest incidences of deafness were also "the areas with highest proportion of whites in the islands." Evans (p.c.) indicates that all of the "white" villages in Roatan were known to have had deaf people living in them, but that the deafness was not found among the Garifuna communities on the island. Dolman (1985: 15) notes that the community in St Elizabeth, Jamaica is "predominantly light-skinned", and that many deaf people trace their ancestry to German settlers. Saint-Barthélemy, with its exceptionally high incidence of deafness, also had a large isolated white population with very high levels of endogamy (Benoist 1964).

In most of these cases, the circumstances which led to high incidences of deafness were somewhat specific to particular times. Genetic counseling aimed at reducing the incidence of deafness (Providence), the influx of large numbers of immigrants over recent years (Grand Cayman, Saint-Barthélemy), and perhaps shifts in the social attitudes which lead to high levels of endogamy among white populations, have meant that historically high deaf populations will soon be significantly reduced. In some places, like the Cayman Islands, where a massive increase in the population due to immigration has taken place over recent decades, this has already happened.

3 Micro-community sign languages

3.1 Overview of Caribbean micro-community sign languages

Of the cases described in the previous section, there has been no attempt to investigate whether the deaf populations in Saint-Barthélemy or Margarita have developed their own signed languages. In the Corn Islands, Kegl (p.c.) reports that Nicaraguan Sign Language (ISN) was introduced in the 1990s, via a deaf school in Bluefields, on the mainland. It is not clear whether any indigenous sign language had already emerged by this time. In Bequia, ASL and Signing Exact English were used in the school opened in 1982, though there has been no research into the signing of deaf Bequians. In all of the other cases, new sign languages have emerged. This section provides a very brief overview of these languages.

3.1.1 Providence Sign Language

The best described rural Caribbean sign language is Providence Sign Language (Washabaugh 1979; Washabaugh 1981b; Washabaugh, Woodward and DeSantis 1978; Washabaugh 1980a; Washabaugh 1980b; Washabaugh 1986; Woodward 1979; Woodward 1987; Woodward 1982). Washabaugh (1979) found that Providence Sign Language was used by deaf and hearing signers from around the island. The next generation of deaf people born after Washabaugh completed his research were also the first to receive special education, at a school established in 1999. Colombian Sign Language was used by the special education teacher at the school, rather than Providence Sign Language. Despite this, these younger signers have generally continued to use Providence Sign Language. As described in the previous research, recent fieldtrips found that there were many hearing signers, though it was notable that in several cases, the families of the younger deaf people did not sign. It might be that this is linked to the introduction of special education, though it might also be a continuation of a trend observed by Washabaugh (1986: 138), where deaf people in certain parts of the island were discouraged from signing, while those in other parts were not.

3.1.2 Old Caymanian Sign Language

Washabaugh (1981b) also described an indigenous way of signing used in Grand Cayman. Even at the time he was writing, Washabaugh said that the language,

which he called Old Caymanian Sign Language (OCSL), had been replaced among younger deaf people by either ASL or a variety of Jamaican Sign Language. An unusual feature of OCSL was a fingerspelling system, quite distinct from either the American or British systems, which Washabaugh suggests is indigenous.[3] On a recent research trip, I met a number of signers who remembered the old alphabet and some other old signs, which they recalled learning from older signers who were no longer alive. There were still older deaf people whose name signs were based on the old alphabet, though the majority had name signs based on the ASL system. Some signers also used place names based on the old system, including WEST_BAY, based on the OCSL letter W (Figure 3).[4] Beyond that, it was clear that the majority of signers used ASL. Several had attended school in the US, and one was currently enrolled at Gallaudet University.

-W-

Figure 3: OCSL -W-.

3.1.3 Jamaican Country Sign / Konchri Sain

Dolman (1985, 1986) first described the indigenous sign language used in Top Hill and Junction in St Elizabeth Parish Jamaica, known as Jamaican Country Sign.[5] Recently, there have been efforts to document this language further (see Adone, Bauer, Cumberbatch, and Maypilama 2012; Cumberbatch 2015b; Gayle 2016), in

3 The Caymanian system bears a remarkable similarity to the Turkish Sign Language (TID) manual alphabet. I have no explanation of why this should be.

4 In contrast to Washabaugh (1981a: 129), only the W initial was used, rather than both W and B.

5 Recently several linguists have referred to the language as 'Konchri Sain', using the orthography for the most widely used spoken language of Jamaica, Jamaican Creole. I have chosen to use the English orthography here on the advice of Jamaican deaf community members who prefer this, and objected to the alternative orthography.

the face of the imminent danger of language loss, as a result of increased contact with ASL, JSL and the wider Jamaican deaf community (Cumberbatch 2012; Zeshan 2007). Gayle (2016) provides a detailed description of some aspects of the morphology and syntax of Country Sign.

3.1.4 Kajana Signs

van den Bogaerde (2005) identified a sign language in a Saramaccan community in Suriname used by deaf people and some of their hearing family members and neighbours. There have been further efforts to begin documenting this language, and some investigation of its stage of development (Cokart 2010; van den Bogaerde 2006).

3.1.5 South Rupununi Sign Language

Based on two visits in 2015, Braithwaite, Kwok, and Omardeen (2016) provide an initial description of a sign language used by deaf and hearing people across a number of Wapishana villages in the South Rupununi region of Guyana. The region is quite large, covering over 2,000 square kilometres. The villages in which deaf people live are spread across the region, from Sand Creek in the north, down to Aishalton in the south. Several deaf people also lived in the main town in the region, Lethem.

We met hearing and deaf signers, and observed deaf villagers participating in communal activities, such as peanut harvesting, during which they communicated easily with hearing friends, family members and neighbours. Despite the large area, we found that there seemed to be a shared sign language. Lexical elicitation showed that the same signs were used for various concepts by signers from different families living across the region, although there was also some variation. Moreover, several deaf people from different villages in the region knew each other, and had had somewhat regular contact, suggesting that similarities may be a result of more than just coincidences deriving from shared iconicity. Figure 5 shows the signs FISH and IGUANA, which were used by unrelated signers living in different villages.

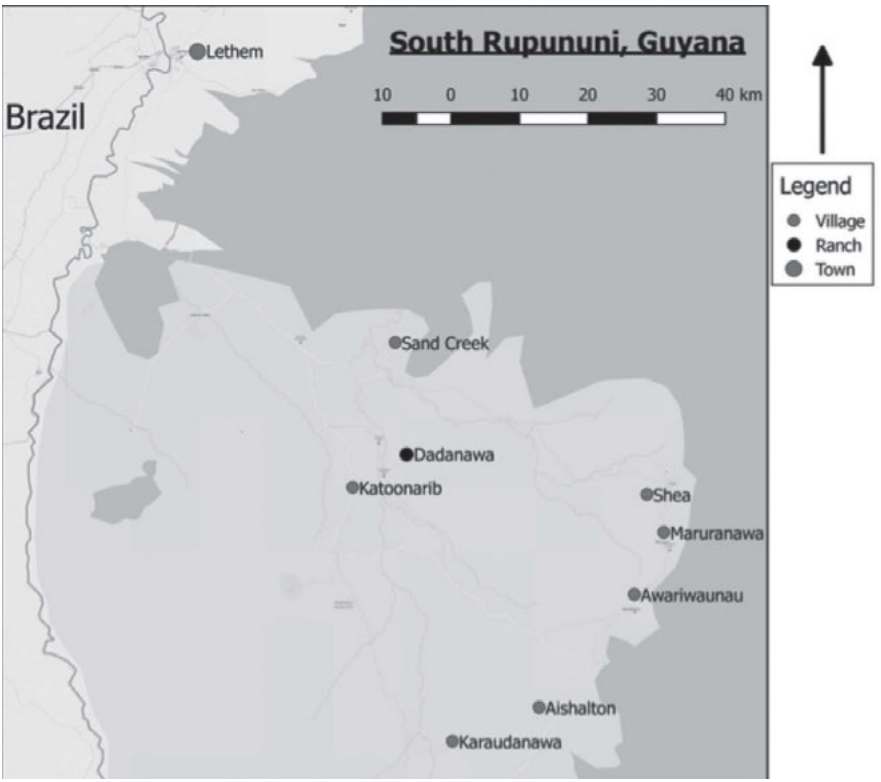


Figure 4: Map of South Rupununi.

IGUANA FISH

Figure 5: Signs used across different villages in South Rupununi.

3.1.6 Bay Islands Sign Language

Fieldwork in August 2016 identified an indigenous sign language being used in the Bay Islands, Honduras in the village of French Harbour in Roatán, and in the neighbouring island of Guanaja. I shall refer to that language here as Bay Islands Sign Language (BISL). The language was used by deaf and deaf-blind people, their family members and friends. Because most of the deaf people who use this language have Usher Syndrome, a tactile variety of the language was used in conversations involving deaf-blind people. One deaf member of the family from French Harbour married a deaf man in Guanaja, where they both live. As the only producer of honey on the island, the man is very well known, and regularly makes the rounds selling honey and other produce to hearing people around Guanaja. The hearing people we observed as we accompanied him on his rounds communicated with him in sign. Recent research indicates that the language used in French Harbour is very close to the one used by some signers in Guanaja. Figure 6 shows the same sign, a namesign, being produced by the same signer in the visual and tactile modalities.

Tactile (BISL) Visual (BISL)

Figure 6: Tactile and visual variants in Bay Islands Sign Language.

Honduran Sign Language (LESHO) was also in use in parts of both islands, and several of the deaf signers in French Harbour and Guanaja appeared to have at least some knowledge of LESHO.

3.2 Comparisons

The sign languages described above have emerged in a variety of different types of community and across various geographical settings. Jamaican Country Sign was used in a village community, Providence Sign Language across a single island,

Bay Islands Sign Language is used across two islands, and South Rupununi Sign Language is used across a region containing many villages. It may even be the case that some of these languages are related to each other. As described in section 2, there is some evidence that the deaf populations of the Cayman Islands are related to those in Providence Island, the Corn Islands, the Bay Islands and possibly also parts of Jamaica.

It is not known whether the sign languages of the Cayman Islands, the Bay Islands, Providence, and Jamaica's Country Sign are historically related. I do not know of any recent contact between deaf people in these places. Washabaugh (1981b: 124–126) observed some lexical similarities between OCSL and PSL, and raised the possibility that this may have been due to both borrowings and cultural similarities. Of the list of apparent cognates that Washabaugh gives, very similar signs are also found in Jamaican Country Sign (Gayle p.c.). For instance, in all three languages, as well as in BISL, the sign meaning 'dead' involves closing the eyes, and casting back the head. These signs could be interpreted as cognates. Given the well known problems with using lexical comparisons to determine historic relationships between signed languages (Woodward 2010), we must be very cautious about jumping to such conclusions. It is conceivable that a sign language emerged in the Cayman Islands, and was then brought to the Bay Islands and Providence by the same migrants who brought the genes for deafness, and that the sign languages in these places are therefore historically related. It is of course also quite possible that these similarities are a result of iconicity, shared culture, including common gestural practices, or are otherwise coincidental. In any case, it would be interesting to see comparative studies of these languages which have emerged in places which share much, culturally, historically, linguistically and demographically. It is also important to document the gestural practices of the wider communities across the region, since these are bound to have had a major influence on the emergence of micro-community sign languages.

The places in which these languages have emerged also differ in significant ways. Living in a relatively small place makes it more likely that deaf people will come into regular contact with each other. Even in Providence Island, however, with a total area of less than 20 km^2, Washabaugh found that there were limited connections between deaf people in different villages. Washabaugh (1986) also argued that attitudes of hearing people towards deaf people in Providence Island had limited the development of the language, and lead to considerable variation even within this small community. The geography of the island, with villages spread around the perimeter of Providence's mountainous centre, seems to have been a factor in limiting the development of a consistent shared sign language in Providence. When Washabaugh was writing, the establishment of a high school, and even the cutting of the road which connects villages, were relatively recent

developments. We might expect that greater connectivity between villages might lead to a reduction in linguistic variation. Whether that has in fact happened must be left for future investigation. A simple lexical elicitation task carried out in 2015 indicated that many signs were consistent across the island. For example, Figure 7 shows the sign for 'fish' which was used by both hearing and deaf signers around the island, and the Colombian Sign Language (LSCol) form, with which younger signers were familiar. Only the youngest deaf signer was not familiar with the PSL form, which he had apparently never seen before.

FISH (PSL)

FISH (LSCol)

Figure 7: PSL and LSCol signs in Providence.

It is perhaps surprising to find that a shared sign language has emerged in South Rupununi, a region spanning hundreds of square miles. Several factors appear to have made this possible. Some of the deaf people we met were itinerant workers, who travelled across the region, and therefore came into fairly regular contact with other deaf people living in different villages. In the centre of the region is the Dadanawa Ranch, one of the largest cattle ranches in the world, and a major local employer. Several deaf people from across the region had been employed at Dadanawa, which seems to have served as an incubator for the emerging language. Finally, although the region covers a large area, there is a strong shared culture across the predominantly Wapishana villages. There are regular regional meetings, for cultural, administrative, sporting and other activities. Deaf people of the region seem to play a full part in such meetings, and this seems to have helped to spread shared ways of signing beyond individual village communities.

It is often assumed that, for a sign language to emerge from homesigning systems, there must be a 'critical mass' of deaf people (Senghas 2005, Gialuisi et al 2013). The situation in Guanaja is interesting in this regard. BISL in Roatan is used primarily by friends and relatives of deaf and deaf-blind signers. In Guanaja,

visual communication seems to be significantly more widespread. The reason for this seems not to be a large number of deaf signers in Guanaja. Instead, because one deaf individual owns a substantial amount of land, and is the only supplier of honey on the island, communication between deaf and hearing people is very common. It would be interesting to investigate further the nature of conversations between deaf and hearing people, and the extent to which the signing of hearing people shows evidence of structural complexity.[6]

A comparison might be made with the circumstances of Country Sign. Dolman (1985: 15) observes that the shop serving the community of Top Hill was run by a deaf family, and that hearing people who used the shop "know country sign language in a rudimentary way." A high ratio of deaf to hearing people in a community may make it more likely that the hearing people will come into contact with deaf people regularly enough that signing becomes common, but even with a fairly small ratio, the social position of deaf individuals within the community may have a similar effect.

The communities in the Bay Islands also provide an opportunity to study the emergence of language in the tactile modality. Since loss of vision takes place later in life, tactile signing only becomes the primary modality for an individual in adulthood. This does not necessarily mean that tactile signing is never acquired natively. Usher Syndrome seems to have been present in the French Harbour community for over 100 years, and therefore there have been deaf-blind tactile signers for a significant period of time. There are currently younger people who began tactile signing with older deaf-blind family members from a young age. Because of the presence of the indigenous tactile sign language, deaf-blind people in French Harbour may be quite independent. One deaf-blind man in the community worked full time, communicating with colleagues using tactile sign. It would be interesting to further investigate the extent to which other members of the community are able to use tactile signing. In addition to the tactile signing used in the Bay Islands, there are tactile signers in Grand Cayman, where Usher Syndrome is also found. Given the prevalence of Usher Syndrome in Margarita (see section 2), it is possible that a tactile language may also have emerged there.

It seems very likely that there are more micro-community sign languages in the region than we know about at present. In 1978, Bernard Tervoort mentioned having seen what he believed to be an indigenous sign language in an unnamed remote Amerindian village in Suriname, but he did not have the opportunity to

6 As the editors have pointed out to me, and as has become increasingly clear from my own ongoing work in the Bay Islands, the presence of fairly effective visual communication between deaf and hearing people does not necessarily mean the use of a shared sign language.

investigate, and no further information has ever been gathered (Tervoort 1978). The incidence of deafness in Saint-Barthélemy and Margarita make the existence of indigenous sign languages in those places a realistic possibility. As it is, what has emerged is a picture of tremendous, and largely undocumented linguistic diversity. In some cases, as in Grand Cayman, it may be too late to witness the indigenous language in regular use. Even here though, there are deaf signers who recall the older ways of signing, and as Nonaka (2007) has pointed out in relation to Ban Khor, there may be hearing signers who recall the older ways of signing, after deaf signers have switched to a different sign language from outside the community. The high concentration of deaf people in Little Cayman may be long past, but even here, it might be possible that there are older hearing people alive in who recall a time when there were deaf islanders, just as Groce (1985) described in Martha's Vineyard.

4 Institutional sign languages

4.1 The history of deaf education in the Caribbean

The Caribbean was the birthplace of two very influential early writers on deaf education, William Thornton, who published an early treatise on deaf education in 1793 (Bell 1917) and Roch-Ambroise Bébian, born in Guadeloupe in 1789. In the last years of his life, Bébian ran a deaf school in Guadeloupe, until his death in 1839 (Irvine 2016). The first school for the deaf in Cuba was founded in 1819, though it was later closed because of a lack of teachers (Echevarría and Rodríguez 2009). Deaf education did not spread across most of the Caribbean until the 20th Century. The earliest schools were often established in the north of the region by missionaries from the United States. Catholic nuns established a Deaf school in Aguadilla, Puerto Rico in 1903 (Fraticelli 1994). Around the same time, a class for deaf children was set up in a public school in Havana, Cuba, and, in 1909, another school was established by American Southern Baptist missionaries.

The next wave of new schools came around the 1940s. St Vincent's School for Handicapped Children was established in Haiti in 1945, again by American missionaries (Parks 2011), and the first deaf school was established in Paramaribo, Suriname in 1946 (Kusters 2006). Meanwhile, Rev. Frederick Gilby, an Anglican priest, CODA (Adult Child Of Deaf Adults), and native signer of BSL, traveled from England to help establish the first deaf school in Jamaica in 1939, and then in Trinidad in 1943 (Braithwaite et al. 2011). He also visited Barbados and Guyana around this time, though deaf schools were not established in those places

until the 1960s. A major rubella outbreak across the region in 1960/1 lead to a significant boom in deaf babies, and, consequently also new deaf schools in the Dominican Republic, Dominica and Aruba (Parks and Williams 2011).

Language policies in Caribbean deaf schools changed over the course of the twentieth century, generally reflecting international trends. Many of the earliest schools, in Puerto Rico and Cuba, employed American Sign Language. Indeed, the first American missionary in Cuba was a deaf ASL signer. Although Gilby was a native BSL signer, and there is evidence that he did some teaching at first while full-time teachers were being found, the schools he established in Jamaica and Trinidad quickly adopted the oralist practices common in England at the time (Lamb 2016).

Oralism was common in the deaf schools across the region until the 1970s, when it started to fall out of fashion. Frances Parsons, an influential proponent of Total Communication, based at Gallaudet University, was invited to Trinidad and Tobago and the Bahamas where she helped to introduce ASL, Signing Exact English and Total Communication, an approach which became popular across much of the English-official Caribbean. Parsons also helped to encourage deaf Peace Corps volunteers from America, who came to teach in new schools across the region including Barbados, St Lucia, Grenada and Guyana. Deaf schools in French colonies have generally adopted LSF, while the Sign Language of the Netherlands (NGT) is used in Dutch territories, and in Suriname, which gained independence in 1975. Despite colonial connections with the United Kingdom, British Sign Language does not seem to have been widely used in the Caribbean, partly because most of the former British colonies had already achieved independence by the time the first deaf schools were established.

More recently, there has been a move towards the recognition of local sign languages in deaf schools. The Jamaican Association of the Deaf adopted a bilingual education policy in its schools in 2000, in which JSL was acknowledged as the official language of instruction (Soutar 2012), and Cuban Sign Language was made the official language of deaf education in 1994 (Echevarría and Rodríguez 2009).

At the same time, successful rubella vaccination programmes have significantly reduced the number of deaf children across the region. Several deaf schools have closed, while others have started to admit children with various special needs. Mainstreaming has become more widespread, and access to assistive devices including hearing aids and cochlear implants has increased. These changes are likely to have had a very significant impact on language transmission and development, though again, much more research is needed.

4.2 Emerging institutional sign languages

Several sign languages have emerged out of deaf schools across the region, though language situations tend to be rather complex, and have been the source of some debate. When a sign language of foreign origin has been very influential in a country, as has happened at one point or other in almost every part of the region, it may not be immediately obvious whether an emerging national language should be viewed as a variety of the international language, or as an independent language. For example, Hochgesang and Mcauliff (2016) discuss whether Haitian Sign Language (LSH) is distinct from ASL, and report that this is a question of considerable interest within the Haitian deaf community. Again, they conclude that it is, based on both initial linguistic comparisons, and, more importantly, the views of the deaf community, though in this case no systematic lexical comparison has yet been conducted. Similar questions have been raised concerning the relationship between ASL and PRSL in Puerto Rico (Williams and Parks 2012), and ASL and DRSL in the Dominican Republic (Williams and Parks 2006). Further historical research, and especially work with older signers, and close linguistic comparisons, could help to clarify such issues.

The roots of what is now called Jamaican Sign Language are similarly unclear. Cumberbatch (2012a: 12) claims that JSL developed from ASL, and that "[i]t can be argued that JSL is simply a dialect of ASL", though "[i]t appears that JSL is beginning to evolve away from its language of origin and become a language in its own right." A similar picture is presented by Dockery (2013: 21–22), who states that "JSL has its genesis in the post-1990s era after the American Christian groups who established American Sign Language (ASL) within the Jamaican deaf community during the post-independence period left the country." Sign language in Jamaica certainly has a much longer history than this. In an essay written in 1948, the first Jamaican teacher of the deaf, Florette Case, quotes a letter from the headmistress of the first deaf school in Jamaica, complaining that, despite the efforts to impose oralism, the older children "have evolved such a system of signing that teaching lip-reading is a hopeless task" (Case 1948: 39). This system clearly preceded the arrival of ASL, which was first brought by American missionaries in 1957. Several members of the deaf community in Jamaica claim that there was a community of deaf people living in Kingston prior to the establishment of the first school, and that they had an indigenous sign language. Older signers remember older ways of signing which are clearly distinct from ASL. Some signs can be traced back to BSL, presumably reflecting Gilby's influence, while others are distinct from both ASL and BSL. Without further research, it is difficult to say whether a language emerged from the first schools and whether a language (apart from JCS) had already emerged

prior to the establishment of deaf education. It is also difficult to determine the extent to which there is continuity between older signing systems, and what is referred to as JSL today. The origins of LSH are similarly unclear. Hochgesang and Mcauliff (2016: 231) say that LSH "has either been influenced by or is even derived from ASL", but add that "it is also evident that LSH is developing into a distinct system."

In Trinidad and Tobago, with a very similar history of deaf education, there are also two views of the language situation. The first resembles Cumberbatch's view of JSL: that the deaf community sign language, TTSL, is a descendent of ASL. This is reflected in the introduction of a dictionary published in 2010, which claims that "[p]rior to the introduction of sign language [=ASL], deaf persons communicated by gestures, mime, facial expressions, reading, writing, lip reading, etc." (*A Melting Pot of Signs* 2010: i). Since then, "local signs have been emerging for the names of foods, fruits, vegetables and festivals which are indigenous to our islands." This view, that TTSL is essentially ASL with some additional local vocabulary, is not uncommon, particularly among hearing people involved in the deaf community. It is contradicted by a second view, that, while ASL has had considerable influence on signing in Trinidad and Tobago, an indigenous language emerged from the first deaf school years before ASL was introduced in 1975. Interviews with deaf people who went to school prior to the introduction of ASL in 1975 make it clear that the second view is correct (Lamb 2016; Braithwaite 2015). For example, one older deaf Trinidadian remembered what it was like in the 1960s: "At my school, Cascade School, we didn't use American Sign Language, we only used Trinidadian Sign Language. It was completely different." Braithwaite (2018) provides a more detailed description of the history of sign language in Trinidad and Tobago, and the effects of various kinds of language contact.

The presence of a sign language introduced from outside the country, often with greater prestige than local ways of signing, can also complicate matters for researchers. Gerner de Garcia (1994: 112) makes the following observations about attempts to document indigenous signs in the Dominican Republic:

> "Researchers generally find indigenous signs difficult to collect, largely because users of these signs have been taught to regard their signs as of lower status ...[than ASL signs]. ... Deaf communities also tend to try to maintain their ethnic boundaries. One missionary couple – a hearing American woman and her deaf Bolivian husband – collected only a few dozen signs in two years of constant interactions with the Dominican deaf community."

It will take a careful approach to methodological concerns, and close attention to how researchers can engage collaboratively and ethically with communities,

to shed light on the questions raised in this section. Braithwaite (2018) discusses some of these issues, as do Hochgesang and Mcauliff (2016).

4.3 Contact and emergence

Brentari and Coppola (2013) describe the following trajectory for the emergence of sign languages, based on the findings of Senghas, Senghas, and Pyers (2005):

(1) homesigns → initial contact variety → sustained contact variety → mature sign language

Homesigners come into contact with each other either as a result of a high incidence of deafness in the community in which they live, or through the establishment of a school or other similar institution. This leads to what they call "initial contact varieties." Over the course of subsequent cohorts / generations, these become "sustained contact varieties", and eventually "mature sign languages."

Some cases of language emergence in the Caribbean seem to diverge in certain respects from this model. The ingredients which went into the initial contact variety have sometimes included not only homesigns, but also fragments of other sign languages. For example, British Sign Language was used intermittently for a short period after the opening of the first deaf schools in Jamaica and Trinidad, and its influence can be seen in the signing of older signers (Braithwaite 2018; Lamb 2016). To complicate things further, the ASL manual alphabet was also used in the first deaf school in Trinidad, years before ASL was introduced. Interestingly, it was only the manual alphabet, taken from books, which was used during this key period of language emergence. Therefore, despite this outside influence, ASL was not the first language of any of the individuals who contributed to creating the new language. Once consequence of this was the development of indigenous lexicalized fingerspellings, including the TTSL sign #BOY (see Figure 8a)

Other kinds of language contact may also have lead to the emergence of new languages and language varieties. In Trinidad and Tobago, the language which emerged over the course of the first three decades of deaf education was then brought into contact with ASL. This has resulted in the emergence of mixed forms, combining phonological features of the TTSL sign with features of its ASL equivalent. Figure 8 provides an example.

Whether these forms indicate the emergence of a new contact language of some sort is not yet clear. Similar examples have lead researchers at the University of Hawai'i to suggest that contact between Hawai'i Sign Language and ASL has lead to a distinct language, Creolized Hawai'i Sign Language (Clark et al. 2015).

If it is true that new languages have emerged from existing sign languages, it would be interesting to investigate what social and linguistic forces are involved in this process. There has also been regular language contact across the English-official Caribbean, as a result of regional camps for deaf children. It easy to imagine this leading to the emergence of a koiné (Siegel 1985), which may help to account for Cumberbatch's (2015a) claim that "the sign languages used in the Anglophone Caribbean are mutually intelligible."[7] My impression is that things are more complicated than this, with multiple languages and language varieties and varying degrees of mutual intelligibility.

The development of deaf education in the Caribbean provides a variety of case studies. We can compare the outcomes a range of factors such as different educational policies, types of schools, the influence of imported sign languages and the presence of otherwise of native signer teachers.

a. #BOY (TTSL) b. BOY (ASL) c. BOY (blend)

Figure 8: Signs for 'boy' in Trinidad and Tobago.

5 Cross-modal contact and language emergence

This chapter has so far provided an overview of sign language emergence across a region about which there is not much previous literature. What particular contributions the study of Caribbean emerging sign languages might make to our understanding of language emergence generally will only become clear as these languages receive greater attention. Nonetheless, this section provides some initial observations, focusing on the role of language contact in the emergence of Caribbean sign languages.

7 Though this could also be a result of the common influence of ASL and Signing Exact English.

It is quite common to read that a particular sign language emerged *ex nihilo*. For instance, Meir and Sandler have described Al-Sayyid Bedouin Sign Language (ABSL) as "Language out of nothing[…]developing without a language model" (Meir and Sandler 2008: 292). Kisch (2012) points out that many ABSL signers are hearing people who also use at least one spoken language, and that "[i]n this respect, no shared sign languages can be considered to develop without exposure to a language model" (Kisch 2012: 88). The influence of spoken languages on signed language development in shared signing communities seems to vary significantly from case to case. For instance, de Vos (2011) reports very little apparent influence from surrounding spoken languages on Kata Kolok, despite the presence of many hearing signers. Spoken and written languages have also played a very prominent role in many of the schools out of which new signed languages have emerged. The Caribbean provides evidence of a variety of ways in which spoken and written languages may influence the emergence of signed languages, including those which have emerged within school contexts, and those which have emerged in shared signing communities. Things can get quite complex in the Caribbean, where it is common for the language of education to differ from the first spoken language of most people.

There are examples of similar language contact situations across the region. One of the common threads linking many of the sign languages mentioned in this chapter is contact with a variety of Caribbean English Creole (CEC). At the same time, many of the environments in which sign languages have emerged in the Caribbean are linguistically complex. Creole languages are used alongside standard varieties of English, French, Spanish and Dutch in various parts of the Caribbean. In the extremely complex linguistic ecologies of Guyana and Suriname, the languages of various First Peoples are also used, as well as several other immigrant languages.

The influence of CEC can be seen in various ways in different sign languages. In JSL, for example, Cumberbatch (2015) reports that the Jamaican Creole quantifier 'nuff' seems to have been incorporated into JSL as a mouthing. It would be interesting to compare the influence of Jamaican Creole on JSL with its influence on Jamaican Country Sign. Do the differences between the circumstances in which each language has emerged influenced the way in which elements of different spoken and written languages have affected their development? Most obviously, JSL, via the ASL manual alphabet, has incorporated forms from written English, in a way that JCS has not.

Braithwaite (2018) provides an account of the ways in which various types of language contact have influenced the emergence of Trinidad and Tobago Sign Language. TTSL makes quite extensive use of lexicalized fingerspelling, including some based on distinctively Creole words such as #VEX (meaning 'angry').

#VEX (TTSL)

Figure 9: Lexicalized fingerspelling in TTSL.

Creole influence can be seen in a different way in the form of the sign in Figure 9, which is used to refer to Port of Spain. The pronunciation of the Creole cognate of English 'town' (commonly used by hearing people to refer to Port of Spain) makes it a near homophone with 'tongue', from which is derived the initial point in this sign.

TONG (TTSL)

Figure 10: Creole influence in TTSL.

Spoken and written languages may form part of the everyday communicative repertoire of signers in other ways. In the Bay Islands, a deaf-blind tactile signer made use of writing with his index finger on the forearm of interlocutors. Writing included both English / English Creole words, and Spanish words.

Figure 11: Forearm writing, Bay Islands.

In South Rupununi, tracing the shape of letters on one's own palm and forearm, as well as on nearby surfaces (a table, the ground) appeared to be a fairly common communicative strategy among deaf signers. Initial observations suggest that the palm writing was used for single letters, often being used to clarify the identity of places and individuals, while writing on the forearm was used for words. Figure 12 shows an example of palm writing, in this instance, the initial of a person, followed by a point in the direction in which that person lived.

Figure 12: Palm writing, South Rupununi.

It appeared that deaf signers in South Rupununi sometimes used this kind of writing to represent written English, but that mouthings seemed to correspond to Wapishana, which is widely spoken in most villages.

Across the region, spoken language situations in these communities multilingualism is quite common. In the Bay Islands, Providence and San Andres, and the Corn Islands, CEC is spoken alongside Spanish. Hooker O'Neill De Carreño (2016) investigated the spoken language use of hearing parents of deaf children in San Andres and Providence. She found that CEC speaking parents, who would normally use CEC with family members, tended to switch to speaking Spanish to their deaf children. This seemed to be a result of the fact that Spanish (through

writing and lipreading), and not CEC, is used in deaf schools, and was therefore more familiar to their children.

It seems that there may be a similar situation in Haiti, where Hochgesang and Mcauliff (2016) note that French, but not Haitian Creole, is taught at deaf schools. They observe that "Without skills in Haitian Creole, another wedge is driven between hearing and Deaf Haitians" (Hochgesang and Mcauliff 2016: 245). If this is correct, we would expect French to have had a more significant impact than Haitian Creole on the development of Haitian Sign Language, despite the fact that Haitian Creole is the mother tongue of the overwhelming majority of Haitians. The fact that deaf Haitians reportedly refer to their language using the French-derived abbreviation LSH may be an example of this.[8]

In addition to influences from spoken and written languages, gestural repertoires provide a very important potential source for emerging sign languages. Nyst (2016) compared the gestures used by speakers of Dutch in the Netherlands, and Anyi speakers from the Ivory Coast. She found that Anyi speakers in the Ivory Coast used body parts to indicate size and shape in a way that Dutch speakers did not. She argues that similarities between this kind of gestural system and the "measure stick signs" found in Adamarobe Sign Language, suggest a gestural substrate for such signs. This is particularly interesting from a Caribbean perspective, since we know that some gestures were brought from West Africa to the Caribbean during the period of the trans-Atlantic slave trade. Rickford and Rickford (1976) show how two related gestures, 'cut-eye' and 'kiss-teeth' are found in communities across the Caribbean, from Saramaccan communities in Suriname in the south, up through Jamaica to the north, and that they are also familiar to African Americans in the United States. They argue that these gestures are very likely to be survivals from West African cultures, brought to the region by enslaved people, and maintained ever since. Although I know of no previous research in the Caribbean, it is clear from my own observations that there are similarities between some of the Anyi size and shape gestures, and those used in parts of the Caribbean. It seems quite plausible that such Caribbean gestures may also be West Africa survivals. We might therefore expect to find similarities in sign languages not just across the Caribbean, but even connecting Caribbean and West African sign languages as a result of related gestural cultures. Investigating such possibilities will require the careful documentation of gestural systems and sign languages across a huge area.

In one of the few studies of gesture in a Caribbean context, Sidnell (2005) describes the use of co-speech gestures in interactions in Bequia. In particular,

8 The Haitian Creole for 'Haiti' is 'Ayiti'.

he looks at ways in which gestures are used in situations where speakers are attempting to establish the identity of non-present persons being talked about. As in much of the Caribbean, the fact that individuals may go by multiple different names, makes it quite possible that the addressee may know someone by a name other than the one used by the speaker. Sidnell found that gestures played an important role in resolving such situations, with all participants making use of gestures associated with physical characteristics of the non-present person. He found that participants used a range of different gestures to refer to the same person, and argued (Sidnell 2005: 85) that this was a crucial part of the interaction: "Thus rather than produce 'the same' gesture, recipients produced recognizably different shapes and in doing so suggest at least some independent knowledge of the person being discussed."

Sidnell's account provides an interesting perspective on Washabaugh's (1980, 1986) descriptions of naming in Providence Island Sign Language. Washabaugh (1980) observes that signers do not consistently use the same sign when referring to a particular individual, and that "on a number of occasions when signers from distant parts of the island were gathered for a convention, they employed the strategy of identifying a person by a series of name signs" (Washabaugh 1980: 86). He also notes (Washabaugh 1980: 86) that some of these signs refer to characteristics which can and are associated with several different people. In these respects, the behaviour of deaf signers in Providence resembles the gestures described by hearing people in Bequia. For Washabaugh (1986: 145), these patterns indicated that deaf signers in Providence "make no use of names, in the strict sense." This conclusion informs Washabaugh's (1986: 146) assessment that PSL is not "a fully functional systematic language." In my own contact with deaf people in Providence it is clear that they are quite familiar with their own (written) names, and make use of them (for example on social media). It would not be surprising if the system for referring to people in PSL more closely resembles the gestural behaviours found in Caribbean cultures, than the naming practices in Western sign languages. More research needs to be done to determine whether, as in Nyst's comparison of Anyi gestures and Adamarobe Sign Language, gestural systems in the Caribbean have undergone recognizable processes of lexicalization and grammaticalization when they become part of new sign languages.

6 Conclusions

Rather than analyzing a single emerging sign language, this chapter has given an overview of sign language emergence across a huge region. The chapter has

identified a variety of signed languages and deaf populations stretching from Cuba in the northwest, down to the savannahs of southern Guyana and the rainforests of Suriname in the Southeast, a distance of over 3,000 miles. The emerging sign languages of the region exhibit tremendous diversity. There are micro- and macro-community languages, languages which are only just beginning to emerge, as well as those with histories stretching back over 150 years. At least one of these languages has a tactile variety, and the prevalence of Usher Syndrome in other isolated communities raises the possibility of more.

At the same time, there are many connections running through the region. The deaf schools of the region share influences from abroad, including imported teaching approaches and languages, especially ASL. Often the same individuals have been influential in different parts of the region, like Rev. Gilby, in Trinidad and Jamaica, or Frances Parsons, who not only visited Trinidad, Tobago and the Bahamas, but helped to make it possible for deaf Peace Corps volunteers to teach in newly established schools in many other places. We have seen that some of the more isolated deaf populations may be related to each other, despite being scattered over large distances, and spanning several international boundaries. Often the languages have emerged alongside the same or closely related spoken languages: English Creoles are spoken in Jamaica, Trinidad and Tobago, the Cayman Islands, South Rupununi, Providence, the Bay Islands, and Suriname (and elsewhere). Even with its diversity, the region shares a Caribbean culture which has grown out of its complex interconnected histories.

This combination -- so many different languages and communities, yet with so much that connects them -- makes the region an ideal place to engage in the kind of comparative research which Nyst (2012) suggests can provide new insights into the ways in which different factors influence language emergence. In many cases, the first deaf schools were established relatively recently, often around the middle of the twentieth century. This means that it is likely that there are still people alive who formed part of the first cohort of deaf school children, allowing us to track the development of these languages by comparing successive cohorts. As we continue to provide initial descriptions of the various emerging sign languages of the region, we can begin to investigate whether and how factors such as geography, population size, and ratio of deaf and hearing signers, have structural effects on language development (Senghas 2005).

As well as looking at the cases in which new sign languages have emerged from deaf schools, it is interesting also to consider those cases when no new sign language has emerged, and ask what ingredients were missing. The use of oralism, for example, may make the emergence of a new signed language more likely, as children are forced to improvise. When the first school uses an imported

sign language, and especially when children are provided with fluent signing models, we might not expect a new sign language to emerge.

This survey has prioritized breadth over depth, partly because of restrictions of length, but also because almost nothing is known about several of these languages. Not only is there a huge amount to be done, but there is very little time in which to do it. Genetic counseling and vaccination programmes have dramatically reduced the incidence of deafness across the region. International sign languages have already replaced indigenous ones. Despite the warnings from Dolman (1986) and Washabaugh (1981b) in the 1980s that the indigenous languages of Grand Cayman and St Elizabeth, Jamaica were endangered, too little has been done to document them for future generations. There may well be other Caribbean sign languages which have never been seen by linguists, and which may be gone before we have a chance to learn what they might have to teach us.

References

Adone, Dany, Anastasia Bauer, Keren Cumberbatch & Elaine L. Maypilama. 2012. Colour signs in two indigenous sign languages. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 53–86. Berlin: Walter de Gruyter-Ishara.

Bell, Marian H. Graham. 1917. Dr. William Thornton and his essay on "Teaching the Deaf, or Surd, and Consequently Dumb, to Speak," 1793: Sketch of the Life of William Thornton. *Records of the Columbia Historical Society, Washington, D.C.* 20. 225–236. Historical Society of Washington, D.C.

Benoist, Jean. 1964. Saint-Barthelemy: Physical anthropology of an isolate. *American Journal of Physical Anthropology* 22(4). 473–487.

Best, Lloyd. 1971. Independent Thought and Caribbean Freedom. In Norman Girvan & Owen Jefferson (eds.), *Readings in the Political Economy of the Caribbean*, 7–28. Mona, Jamaica: New World Group.

Bogaerde, Beppie Van den. 2006. Kajana Sign Language, Surinam. Presentation at the Workshop on Sign Languages in Village Communities. Max Planck Institute for Psycholinguistics, Nijmegen, the Netherlands, April 4–6, 2006.

Bogaerde, Beppie Van den. 2005. Everybody signs in Kosindo also? *Deaf Worlds* 21. 103–107.

Bonaïti, Catherine, Florence Demenais, Etienne Bois, Joelle Hochez & D. C. Rao. 1986. Studies on an isolated West Indies population: IV. Genetic study of hearing loss. *Genetic Epidemiology* 3(2). 113–119.

Braithwaite, Ben. 2015. Deaf perspectives on deaf education: An ethnographic study from Trinidad and Tobago. *Caribbean Educational Research Journal* 3(1). 18–26.

Braithwaite, Ben. 2018. Language contact and the history of sign language in Trinidad and Tobago. *Sign Language Studies* 19(1). 5–39.

Braithwaite, Ben, Kathy-ann Drayton & Alicia Lamb. 2011. The history of Deaf language and education in Trinidad and Tobago since 1943. *History in Action* 2(1). 12–17.

Braithwaite, Ben, Taryn Forrest-Harriot, Rian Gayle & Alicia Lamb. 2016. The history of sign language and the Deaf community in Jamaica. Paper presented at the Society for Caribbean Linguistics 21st Biennial Conference. UWI Mona, Jamaica. 1 - 6 August.

Braithwaite, Ben, Lily Kwok & Rehana Omardeen. 2016. Signing among the Wapishana of the South Rupununi. Paper presented at the University of the West Indies linguistics research day. University of the West Indies, St.Augustine, Trinidad and Tobago. 6 Nov. 2015

Brentari, Diane & Marie Coppola. 2013. What sign language creation teaches us about language. *Wiley Interdisciplinary Reviews: Cognitive Science* 4(2). 201–211.

Brothwell, Don R. 1967. The Amerindians of Guyana: A biological review. *The Eugenics Review* 59(1). 22–45.

Case, Floretta. 1948. Essay on the history of education in the British West Indies colonies. Manuscript. Manchester University.

Castillo-Solórzano, Carlos, Peter Carrasco, Gina Tambini, Susan Reef, Monica Brana & Ciro A. de Quadros. 2003. New horizons in the control of rubella and prevention of congenital rubella syndrome in the Americas. *The Journal of Infectious Diseases* 187(s1). S146–S152.

Clark, Brenda, Linda Lambrecht, Samantha Rarrick, Claire Stabile & James Woodward. 2015. Documentation of Hawai'i Sign Language: An overview of some recent major research findings. Presented at University of Hawai'i at Mānoa. Honolulu.

Cokart, Richard. 2010. *Kajana Gebarentaal, een homesign of een gabarentaal in ontwikkeling?* [Kajana Sign Language, a homesign system or a sign language in development?] Amsterdam: University of Amsterdam BA thesis.

Cumberbatch, Keren. 2012a. Sociolinguistic sketch of Konchri Sain. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 387–388. Berlin: De Gruyter Mouton-Ishara Press.

Cumberbatch, Keren. 2012b. *A linguistic description of the language of the urban Deaf in Jamaica.* University of the West Indies, St. Augustine Campus dissertation.

Cumberbatch, Keren. 2015a. Konchri Sain. In Julie Bakken Jepsen, Goedele De Clerck, Sam Lutalo-Kiingi & William B McGregor (eds.), *Sign languages of the world: A comparative handbook*, 533–566. Berlin: De Gruyter Mouton-Ishara Press.

Cumberbatch, Keren. 2015b. Jamaican Sign Language. In Julie Bakken Jepsen, Goedele De Clerck, Sam Lutalo-Kiingi & William B. McGregor (eds.), *Sign languages of the world: A comparative handbook*, 511–528. Berlin: De Gruyter Mouton-Ishara Press.

Dockery, Karla F. 2013. *The reading comprehension of Deaf/Hard-of-Hearing Jamaican students: The contributions of intellectual ability, sign-language comprehension, vocabulary knowledge, and metacognitive awareness.* Montreal: McGill University dissertation.

Dolman, David. 1985. The language of St. Elizabeth's Deaf community. *Jamaica Journal* 18(4). 10–15.

Dolman, David. 1986. Sign languages in Jamaica. *Sign Language Studies* (52). 235–242.

Doran, Edwin. 1952. Inbreeding in an isolated island community. *Journal of Heredity* (43). 263–266.

Echevarría, Yaersy Díaz & Manuel Rodríguez Rodríguez. 2009. Breve reseña histórica de la enseñanza de la lengua a las personas sordas. http://www.cultura-sorda.org/breve-resena-historica-de-la-ensenanza-de-la-lengua-a-las-personas-sordas/.

Farabee, William Curtis. 2009. *The Central Arawaks*. Cambridge: Cambridge University Press.

Fenlon, Jordan & Erin Wilkinson. 2015. Sign languages in the world. In Adam C. Schembri & Ceil Lucas (eds.), *Sociolinguistics and Deaf communities*, 5–28. Cambridge: Cambridge University Press.

Fraticelli, Yolanda Rodrigez. 1994. Events in the history of Deaf education in Puerto Rico. In Carol Erting (ed.), *The Deaf Way: Perspectives from the international conference on Deaf culture*, 208–211. Washington, D.C.: Gallaudet University Press.

Fréry, N., R. Maury-Brachet, E. Maillot, M. Deheeger, de Merona B. & Alain Boudou. 2001. Gold-mining activities and mercury contamination of native Amerindian communities in French Guiana: Key role of fish in dietary uptake. *Environmental Health Perspectives* 109(5). 449–456.

Gayle, Bertram. 2016. *Selected features of Konchri Sain morphology and syntax.* MPhil thesis. University of the West Indies, Mona Campus.

Gerner de Garcia, Barbara. 1990. The emerging deaf community in the Dominican Republic: An ethnographic study. In Ceil Lucas (ed.), *Sign Language Research: Theoretical Issues*, 259–272. Washington, D.C.: Gallaudet University Press.

Gerner de Garcia, Barbara. 1994. The Developing Deaf Community in the Dominican Republic. In Carol J. Erting (ed.), *The Deaf Way: Perspectives from the international conference on Deaf culture*, 110–113. Washington, D.C.: Gallaudet University Press.

Gialluisi Alessandro, Dan Dediu, Clyde Francks & Simon E. Fisher. 2013. Persistence and transmission of recessive deafness and sign language: New insights from village sign languages. *European Journal of Human Genetics* 21(9). 894–896.

Girvan, Norman. 2001. Reinterpreting the Caribbean. In Brian Meeks & Folke Lindahl (eds.), *New Caribbean thought: A reader*, 3–24. Kingston: UWI Press.

Groce, Nora Ellen. 1985. *Everyone here spoke sign language: Hereditary deafness in Martha's Vineyard*. Cambridge, MA: Harvard University Press.

Hinman, Alan R., Bradley S. Hersh & Ciro A. de Quadros. 1998. Rational use of rubella vaccine for prevention of congenital rubella syndrome in the Americas. *Revista panamericana de salud publica [Pan American Journal of Public Health]* 4(3). 156–160.

Hochgesang, Julie A. & Kate Mcauliff. 2016. An initial description of the Deaf community in Haiti and Haitian Sign Language (LSH). *Sign Language Studies* 16(2). 227–294.

Holm, John A. 1989. *Pidgins and Creoles: Volume 2, Reference Survey (Vol. 2)*. Cambridge: Cambridge University Press.

Hooker O'Neill De Carreño, Maureen. 2016. *El bilingüismo de los sordos: un estudio exploratorio sobre la situación lingüística del sordo en la comunidad multilingüe del archipiélago de San Andrés, Providencia y Santa Catalina.* Sede Caribe: Universidad Nacional de Colombia MA thesis.

Irvine, Paul. 2016. Roch Amboise Auguste Bebian (1789–1839). In Genie Gertz & Patrick Boudreault (eds.), *The SAGE Encyclopedia of Deaf Studies*. SAGE Publications.

Keogh, Ivan J., R. N. Godinho, T. P. Wu, A. M. D. De Palacios, N. Palacios, M. B. De Alford, M. I. De Almada, et al. 2004. Clinical and genetic linkage analysis of a large Venezuelan kindred with Usher syndrome. *International Journal of Pediatric Otorhinolaryngology* 68(8).

Kisch, Shifra. 2012. Demarcating generations of signers in the dynamic sociolinguistic landscape of a shared sign language: The case of the Al-Sayyid Bedouin. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 87–125. Berlin: Mouton De Gruyter-Ishara.

Kusters, Annelies. 2006. *Zeil je voor het eerst: Een historisch en etnografisch onderzoek naar dovencultuur in Paramaribo, Suriname.* [A historical and ethnographic study of Deaf culture in Paramaribo, Suriname]. Leuven: Katholieke Universiteit Leuven MA thesis.

Lamb, Alicia. 2016. *Trinidad and Tobago Sign Language (TTSL): Its emergence, development and transmission.* University of the West Indies, St. Augustine Campus MPhil thesis.

Lattig, M. C., N. Gelvez, S. L. Plaza, G. Tamayo, J. I. Uribe, I. Salvatierra & M. L. Tamayo. 2007. Deafness on the island of Providencia-Colombia: different etiology, different genetic counseling. *Genetic Counseling* 19(4). 403–412.

Meir, Irit & Wendy Sandler. 2008. A Language in Space: *The story of Israeli Sign Language.* New York: Erlbaum.

Meir, Irit, Wendy Sandler, Carol Padden & Mark Aronoff. 2010. Emerging sign languages. In Marc Marschark & Patricia Elizabeth Spencer (eds.), *The Oxford Handbook of Deaf Studies, Language, and Education 2*. 267–280. Oxford: Oxford University Press.

Nonaka, Angela M. 2007. *Emergence of an Indigenous sign language and a speech/sign community in Ban Khor, Thailand.* Los Angeles: University of California, Los Angeles dissertation.

Nyst, Victoria. 2012. Shared sign languages. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language. An international handbook*, 552–574. Berlin: Mouton de Gruyter.

Nyst, Victoria. 2016. The depiction of size and shape in gestures accompanying object descriptions in Anyi (Côte d'Ivoire) and in Dutch (The Netherlands). *Gesture* 15(2). 156–191.

Parks, Elizabeth. 2011. The deaf people of Haiti. SIL international electronic survey report 2011-032. (www-01.sil.org /SILESR/2011/silesr2011- 032.pdf. Accessed 2014-12-02.)

Parks, Elizabeth & Parks, Jason. 2010. Investigating sign language variation through intelligibility testing: The recorded text test retelling method. Poster presented at Theoretical Issues in Sign Language Research 2010, West Lafayette, IN. Sept. 30- Oct. 2.

Parks, Elizabeth & Williams, Holly. 2011. Sociolinguistic profiles of twenty-four deaf communities in the Americas. SIL international electronic survey report 2011-036.

Peplow, Daniel & Sarah Augustine. 2007. Community-directed risk assessment of mercury exposure from gold mining in Suriname. *Revista panamericana de salud publica [Pan American journal of public health]* 22(3). 202–210.

Rickford, John R. & Angela E. Rickford. 1976. Cut-eye and suck-teeth: African words and gestures in New World guise. *The Journal of American Folklore* 89(353). 294–309.

Roopnarine, Lomarsh. 2006. Small-scale gold mining and environmental policy challenges in Guyana: Protection or pollution. *Canadian Journal of Latin American and Caribbean Studies* 31(61). 115–143.

Senghas, Richard J., Ann Senghas & Jennie E. Pyers. 2005. The emergence of Nicaraguan Sign Language: Questions of development, acquisition, and evolution. In Sue Taylor Parker, Jonas Langer & Constance Milbrath (eds.), *Biology and knowledge revisited: From neurogenesis to psychogenesis,* 287–306. New York: Routledge.

Sidnell, Jack. 2005. Gesture in the pursuit and display of recognition: A Caribbean case study. *Semiotica* 2005(156). 55–87.

Siegel, Jeff. 1985. Koines and koineization. *Language in Society* 14(3). 357–378.

Soutar, Iris. 2012. *An evaluation of a policy implementation for a bilingual approach to literacy formation for young Deaf children.* University of the West Indies, Mona Campus dissertation.

Tervoort, Bernard. 1978. Billingual interference. In I. M. Schlesinger & Lila Namir *(eds.), Sign language of the Deaf: Psychological, linguistic and sociological perspectives*, 169–240. New York: Academic Press.

Vos, Connie de. 2011. Kata Kolok color terms and the emergence of lexical signs in rural signing communities. *The Senses and Society* 6(1). 68–76.

Vos, Connie de & Roland Pfau. 2015. Sign language typology: The contribution of rural sign languages. *Annual Review of Linguistics* 1(1). 265–288.

Washabaugh, William. 1979. Hearing and deaf signers on Providence Island. *Sign Language Studies* 24. 191–214.
Washabaugh, William. 1980a. The Manu-Facturing of a language. *Sign Language Studies* 29. 291–330.
Washabaugh, William. 1980b. The organization and use of Providence Island Sign Language. *Sign Language Studies* 26. 65–92.
Washabaugh, William. 1981a. The Deaf of Grand Cayman, British West Indies. *Sign Language Studies* 31. 117–134.
Washabaugh, William. 1981b. Sign Language in its social context. *Annual Review of Anthropology* 10. 237–252.
Washabaugh, William. 1986. *Five fingers for survival*. Ann Arbor: Karoma.
Washabaugh, William, James Woodward & Susan DeSantis. 1978. Providence Island Sign: A context-dependent language. *Anthropological Linguistics* 20. 95–109.
Williams, Holly & Elizabeth Parks. 2010. A sociolinguistic survey report of the Dominican Republic deaf community. SIL international electronic survey report 2010-005.
Williams, Holly & Elizabeth Parks. 2012. The Puerto Rican Deaf community. SIL international electronic survey report 2010-005.
Wilson, Peter J. & John Buettner-Janusch. 1961. Demography and Evolution on Providencia Island, Colombia. *American Anthropologist* New Series 63(5, Part 1). 940–954.
Woodward, James. 1979. The selflessness of Providence Island Sign Language: Personal pronoun morphology. *Sign Language Studies* 23. 167–174.
Woodward, James. 1982. Beliefs about and attitudes towards Deaf people and sign language on Providence Island: On depathologizing deafness. In James Woodward (ed.), *How you gonna get to heaven if you can't talk with Jesus*, 51–74. Silver Spring, MD: T. J. Publishers.
Woodward, James. 1987. Providence Island Sign Language. *Gallaudet Encyclopedia of Deaf People and Deafness, Vol. 3*. McGraw-Hill.
Woodward, James. 1991. Sign language varieties in Costa Rica. *Sign Language Studies* 1073(1). 329–345.
Woodward, James. 2010. Reponse: Some observations on research methodology in lexicostatistical studies of sign languages. In Gaurav Mathur & Donna Jo Napoli (eds.), *Deaf around the world. The impact of language*, 38–53. Oxford: Oxford University Press.
Zeshan, Ulrike. 2011. Village sign languages: a commentary. In Gaurav Mathur & Donna Jo Napoli (eds.), *In Deaf around the world. The impact of language*, 221–230. Oxford: Oxford University Press.
Zeshan, Ulrike. 2007. The ethics of documenting sign languages in village communities. In Peter K. Austin, Oliver Bond & David Nathan (eds.), *Proceedings of the Conference on Language Documentation and Linguistic Theory,* 269–279. London: SOAS.

Olivier Le Guen, Rebeca Petatillo and Rita (Rossy) Kinil Canché

Yucatec Maya multimodal interaction as basis for Yucatec Maya Sign Language

1 Introduction

This chapter aims at showing, using qualitative examples, that Yucatec Maya communication relies on numerous non-verbal strategies used in everyday interactions to communicate propositional content. This is possible through a semantically rich multimodal communication system, using many iconic and quotable gestures and character perspective. All these strategies come to complement oral communication and, because of this extensive and systematic use of the non-verbal channel, Yucatec Maya speakers have generally no trouble communicating visually if confronted with a situation in which they cannot use speech. This is why, we argue, it has been so easy for deaf people and their hearing kin to "invent" signed languages and also the reason why these newly created sign languages look so similar to one another although spread in different villages in the Yucatec peninsula.

Recently many so-called "emerging sign languages" have been studied and put to light in the research field (de Vos and Pfau 2015; Meir, Sandler, Padden, and Aronoff 2010; Nyst 2012; Zeshan and Vos 2012 inter alia). However, and although this is a tremendous development, the fact remains that numerous emerging sign languages are still unidentified. In the Yucatec peninsula one village (Chicán) is particularly known and has been described as "the" Yucatec Maya Sign Language village (de Vos and Pfau 2015; Johnson 1991; Shuman 1980; Shuman and Cherry-Shuman 1981) and some authors even talked about "Chicán Sign Language" (Escobedo Delgado 2012). However, and despite the fact that many authors were aware of the existence of other sign languages in the same region, almost nobody has tackled the issue of comparison. Such a position is obviously problematic and the aim of this chapter is to seriously consider the fact that there are several villages in the Yucatec peninsula that show similarities in their sign languages and try to explain why, using empirical data and in-depth ethnography.

Our theoretical proposal is to consider Yucatec Maya multimodal communication as a basis for Yucatec Maya Sign Language, which allows for a fruitful and constructive comparison between multimodal communication and sign language but also for comparing the different sign languages used in the

https://doi.org/10.1515/9781501504884-007

peninsula. To this purpose, we analyze the similarities as well as the predictable differences in the various Yucatec Maya signing varieties encountered in the Yucatec peninsula, and we provide reasons why it is productive and theoretically more interesting to consider Yucatec Maya Sign Language as one unified language and not several independent languages. This, in turn, also legitimizes the unique label Yucatec Maya Sign Language (YMSL). Such a position implies consideration of the fact that gesture is already, in some ways, a linguistic device and that processes of grammaticalization and lexicalization occur from gesture to sign (on various levels) and in predictable ways. These last two issues are examined in the last part of this chapter.

In section 2, we will discuss the reasons why variation should be carefully examined in understanding the emergence of the Yucatec Maya Sign Language(s). Section 3 gives an overview of the use of gesture and multimodality in spoken Yucatec Maya, an important issue since our hypothesis is based on the fact that Yucatec Maya speakers use many systematic gestures providing a fertile environment for the emergence of the YMSL. Section 4 gives various examples of signs derived from gestures (quotable, iconic, manual classifiers) and illustrates how much the use of character perspective is shared among hearing and deaf people. This section will also consider some linguistic calques and cultural transfers from Yucatec Maya to YMSL. Section 5 discusses how much multimodal communication can be considered linguistic input and provides some reflections on paths of grammaticalization and lexicalization from Yucatec Maya visual behavior to YMSL. This section also discusses briefly some features of the Yucatec Maya multimodal communication that limits some aspects of the creation of YMSL. It also examines how YMSL exhibits many forms of innovations, i.e., the creation of a sign without a gestural predecessor. The conclusion will justify why it is relevant to consider YMSL a unified language and the sign languages used in Chicán and Nohkop as varieties.

2 The Yucatec Maya Sign Language: Taking variation into account

As we mentioned, our aim in this chapter[1] is to provide evidence that the various documented sign languages in the Yucatec Peninsula (until now 4, see YMSL

1 For more information about the setting and the villages of study, we refer the reader to the sociolinguistic sketch (YMSL sketch, this volume).

sketch, this volume) should in fact be considered a single language – the Yucatec Maya Sign Language – our postulate being that Yucatec Maya multimodal communication provides a systematic basis for similar developments in unrelated communities. However, in order to make such a claim, several issues should first be considered. The first is the scale of the area under investigation – in other words: does YMSL only emerge in areas where Yucatec Maya is spoken, or can it extend to other areas where other Mayan languages are in use? That is, is YMSL different from other emerging sign languages in the Maya area? Fox Tree (2009) for instance proposes that several signed languages of the Maya area belong to one unified language complex; however his proposal is based on a hypothetical previous prehispanic pan-Mayan sign language (for which there is no historical evidence) and does not provide any convincing data or systematic analysis to support his claim. What is needed is a comparison with other emerging sign languages of Mesoamerica, and specifically from the Mayan area. This book (along with other publications) allows for a first comparison, especially with Zinacantan family homesign (Haviland 2011, 2013b, 2013a) and shared homesign systems in Nebaj (Horton, this volume). While we indeed encounter some consistencies among these various emerging languages, current research has shown some important differences at various levels: grammatical (noun formation for instance, see Haviland (2011), Safar and Petatillo Chan, this volume), lexicon, word order (Le Guen, 2019) and attitudes towards deafness (see sociolinguistic sketches, this volume). Such differences lead us to think that languages outside of the Yucatec peninsula are different, while what we are witnessing in the Yucatec area falls more into the level of what we could call "variation". Our proposal (at least tentatively and based on current evidences) is that all the sign languages within the peninsula (or at least the ones we documented), could be considered varieties of YMSL.

Throughout this chapter, we will examine several examples – obviously limited for reasons of space – from two unrelated villages (Chicán and Nohkop) that display the emergence of similar linguistic strategies. We will show that most of these strategies can be traced back to a similar linguistic and cultural background: the Yucatec Maya sociocultural setting and multimodal communication.

3 Multimodal interaction among the Yucatec Mayas

Multimodal expression is a feature of all languages in the world (Enfield 2009; Sidnell and Stivers 2005), either with the use of gesture (Kendon 2004; McNeill 1992), prosody (Couper-Kuhlen and Selting 1996) or facial expressions (Ekman 2006). Several theories even see the origin of human language in multimodality, see for instance Vigliocco et al. (2014) and Levinson and Holler (2014). Simply consider the fact that pointing is always associated with various verbal deictics in every language of the world (Kita 2003). However, while it is an indisputable fact that all human groups gesture, they do not do so in the same way. Specifically, some types of gestures are more or less frequent and complement speech in various ways (see for instance Kendon 2004: 344–354). In this section, we show how Yucatec Maya gestures semantically complement verbal information in the form of 'composite utterances' (Kendon 2004, Enfield 2009). We argue that Yucatec Maya do transmit important information regarding the content of the communicative message though the visual channel (see Le Guen (2011b) for a discussion on this point).

3.1 The notion of composite utterance

Enfield (2009), following Kendon (2004), exposes at length the notion of 'composite utterance', in order to explain and analyze the division of labor between speech and gesture in the delivery of a communicative message. In Kendon's words: "the relationship between word and gesture is a *reciprocal* one – the gestural component and the spoken component *interact* with one another to create a precise and vivid understanding" (Kendon 2004: 174, emphasis original).

To give an idea of how this phenomenon works, consider the following example (Figure 1)[2] where a Yucatec Maya participant describes a cartoon where a little mouse is throwing dough on one side of the screen, then on the other, and finally the mouse itself gets thrown away on the initial side.

In this example, if we only listen to the participant's speech, there is basically no spatial information (path or orientation), i.e., about which side the object gets thrown. The participant just says twice "elsewhere" and uses a deictic verb with

2 All figures and examples from the YMSL corpus marked with a camera symbol are available as supplementary video files in the eBook version of the volume at https://www.degruyter.com/view/title/523378.

no directional information "go". However, if we consider her speech plus gestures, the communicative message becomes clear and precise. She describes the first event as the dough going "on the left/south side" (bear in mind that Yucatec Maya use a geocentric frame of reference, see Le Guen (2011b)), the second event as the dough going on the "right/north side" and finally the mouse "going on the left/south side" and upward. As in many languages, the verbal deictic is meant to orient the interlocutor's attention towards the gesture produced and where some relevant information is being displayed, foregrounding the gesture (Cooperrider 2017). What is noteworthy in this example is that the Yucatec participant chose to indicate the spatial information through the visual and not the oral channel. This strategy, as we will see in this chapter, is fairly common in Yucatec Maya (see Le Guen 2011b).

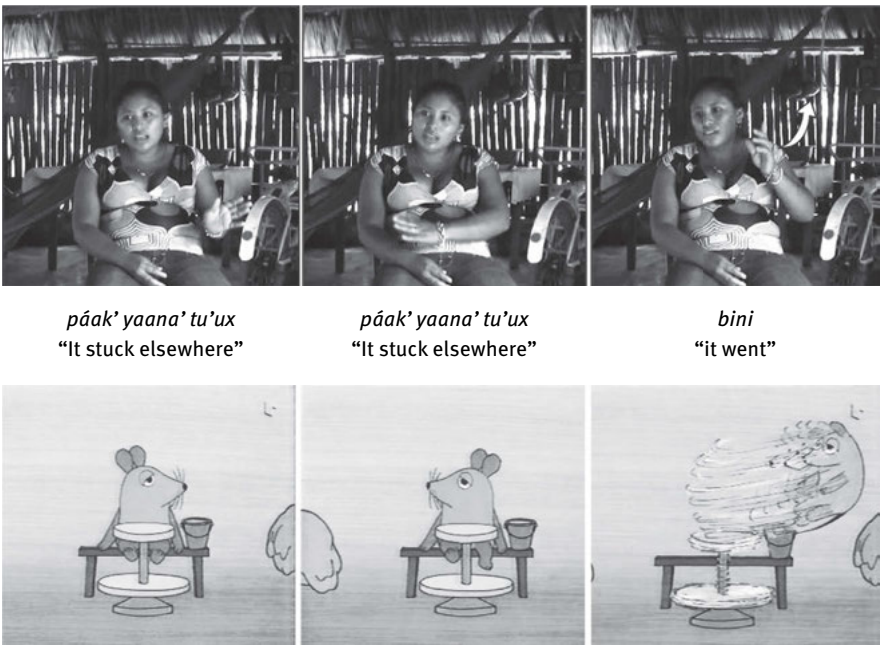


Figure 1: Example of a composite utterance where gesture gives the relevant information.

This example leads us then to the question: what counts as a "gesture"? Although we will not go into great detail here (but see McNeill 1992, Kendon 2004, Enfield 2009 for detailed accounts on this issue), we consider that a gesture is "a movement of the hand or the head that is loaded with a communicative intention". In considering this definition, we also want to distinguish "content"

versus "pragmatic gestures" (Kendon 2017). While the latter only have to do with the delivery of the message, the former directly relate to and complement the content of the speech (as in our example in Figure 1). Among content gestures, we will pay special attention to three categories of gestures: (a) conventionalized gestures, that Poggi (Kendon 1992) considers "quotable" (i.e. gestures with stable and quotable form and meaning), (b) gestures that carry an iconic dimension (i.e. resemble the referent in some way), and what we will refer to as (c) "manual classifiers" (i.e. gestures that refer to discrete categories of entities).

3.2 The importance of gestures in Yucatec Mayan interactions

One of the goals of this chapter is to show how fundamental gestures are in Yucatec Mayan interactions. We will not be interested in the proportion or frequency of gestures produced, as the issue of whether or not some cultures produce more gesture is still under debate.[3]

Instead, we want to stress the importance of Yucatec Mayan gestures at the semantic level, that is, on how communicative messages are produced and the way information gets distributed through both semiotic channels, oral and visual, in the form of composite utterances. We will make this demonstration using two kinds of data, qualitative and quantitative.

3 Qualitative data and observations have pointed out that certain cultures seem to produce more gestures than other. For instance, Barzini (1964) noticed that Italians produce more gestures than English speakers. Efron (1972) compared Italian and Jewish immigrants to America, and shows that they tend to attend to gesture more in interaction with speech than American speakers. Also, Efron's study shows that newly immigrated Italians produce more body actions and pictographic gestures than the previous generations. So (2010) conducted a study showing that English monolinguals produced more gestures (both representational and nonrepresentational) than the Chinese monolinguals. Working with Chinese-English bilinguals, the author demonstrates experimentally that Chinese participants, when speaking in English, produced a similar number of representational and nonrepresentational gestures to the English monolinguals. However, when speaking in Mandarin Chinese, bilinguals produced more representational gestures than the Chinese monolinguals. The author proposes the possibly of a transfer in gesture frequency from a high-gesture (English in this case) to a low-gesture language (Mandarin Chinese).

The first example is an extract from a natural conversation between two Yucatec Maya women that took place without the researcher present.[4] Example (1) is an extract from a conversation in which they talk about a mother from their village who left with her children a few years ago, and how she (the speaker) would not be able to recognize them today. This extract is 11 seconds long and the woman who speaks uses 7 gestures, all fundamental to the communicative message. Although we will not discuss in detail all the gestures produced, we will mention their type and refer the reader to the sections below where those gestures are discussed further. The underlined part in the examples indicates the gestures that are produced with speech; the gestures are referred to in the figure using letters (a, b, c, etc.).

(1) Conversation between two Yucatec Maya women

Gray-haired lady:	*chéen*	*yikn*	*u-maama*[Figure 2a]*-o'*	*p'áat-óo'*
	only	LOC	3A-mother-DT	leave-PL

'They left with their mother'

le paal-a'	*le*	*k-y-a'-k-o'ob*[Figure 2b]	*in-soob-o'*[Figure 2c]
DET child-DT	DET	HAB-3A-say-TR.IC-PL	1A-nefiew-PL

'the children, they say, my nephews'

tak mejen-tak[Figure 3a]	*ka'*	*j b is-a'ab-o'b-e'*[Figure 3b]
even small.PL-DISTR	CONJ	CP.INTR take-PAS-PL-TD

'even (if they were) little, they have been taken away'

tu'ux[Figure 3c]	*ken a-k'aj*óo-t	*paal-al-o'ob*	*chan tiyáah*
where	CONJ 2A-recognize-APPL	child-PL-PL	little aunt

'Where will you recognize (these) children, little aunt?'

úuch	*nuuk-ak-o'ob*[Figure 3d]
distant.time	big.PL-SUBJ-PL

'They're long grown up (now)'

4 This method consists in placing the camera(s) near the participants while they are interacting and to leave the scene (usually staying at some distance or in the next room). The participants are aware they are being recorded but no researcher is present, leaving room for natural and spontaneous conversations and interactions. This is a common method used in Conversational Analysis for collection of "natural data", i.e., at least the more natural that it is allowed for. All figures and examples marked with a camera symbol are available as supplementary video files in the eBook version of the volume at https://www.degruyter.com/view/title/523378.

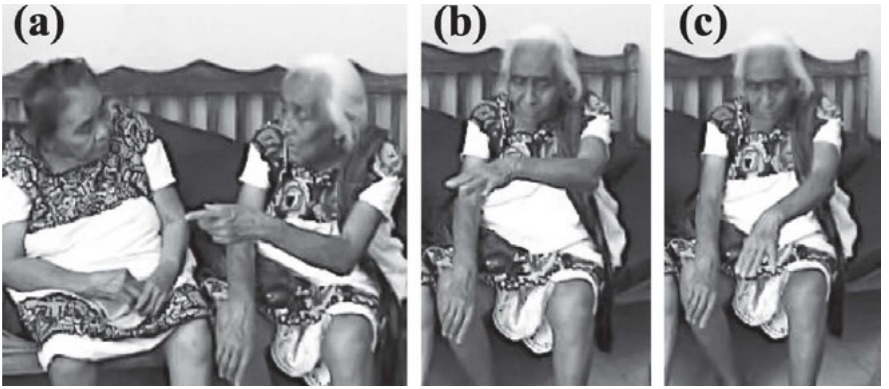


Figure 2: They were left (only) with their mother, the children, they say (a), my nephews (b, c).

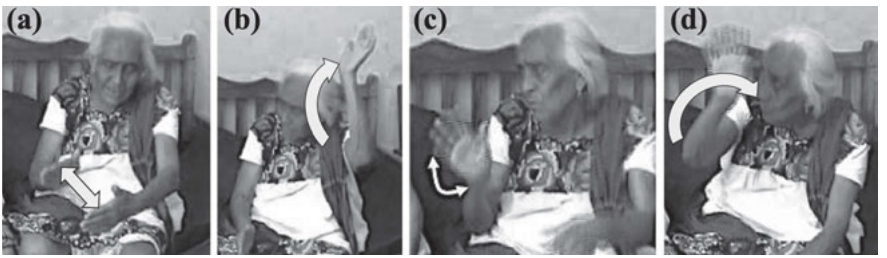


Figure 3: Even (if they were) little (a), they have been taken away (b). Where (c) will you recognize children, little aunt? They're long grown up (now) (d).

When we look at the gestures produced by the woman in Figure 2 and Figure 3, we notice that every gesture serves to complement information present in the speech or even supply information not provided orally. The first gesture in Figure 2a is an instance of "metonymic pointing" (Le Guen 2011a) accompanying the spoken reference to the mother. This pointing is correctly oriented towards the house of the mother mentioned in the speech and serves to clarify the verbal reference.

The next two gestures are "manual classifiers" (see section 4.3), which directly refer to the speaker's nephews. Both gestures indicate the heights of the nephews in question. Although in the speech the use of a plural marker indicates that there are multiple children, we do not know how many or their age. However, with the complementary gestures (Figure 2b, c) we know there are two children and we can infer that one is probably around five and the other around eight. Although such indication is in no way precise, this is typically the height used in gesture to talk about these ages in everyday interaction. We should also mention

that Mayan children are smaller than European children. Among the Mayan, children younger than 12–15 years are usually referred to by their height and not by (numerical) age.

After showing the height of two of her nephews, the speaker goes on to mention that "even (if they were) little" they were taken away. In order to exemplify how little they were, she produces a gesture considered a SASS (Size And Shape Specifier, see Safar and Petatillo Chan, this volume but also Tano Angoua and Nyst (2018)) typically used for little babies (Figure 3a). With this gestural information, we know that they were taken away while they were babies (i.e., not yet walking).

In order to put emphasis on the fact that "they have been taken away" the speaker adds a metaphoric gesture directed upwards performed with an open hand (Figure 3b), that expresses a distant or unknown location (see Le Guen 2011a).

In her next utterance, the speaker utters a rhetorical question: "where will you recognize (these) children" (i.e. how could you recognize a child after so many years?) and produces an interrogative gesture, palm up moving side to side (Figure 3c). In this case, the gesture does not add supplementary information but stresses the interrogative nature of the utterance (although it is only a rhetorical question in this case) and the implied despair of the answer ("nowhere!").

Finally, accompanying her last utterance, the speaker produces a gesture similar in form and nature to the one in Figure 3b, but now referring to time. This gesture is a metaphoric extension from the spatial one (Le Guen and Pool Balam 2012) and indicates "a long time (ago)" (Figure 3d). This gesture is produced in synchrony with the time marker *úuch* "distant time" and puts emphasis on the fact that the events described happened a long time ago (also the reason why it would be difficult, if not impossible, to recognize the children now).

This example, although singular, is nonetheless representative of how Yucatec Mayas use gestures in natural interactions and how much their gestures are systematic. Besides the interrogative gesture with *tu'ux* "where" (Figure 3c) and the temporal metaphorical gesture with *úuch* "a long time" (Figure 3d) that only puts emphasis on the question and the distant time respectively, all the other gestures add some crucial information that is not present in speech:

- Metonymic pointing (Figure 2a): specifies the referent "mother" (through its location)
- Manual classifiers (Figure 2b, c): specify the number and the age of the children
- SASS (Figure 3a): specifies that "little" means baby (not yet walking)
- Spatial gesture with "taken away" (Figure 3c) implies "we do not know where"

Obviously, one qualitative example cannot be enough to have a proper representation of how gestures are produced overall among Yucatec Mayas, this is why we now turn to quantitative data. Rebeca Petatillo (2015) looked at the frequency and the types of gestures used by eight participants in a retelling task, following the now classic protocol proposed in McNeill (1992), see Table 1 for detail. Participants watched eight videos from the German cartoons *Die Sendung mit der Maus* "the mouse show" and after each video they had to retell it to the researcher, in this case Rebeca, a native Yucatec Maya speaker.[5]

Table 1: Yucatec Maya participants involved in the Maus task.

Gender	Participant	Age	Schooling
Female	1	10	Elementary
	2	17	Elementary
	3	19	High school
	4	38	Elementary
Male	5	12	Elementary
	6	22	University
	7	48	No
	8	64	No

All sessions were video-recorded and then entirely transcribed using the program ELAN. All the gestures were coded and analyzed according to the following categories:

- Iconic gestures (somehow representing the referent, see section 4.2)
- Placing in space (placement of an entity in virtual space, i.e. a gesture that is at the same time deictic and iconic)
- Direction only (indication of a direction, real or imaginary)
- Manner (showing the way an entity moves in space, that can also include direction/path)
- Quotable gestures (gestures with stable form and meaning widely recognized and used in the community, see section 4.1)
- Metaphoric (representation of abstract concepts)

5 This method was inspired by Sotaro Kita's entry in the field manual of the Max Planck Institute for Psycholinguistics (http://fieldmanuals.mpi.nl/).

- Deictic (points to a referent, concrete or abstract)
- Beats (pragmatic gestures (Kendon 2017) that do not add meaning to the speech)
- Character perspective (the body of the participant enacts the action performed by the character in the narration, see section 4.4)

The coding scheme was established by Olivier Le Guen and Rebeca Petatillo. After Rebeca coded all gestures, Olivier revised the coding and in cases of disagreement or doubt, both discussed which category would better fit the gesture (when possible).[6] In the end, the great majority of the gestures was codable and Figure 4 presents the results of the analysis of the total number of 919 gestures produced by the eight participants. The vast majority of gestures were iconic. This is not so surprising given that the narrations are mainly about concrete representations, i.e. movement and activities of the mouse and his cartoon companions; and not, for instance, about concepts or argumentation, the reason why there are few metaphoric gestures (3%). Interestingly, we did not notice any difference related to gender in overall gesture frequency (462 for Males vs. 457 for Females).

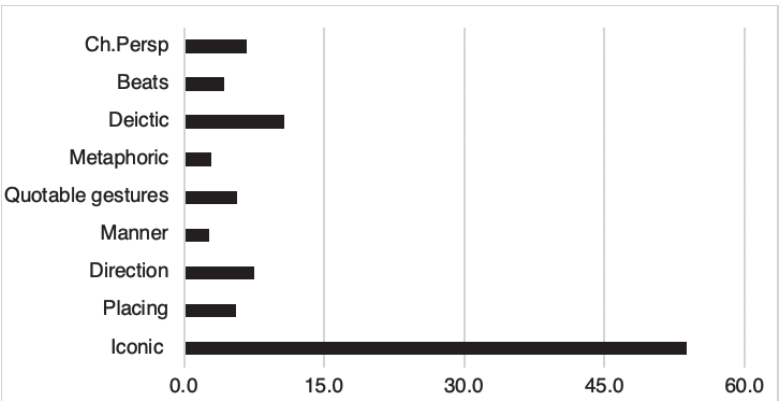


Figure 4: Proportion of the types of gestures used by Yucatec Maya participants.

As mentioned, because of the nature of the task (retelling concrete actions from videos), these results are somehow predictable and only a cross-cultural comparison would be able to tell if Yucatec Mayas are doing something special. Although we could not run such a study, we did compare results from Yucatec

6 For space limits, we cannot explain in detail our classification but more explanations can be found in Petatillo Balam (2015).

Mayan participants with McNeill's study with US participants from Chicago. The later retold episodes of Tweety (Canary Row) and Sylvester. In both cases, participants were involved in a similar task. This comparison, although not completely accurate since the protocol and the coding were not exactly similar, reveals several interesting cultural differences in gesture production. In order to compare our results with Mc Neill's (1992: 93), we had to collapse several of our categories (quotable gestures, manner, direction and placing) into a general "iconic" category. We also decided to collapse the character perspective with the unclassified category, to better correspond to McNeill's categories. A comparison of the results is shown in Figure 5.

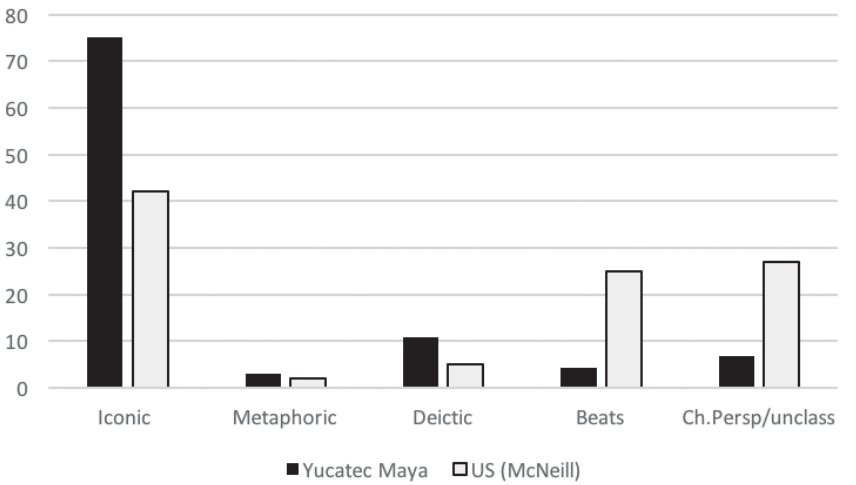


Figure 5: Comparison of gesture production by types between Yucatec Mayas and US (Chicago) participants (McNeill 1992: 93).

Several conclusions can be drawn from this comparison. First, as mentioned earlier, we can expect a limited production of metaphoric gestures from the task given its concrete nature. This is indeed borne out in both the Yucatec Maya and US results (2.9% vs. 2% of metaphoric gestures respectively). Second, we also notice among the two groups a good proportion of deictic gestures (10.8% for YM vs. 5% for US). Third, and not surprisingly, in both groups the proportion of iconic gestures is by far the most important since the task implies retelling concrete and visual events. However, while 42% of gestures produced by US participants were

iconic, the proportion among Yucatec Mayas was almost double: 75.2%.[7] These results allow us to notice cultural differences. In both cultures, we notice a high proportion of iconic gestures but the much higher proportion produced among the Yucatec Mayas reinforces the idea that Yucatec gestures very frequently come to concretely illustrate speech (as shown in example 1 above). A second comparison that supports the same idea is the very low proportion of beat gestures among Yucatec Mayas (4.4%) compared to US gesturers (25%). Beat gestures are pragmatic in nature and do not complement speech semantically, i.e. they mainly support the production and delivery of the communicative message.

3.3 Summary

In sum, qualitative as well as quantitative data point to the fact that Yucatec Mayas tend to substantially and systematically supply their speech with content gestures, i.e. relevant information is distributed between both semiotic channels (auditory and visual). This tendency is not random and might have its roots in the local history. Although ancient Mayas invented a writing system, its use and understanding has always been restricted a small proportion of the population (Lacadena 2004; Tozzer 1941). Because there were really no forms of massive disembodied communication, Yucatec Mayan speakers always relied on face-to-face communication, much like deaf signers (before the era of multimedia communication via video). This face-to-face communication might have allowed (or even forced) speakers to take advantage of the gestural modality available to communicate meaning. Of course, there is no real way to prove this hypothesis, unless we gather more cross-cultural data on gesture and compare various kinds of behaviors of multimodal communication in different types of societies.

Visual communication however is often noticeable through speech. Le Guen (2018a) shows how gestures are syntactically aligned with speech and that a number of words exist in Yucatec Maya that indicate that relevant information is being transmitted visually through the gesture; words such as *bey-* "like this". Although this is a common strategy in languages of the world, Yucatec Maya also has specific words to introduce gesture, such as *beytak*/*buka'aj* "of this particular

7 In McNeil's study (from McNeill and Levy (1982) reported in McNeill (1992: 92–93), the total number of gesture was 790. In the original study of 1982, the authors report 6 young adult females and one young adult male (p.273). The average of retelling was under five minutes. Coding from 1992, divides gestures occurring within narrative and extranarrative clauses. The total of each category is as follow: Iconic: 261, Beat: 268, Metaphoric: 43, Deictic: 28, None: 190.

height/size" that are (almost always) accompanied by a gesture (see section 4.3). We take the existence of such precise words as evidence of linguistic support for the use of multimodality. This idea of multimodality of language is so strong that Le Guen (2011b) shows that in the case of space, some gestures do in fact replace the lexicon: many women and men do not know the verbal terms for cardinal directions (even though such terms exist in Yucatec Maya) but can nonetheless, in spatial tasks, correctly use their gestures to indicate cardinal orientation and geocentric organization of entities. Not only are their gestures correctly oriented but, without the gesture, the communicative message in the speech is empty. Because people do not know the lexemes for cardinal terms, they cannot paraphrase such a communicative message with speech only; to put it simply, they cannot talk about space without using gestures. The use of composite utterances in which gesture turns out to be indispensable to communicate about space is common among Yucatec Mayas, although such a strategy is not restricted to this culture; Floyd (2016) makes a similar argument regarding expressions of time in Nheengatú.

Because speakers consider gesture a productive resource, they can, and indeed do, use them systematically and meaningfully in everyday interactions. In a sense, we could argue that Yucatec Maya communication is to a certain extent "visible", hence, to some degree, accessible and understandable to people who cannot hear. Because of that, we could expect that since a great proportion of Yucatec Mayan gestures semantically complements speech, deaf children who are born in these communities may be able to understand a greater proportion of what is conveyed, even without hearing the accompanying speech. Another consequence of the greater integration of gesture into language is that gestures acquire linguistic properties, an idea considered in more detail in the following discussion.

4 From gesture to sign

In this section, we consider several types of gestures and analyze how they are transformed into signs in YMSL. For the purpose of the demonstration, we will only consider data from two villages, Chicán and Nohkop. Although we only consider a few qualitative examples in this chapter, the tendencies presented apply to many more gestures of each category.[8]

8 We are currently conducting a study to look at the etymology of all the signs collected in our vocabulary data from Nohkop and Chicán, around 400 in each village.

In this section, we consider four gesture types (or strategies) frequently used among Yucatec Maya speakers and almost systematically transformed into signs in YMSL. The first type is what has been referred to by Kendon (1992) as "quotable gestures" (also known as emblems) (see also Kendon 1988). The second type are iconic gestures, and we will be interested more specifically in the processes of transfer of iconicity from gestures to signs. The third type consists of gestures known as classifiers and SASSes (Shape and Size Specifiers, see Klima and Bellugi (1979); Supalla (1986a,b) for SASSes in sign languages) that have mainly one purpose: to visually show the size, shape or outline of an entity (see Safar and Petatillo Chan, this volume). The fourth type, or better said, strategy, is the use of character perspective. Although this is in no way specific to their culture, Yucatec Mayan speakers do use it frequently as a narrative resource to represent different kinds of entities. Finally, we consider the case of transfer of cultural concepts and linguistic calques.

4.1 Systematic gestures (quotable gestures) always become signs

What characterizes quotable gestures is that they have a stable form and meaning. Although these have been previously referred to as "emblems" (Efron 1972; McNeill 1992), we follow Kendon (1992)'s terminology that relies on an interactional definition. The author considers that there is some tolerance in the way a gesture can be produced, or "quoted"; too much alteration of the form of a conventional gesture however, will turn it into another gesture or make it unintelligible. Quotable gestures can be considered linguistic symbols in the sense that they can replace words or speech acts in multimodal discourse (Brookes 2004; Kendon 1992). For this reason, they make very good candidates for the creation of signs as they already have a stable form and meaning and constitute some sort of "proto-signs". Not surprisingly, many of the Yucatec Maya quotable gestures were transformed into similar signs in both villages (see also Coppola, this volume, for similar processes in Nicaragua). In Table 2, we present a short list of such items.

These items are considered according to two main types proposed by Poggi (in Kendon 1992): lexical and holophrastic. Lexical gestures can replace nouns, verbs, adjectives, pronouns and only serve as components of a communicative act. Their meaning will depend on the context of the utterance (Kendon 1992: 94–95). On the other hand, holophrastic gestures, as the name suggests, replace not only words but entire speech acts. They have a fixed meaning and are performative (Kendon 1992: 95–96).

Table 2: Examples of quotable gestures transformed into sign in YMSL (Chicán and Nohkop). The sign in both villages retains both the form and the meaning of the gesture in Yucatec Maya.

Type of gesture	Maya gloss of the gesture and sign	English gloss
Holophrastic	GRAASYAS	'thank you'
	KO'OTEN$_1$	'come (here)'
	KO'OTEN$_2$	'come here' (only used among lovers)
	MA'ALO'$_1$	'good, okay, nice'
	MA'ALO'$_2$	'good, okay, nice, beautiful'
	MINWÓOJLI'	'I don't know'
	PA'ATIKI'	'wait'
Lexical	JUMPÁAY	'different, apart'
	K'AXAL JA'	'(to) rain'
	K'IIN	'sun'
	KAAY	'fish'
	KI'$_2$	'good (taste)'
	KOCH BOOLA	'play ball (football)'
	LÚUBUL	'(to) fall'
	MÍIS	'to sweep, broom'
	TAK'IN	'money'
	XOOK-ESKWEELA	'to study, school'
	WEENEL	'to sleep'
	CHAAS BO'OL	'(to) pay in cash, to pay in a single exhibition'
	BO'OTIK	'(to) pay so./sthg.'
	ICHK'IL	'(to) bath'
	JATS'	'(to) hit'
	P'O'	'(to) wash'
Lexical (action/object)	WAAJ / PAK'ACH	'(to make) tortilla(s)'
Lexical (concept)	LOOKO	'crazy'

As our glosses in English show, many signs are verbo-nominal in nature, that is they can be used either as a verb or a noun according to the morphosyntactic context in which they are embedded. Note that this actually how many of the spoken Yucatec Maya roots work too (see Le Guen 2015; Lois and Vapnarsky 2006).

In order to explain how these gestures become signs, we will consider a few quotable gestures in more detail.

4.1.1 Lexical quotable gestures transformed into signs

In Yucatec Maya, as well as in other cultures in Mesoamerica (Meo-Zilio and Mejía 1980), there are numerous quotable gestures used to replace words that designate objects. Such gestures are easily transformed into signs for nouns in the local sign languages. Consider for instance example (Figure 6) for MONEY.

Figure 6: Quotable gesture for MONEY transformed into a YMSL sign.

Once integrated in YMSL, it is used as a nominal sign. One difference from the main tendency in spoken languages,[9] is that, in the visual modality, signs or gestures can be directly modified through size of articulation and movement, whereas spoken language nouns usually need to be modified by an adjective. For instance, to express "a lot of money" a gesturer or a signer can simply articulate the sign bigger or synchronically add a non-manual marker (e.g. squinting the eyes as an intensifier).

While some lexical gestures were transformed into nouns in YMSL, others have become a sign that can function as different parts of speech: a noun and an adjective or a noun and a verb (note that in sign languages, nouns and verbs can often look very similar, see Supalla and Newport 1978). Let's consider the case of lexical quotable gestures that are adjectival in Yucatec Maya multimodal interaction and become an adjective or a noun in YMSL. This is the case for instance for a gesture like PÁAP "*hot/spicy*",[10] that, in YMSL means HOT/SPICY

9 We prefer to speak of tendency as there are also iconic processes in spoken languages, what Okrent (2002) calls "spoken gestures".

10 In order to differentiate gesture from signs, gesture glosses are indicated in italics, while signs are in SMALL CAPS.

and also can become the noun CHILI, see Figure 7. In the latter case however, a SASS can optionally be added to the base sign for disambiguation that it is the noun (see Safar and Petatillo Chan, this volume, Haviland 2011).

Figure 7: PÁAP "spicy" gesture that became an adjective ("hot") and a nominal ("chili").

The same goes for the gesture "MAKING TORTILLA" that refers to an action in Yucatec Maya multimodal interaction and becomes a verb in YMSL but can also denote (with an optional SASS) the noun "TORTILLA". In natural interactions, the morphosyntactic as well as the pragmatic contexts will help disambiguate if the sign is a noun or a verb in the absence of a SASS.

Some lexical quotable gestures describe actions rather than objects. On example is the gesture for TO-GO, glossed as *bin* in Maya. The gesture is performed with an open palm (close to a B handshape) held horizontally, that is, with the thumb at the top, and moving forwards from the body. This gesture is commonly used in Yucatec Maya interactions and narratives and expresses that the referent goes (somewhere). However, as with other Yucatec Mayan gestures, *bin* is already semantically multidimensional. For instance, while the gesture can simply be used to indicate a movement plus a direction "to go in a particular direction"[11] (Figure 8a), other features can be added, such as manner of motion, transforming

11 Note that Yucatec Mayas used a geocentric Frame of Reference and the direction they point to is relevant, i.e. correctly oriented, and not just metaphoric. If the direction is unknown the gesture would go up, following the "up is far" rule, see Le Guen (2011a).

the gesture into *to-go-walking or to-go-jumping* (Figure 8b). The same gesture can also be modified to express the shape and size of an entity (Figure 8c, d). In these latter two examples, the speaker reduces the size of the hand to describe the mouse (compared to the speaker in (Figure 1) who describes the same entity) and then reduces it even more when he later depicts a smaller elephant, using the hand in a B-shape (Figure 8c) or even only one finger (Figure 8d). Note that even this gesture is glossed as "*to-go*" and can be used with other deictic verbs in speech like "*to come*", representing more the manner than the deictic reference point. This is consistent with the deictically loose semantics of the verb in Yucatec Maya that only encode path while "there is no differentiation whatsoever of source, goal, or location outside these verb roots" (Bohnemeyer 2003: 87). In Mayan spatial verbs, goals and locations are then left to be indicated by another independent clause or by a gesture (that plays the role of semantic complement in this case). However, a more precise analysis might be required of the gesture itself and the sign to see if, as in AdaSL, a specific palm orientation might distinguish actions like "come" and "go" (see Nyst 2007: 173–174), as seems to be the case in the examples in Figure 8(a vs. b-d).

kubin	*e chan ratono' kutaal, tak tak tak*	*le'ti'e' ka'aj taale', ka' p' utaali'*	*le chan elepante' kutaal xan*
"he goes"	"the little rat comes, tac tac tac"	"he, when he came, when he started coming"	"the little elephant, he comes too"

Figure 8: Various dimensions expressed by the gesture *bin* "to go".

Not surprisingly, this gesture got transformed into sign in YMSL as *go* (at least in the prototypical case with a movement away from the body; in contrast, COME is usually performed toward the body with the index finger). In the following example, Don Teodoro (at the time, the oldest deaf person in Chicán) is narrating how he used to go walking to work in the field with his father. Like with the TO

GO gesture, the signer expresses in the sign both the manner and the direction (raising the sign upward to express the fact that it is far away) (Figure 9a, b).

Figure 9: WE (USED TO) GO [to the field] WALKING (a), (IT WAS) FAR (b).

Again, what makes this a sign, and not just a borrowing of a gesture into the signing flow, is its morphosyntactic integration to the discourse. The sign is not accompanied by other linguistic information and is by itself now the linguistic content. The sign performed by Don Teodoro has two parts. First, in Figure 9a, the sign is the verb TO GO and the subject is the first-person plural (Don Teodoro and his father), we know this from context as the body acts as the person marker (see Meir, Padden, Aronoff, and Sandler 2007). The second part of the sign (Figure 9b) is a gradual elevation of the hand upward above the head, representing symbolic (or unknown) distance.

4.1.2 Holophrastic gestures transformed into signs (and the process of desemanticization)

By their nature, holophrastic gestures replace speech acts, i.e., entire utterances or verbs in imperative form. Once transformed into signs, they usually keep their main meaning in the sign language. Consider the case of *come here*, in Yucatec Maya and YMSL. In both languages, the gesture or the sign have an imperative meaning and are both used to ask an interlocutor to come to the space where the speaker or the signer is located. The only difference is that the gesture can be

accompanied by speech (although the gesture here does not provide additional meaning but rather reinforce the illocutionary act).

In order to exemplify this process, let us consider the example of the gesture TS'OK "*it ends*" that replaces a speech act in Yucatec Maya. In the first case (here glossed TS'OK$_1$), the sign in YMSL has the same form and function as the gesture, thus we only show an example of the gesture. In Figure 10, the speaker uses the *ts'ok* gesture as a holophrastic gesture that could be glossed as "there it ends". It is fairly common, as in this example, to encounter it at the end of a narrative, as is also the case in YMSL.

Figure 10: *Cheen bey náakik u tsikbalil e x ts'éeko'* "and this how the story of the *ts'éek* witch ends".

Some quotable gestures also get transformed into discourse markers, but for this, they have first to change their meaning and function with respect to the gesture from which they originate. This process is known as desemanticization. This means that synchronically, the same sign can have several meanings and functions while exhibiting different morphosyntactic placements and usages. Here it is important to mention that there exist several paths of lexicalization (see section 5.2 for a more detailed discussion).

In YMSL, the sign TS'OK derived into a second sign with similar form but different meaning and function, namely it became a discourse marker that we gloss TS'OK$_2$. A discourse marker has the function of linking parts of speech and does not have a specific meaning on its own or, at least, its meaning cannot be interpreted at the same level as other parts of speech. In the case of TS'OK$_2$, it is

used to mark a transition between utterances. Figure 11 presents an example of its use to separate each item in a list recounted by a deaf speaker of Nohkop (see also a similar example in Le Guen 2012, fig. 11).

Figure 11: There was one chicken, then, four chickens, then… .

In this example, the signer is retelling a list of objects previously shown in photographs the day before. The sign TS'OK$_2$ should not be understand as "there it ends" but as a discursive connector meaning "and" or "then" in English" or as an equivalent of a comma in writing.

Finally, the sign also evolved into another (although predictable) function: a terminative marker that we gloss TS'OK$_3$. As a terminative, TS'OK$_3$ is directly suffixed to a base sign, as in the example in Figure 12.

Figure 12: The baby died (lit. "he finished being unconscious").

In this example, TS'OK$_3$ is a temporal marker that directly predicates on the verb *kimil* "being unconscious" and functions as perfective aspect (and is not to be read as a separate predicate). This verbal expression is actually a calque from Yucatec Maya *ts'ok (u) kimil* that literally means "(he) finished to be unconscious", meaning "he died". In YMSL, TS'OK$_3$ has a similar function as in spoken Yucatec Maya *ts'ok*, although it is a terminative aspect in the spoken language (i.e. marking the end of an activity) and not a perfective (i.e., marking a state of completion).

In sum, once integrated in YMSL, TS'OK has three different meanings and functions: (1) as a holophrastic sign meaning "there it ends", (2) as a discourse marker used to link parts of speech and, (3) as a terminative marker. Because it has a very close tie to the co-speech gesture, the hypothesis here is that the sign originates in the gesture and additionally takes on the two other meanings. Although there is no historical evidence of this process, it seems likely, especially because such a desemanticization process is actually very widespread in sign languages of the world (de Vos 2012b). In the case of the sign TS'OK, since the form is similar but has different functions, we can talk of homophones and label them as different signs, as follows: TS'OK$_1$, TS'OK$_2$ and TS'OK$_3$. The analysis of TS'OK offers a good example to understand the path of grammaticalization (and desemanticization) of gestures, in this case, holophrastic, into the sign language (see section 5.2 for a more detailed analysis). What is noteworthy is to see how a gesture can rapidly derive various forms of grammatical markers in an emerging signed language and, inversely how emerging languages need such markers for efficient communicative interactions, even at an initial stage. Such data would come to support the hypothesis that emerging languages are complex from the start and not just skeletal forms of communication.

4.2 Transfer of iconicity and semi-conventionalized gestures

In this section, we explore signs that have been created based on iconic, locally recognizable, features of objects or actions, i.e., on what we call 'semi-conventionalized gestures'. We want to consider this category as intermediary between fully arbitrary and/or conventionalized (i.e. quotable) gestures and idiosyncratic gestures. Semi-conventionalized gestures do heavily rely on iconicity and differ from quotable gestures since the context of their production is decisive for their comprehension. They are however systematic enough to be similar among the speech community. A second reason why we want to consider semi-conventionalized gestures as separate is that the path of lexicalization into the sign language is somehow different from the one of quotable gestures we saw above. Because semi-conventionalized gestures do not have stable and strict forms, as do quotable gestures, but rather a "usual way" they are performed, it is difficult to attest that the gesture is the predecessor of the sign. Instead of considering a gesture-first hypothesis, it seems more likely that speakers and signers rely on similar intuitions and that the sign becomes conventionalized among signers and then enters the sign language lexicon. Such a proposal allows to explain why there can be differences between speech communities for such signs (and why it is not the case for signs that originate in quotable gestures). It

also allows us to understand why some of those signs remain comprehensible by bilingual signers of the Yucatec Maya community (but not foreigners), for they keep some level of iconicity and because they originate from a shared cultural background.

When considering iconicity, there are two easy traps to fall into. The first is to consider that because some signs are iconic, they are only gestural or are not fully conventionalized. The second to assume that iconicity opposes arbitrariness and is therefore completely transparent. Considering that signs are not conventionalized or only gestural based on the fact that they resemble the way an object is manipulated or how an action is performed is problematic. One reason, pointed out by Perniss et al. (2010), is that there is more than one way to represent an object or an action, as with their example involving the signs for CAT in ASL and BSL. In both languages, the signs are highly iconic, with both signs representing the cat through its whiskers (an example of metonymy). However, while in ASL the handshape traces a single whisker, in BSL the fingers are spread out depicting all the whiskers. Although both forms may be understandable by signers of the other language, only one is the accepted form in each sign language.

A similar argument can be made using the same example for the YMSL. In Chicán, the sign for CAT is performed as in BSL (Figure 13a), while in Nohkop it depicts the cat scratching (Figure 13b). This latter example is actually interesting as the performing of a characteristic action has transformed the form into a noun.[12]

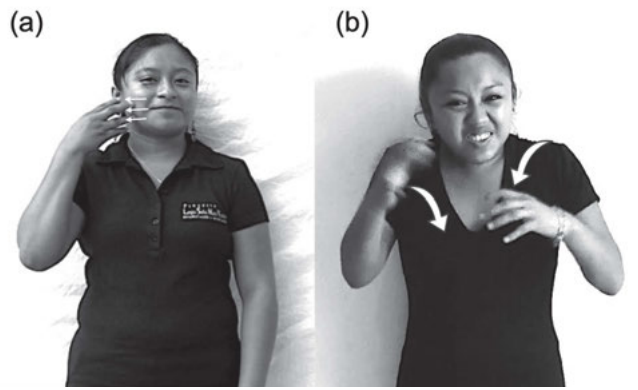


Figure 13: CAT in the YMSL of Chicán (similar to BSL) and CAT_2 in the YMSL of Nohkop.

12 Note that there is another variant for CAT in Nohkop, less used, but signed similarly as in Chicán, tracing the whiskers with the fingers.

The case of "CHAYA" (Figure 14) resembles the example of CAT. One characteristic of the plant is that it has small thorns and generally when one picks the leaves (that are edible) one ends up with a lot of itching. Both signs represent different parts of the same process. While in Chicán (Figure 14a) the sign represents somebody scratching her skin, in Nohkop (Figure 14b), the sign mimics how the thorns bite the skin and cause itching (the pain being represented simultaneously with a non-manual expression on the face).

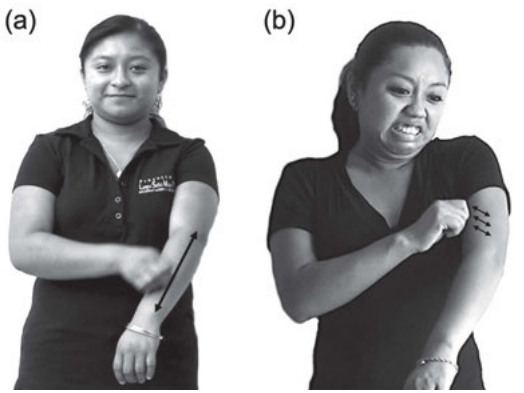


Figure 14: CHAAY "chaya (spinach)" in (a) Chicán (person scratching) and (b) Nohkop (thorns pricking).

Consider now similar processes in the following example for the sign K'ÁAN "hammock" (Figure 15).

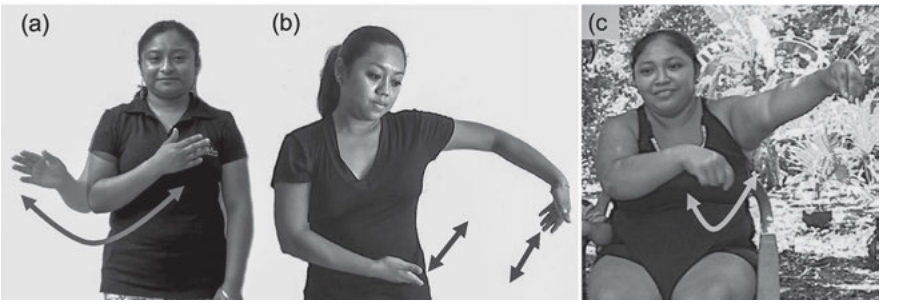


Figure 15: Signs for K'ÁAN "hammock" in (a) Chicán and (b) Nohkop and (c) the gesture produced by a speaker from Kopchen.

In the case of "hammock", while in Chicán the strategy is using transfer of iconicity with the hand representing the object (Figure 15a), Nohkop signers use a tracing

strategy to represent the sides of the hammock (Figure 15b).[13] Interestingly, if we compare to an instance of an improvised gesture to represent *hammock* from a speaker of Yucatec Maya (in Figure 15c), we notice that she represents the point where the hammock is held with her left hand and showing the movement of the hammock with her right hand. Such a strategy relies on what Padden et al. (Hwang et al. 2017; Padden, Hwang, Lepic, and Seegers 2015; Padden et al. 2013) refer to as "patterned iconicity", i.e., a predictable, stable relationship between certain types of referents and certain visual iconic strategies that are the basis for signs' creation. Because different languages chose to represent the referent on the basis of a similar iconic strategy, certain signs ended up being similar in close-by communities (as in the case of YMSL and among the other emerging sign languages of the Americas), but also among unrelated languages of the world.

Several strategies are available for signers to create a new lexicon using transfer of iconicity. One of them is a "tracing" strategy, as shown in example (Figure 15b). Another is mimicking an action (Figure 13b, Figure 14a, b). Recently, Padden et al. (2013) also examined two additional strategies. The first, called 'handling strategy', represents an object by a handshape that depicts a hand holding and manipulating the object. The second is named 'instrument strategy' in which the handshape stands for the object being depicted (as in Figure 15a above) (but see Safar and Petatillo Chan, this volume, for careful analysis in YMSL).

However, iconicity is never fully transparent and is, to some extent, culturally determined. As already pointed by Taub (2001: 19–20), iconicity is motivated by everyday experience, to a certain extent common to all humans, but also, as expected, by local experiences specific to a culture or community. In order to illustrate this point in the Yucatec Maya area, consider the example of POCKET-GOPHER, a sign perfectly transparent for a Yucatec Maya, while not at all obvious for a person foreign to this culture. The sign for BAAJ "POCKET-GOPHER" (a common rodent that lives underground) in both Nohkop and Chicán is a compound. In each village, the sign is built on a similar strategy but realized in slightly different ways. The first sign in each case is metonymical as it depicts a salient feature of the animal: in Nohkop its whiskers (Figure 16a) and in Chicán its prominent teeth (Figure 16c). The second sign (of the compound) iconically depicts the way gophers are caught using a traditional trap. In Nohkop, the sign is performed with both hands, the left hand represents the branch to which the cord is attached and the right hand the knot that catches the animal (Figure 16b). In Chicán, the sign is more economical and only represents the part of the animal that gets trapped

13 The tracing variant also exists in YMSL of Chicán, but it is less frequent than the one shown in Figure 14a.

by the cord (Figure 16d). Figure 16e is a reproduction of the trap. Obviously, for someone who does not know this kind of trap and the way gophers are seized in this particular cultural context, the sign will not be transparent.

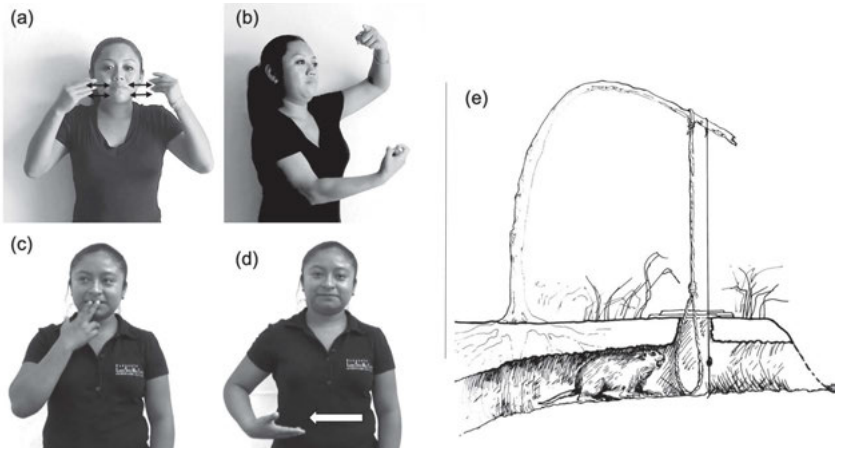


Figure 16: BAAJ "POCKET-GOPHER" in YMSL of Nohkop (a-b), and in Chicán (c-d). Illustration of the trap (e) (drawing adapted from Hunn 1977: 114).

All the signs presented in this section are semi-conventionalized gestures commonly used by Mayan speakers that are iconic enough to be understood without difficulty. This category of signs is important for the communication between deaf and hearing signers fluent in YMSL and hearing Mayan speakers not (too) familiar with the sign language. Because of their iconic dimension and their culture-specific roots, these signs are usually transparent enough for non-signers, but also among signers from different villages, and this common experience allows for linguistic accommodation or translanguaging (see Safar 2017).

4.3 Classifiers and SASSes already present in gesture

In many (if not all) languages of the world, some gestures resemble what are considered Size-and-Shape Specifiers (SASSes) in sign languages, as they visually represent the size and shape of an entity. SASSes in gestures are used to specify the size of an entity (concrete or metaphoric) and are generally introduced with a deictic marker in speech (e.g., "like this"). SASSes should be differentiated from simple iconic gestures, for they are systematic, referring to sets of entities, such as, for instance, SASSes depicting long objects or entities (e.g., machete, babies, etc.) or round objects (e.g., the diameter of trees). Speech usually disambiguates

the referent of a SASS gesture and certain languages, including various Mayan languages, have even developed specific deictic words that are specifically used with a gesture. In Yucatec Maya, this word is *buka'aj* (o *beytak*) that means literally "of this size" but is meant to direct the attention of the interlocutor to the gesture of the speaker. An example is presented in Figure 19b.

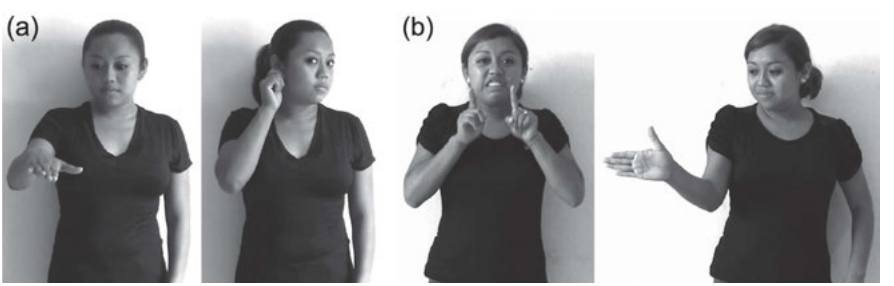
Regarding their path of lexicalization into signs, SASSes display several behaviors. They can still be used as suffix in the sign language, e.g., to specify either the meaning of the sign (i.e., the size of an entity). However, they can also be lexicalized and become signs on their own, e.g., both hands showing a horizontal length for BABY (see Figure 12). Finally, SASSes followed a similar pattern of lexicalization as quotable gestures and can be desemantized to function as suffixes to determine part of speech, in this case noun markers (see Coppola and Senghas 2010, Safar et al., this volume, for more details).

We also want to examine in more detail a subtype of SASSes that we refer to as "manual classifiers". Despite that these gestures are ubiquitous in everyday interactions, they only have been mentioned in the literature in Mesoamerica (Foster 1973; Meo-Zilio and Mejía 1980; Zavala 2000: 144). These gestures also exist in other parts of the world (Nyst 2007: 135, Safar, p.c.), but Mesoamerica seems to be a place where they are very productive. Some Mesoamerican languages can discriminate up to six different types of entities, like Me'phàa (Tlapaneco) for instance (Iván Oropeza Bruno, p.c.). We argue that this subtype of gesture is close to the classifiers present in many sign languages (Emmorey 2003; Supalla 1986) since these gestures not only specify the height of some entities but do so contrastively according to entity type, i.e., they are paradigmatic. In Yucatec Maya, manual classifiers only distinguish between two types of entities: upright objects and humans vs. four-legged animals. We consider these gesture classifiers as they perform a similar function in spoken languages (although in the case of Yucatec Maya the gestures are not a replication of the classifiers of the spoken languages) and sign languages.

The first manual classifier we consider is a gesture that commonly accompanies speech in many Indo-European languages (however, it is not considered a manual classifier as such in these languages as it is not contrastive with other gestures with the same function). In Yucatec Maya, it is used as a manual classifier only for upright entities (children, small trees, etc.) (Figure 17a). The handshape is a flat hand, palm facing downwards, that indicates the height of such entities. This manual classifier contrasts with the first one, especially because it is more specific, displaying the height of four-legged entities (dogs, pigs, horses, etc.). In this case the handshape is a B- or 5-handshape (the hand can be tight or relaxed) and the meaningful part is the bottom edge of the hand that corresponds to the height of the shoulder junction calculated from the ground (Figure 17b).

Figure 17: manual classifiers in Yucatec Maya gestures showing the height of upright entities (a) and four-legged animals (b).

In YMSL, both classifiers retained their function in the sign language, i.e. to show both the height and the type of entities. However, in YMSL, the manual classifier for upright entities is restricted (or better said, used by default) to refer to humans. For this reason, we glossed the classifiers in YMSL as SPEC-HEIGHT:HUMAN (upright human entity) and SPEC-HEIGHT:4LEG (four-legged animals). As for SASSes, classifiers work as nominal suffixes, as in GIRL (Figure 18a) and WILD-BOAR (Figure 18b), see Tkachman and Sandler (2013). In this sense, they differ from other classifiers in sign languages since they do not represent the entire entity through the handshape, and therefore cannot be used to show motion of an entity through signing space.



SPEC-HEIGHT:HUMAN+FEM — WILD BOAR+ SPEC-HEIGHT:4LEG

'young girl' — 'wild boar'

Figure 18: Classifiers used as nominal suffixes.

In all villages, signers of YMSL productively exploited the substrate of Yucatec Maya gestures which in many ways already are "sign language-like". Although the gesture retains its meaning and form in YMSL, it also synchronically undergoes a process of grammaticalization with a restriction in its meaning and syntactic position: the height specifier becomes a nominal affix to the main sign and does not iconically represent the height of the entity any longer, only its class (see Safar, forthcoming).

4.4 A habit of using character perspective

Although it has been recognized as a fairly common tool in many sign languages (Fauconnier 1985; Liddell 2003), the use of character perspective (also referred to as constructed action in sign language literature) seems to be less frequent among speakers of Indo-European languages (Earis and Cormier 2013). Furthermore, it is also rare that speakers of Indo-European languages take the perspective of another actor than the self, other humans and, even more rarely, that of animals (Unsworth et al. 2012). Interestingly, Yucatec Maya speakers, especially in narratives, make extensive use of character perspective and shift between characters in the story. In this way, they resemble signers of sign languages. We will first consider how perspective is used among speakers of Yucatec Maya and then turn to an example in YMSL.

In order to illustrate how character perspective is used among Yucatec Maya speakers, consider the following example (2), an extract from a natural conversation between two men from Kopchen talking about encounters with snakes.

(2) Conversation between two Yucatec Maya men
kiwu'uyke' tumáan e ba'a beyo'
I heard it [the snake] going like that

beey te' ich uyich e mejen k'áax beya' ku'ye' tumáan beya'
among the small grass like this, I heard it moving like this[Figure 19a]

(tu) péejkuns uba chen ka' tinwilaje' Tuh, buka'aj wa'lik ukaala' Delio
it was moving and suddenly, mate! It raised its neck this high[Figure 19b], Delio!

ubeenma beya'. Teen kyik te' ka'anlo'
it curbed like this[Figure 19c]. It was looking up at me[Figure 19d]

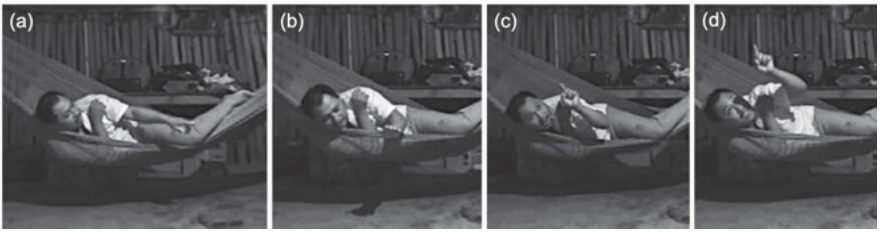


Figure 19: Use of character perspective in a Yucatec Maya narration.

The first gesture made by the speaker (Figure 19a) is a 'metaphoric pointing' (Le Guen 2011a) that considers the speaker's perspective at the time of the encounter, pointing at where the snake was according to his current position and orientation (and not his actual orientation at the time of the encounter). The second gesture (Figure 19b) is a manual classifier that specifies the height of the snake rising up and threatening the speaker (see section 4.3). The third gesture reflects a "mixed perspective" (see Perniss 2007): while the index finger of the left hand specifies the shape of the snake's body (Figure 19c), the head of the speaker takes the perspective of the snake (i.e., as if the speaker is embodying the snake), looking up. Interestingly, this use of pointing with character perspective (i.e. the finger represents the head of the snake looking up and slightly turns into a point upward) falls into the strategies commonly used in sign languages, one that Perniss named "entity classifier in character perspective (non-aligned)" (2007: 204). The last gesture is a clarification of the previous one. The speaker continues to take the snake's perspective, his eyes are looking up even more, adding a pointing gesture with the index finger that indicates the direction of the snake's gaze to the man's face while verbally specifying "it was looking up at me" (Figure 19d). Note that the last pointing is also made from the perspective of the snake and is equivalent to the strategy Perniss describes in sign language as "index in character perspective" (2007: 206).

In order to show how much character perspective is used in Yucatec Maya, we transcribed all the gestures produced by a male speaker from Kopchen in a 12'32" long narrative composed of a total of 258 utterances and 301 gestures, of which 100 fall into the category of 'character perspective' (see also Figure 4). The narration tells the story of a man who discovers that his wife is a witch. In his performance, the speaker embodies all the characters of the story, and even sometimes takes mixed perspectives. In order to illustrate the level of complexity of the character perspectives used in the story, consider the following example (3), an extract from the narrative in which the speaker embodies the witch and the man simultaneously (see Figure 20).

(3) The story of the witch

a. *ts'-uy-áak'ab-tal* *bin* *bey-a'* *chúumuk* áak'a'
TERM-3A-night-INCH EVID MAN.DT middle night
'it was night already, like this, they say, it was the middle of the night'

b. *chen* *ka'* *t-uy-u'ub-e* *tun-ma'ach-a'* *bey-a'*
only CONJ CP.TR-3A-feel-SBJ PROG-3A-grab-PAS MAN.DT
'all of a sudden, he felt he was being touched like this'

c. *tun-ma'ach-a'* *bey* *t-u-tséel* *bey* *yaan-a'*
PROG-3A-grab-PAS MAN FOC-3A-side MAN EXIST-DT
'he was being touched, as she was on his side like this'

d. *tun-mach-ik*
PROG-3A-grab-IC.TR
'she was touching him'

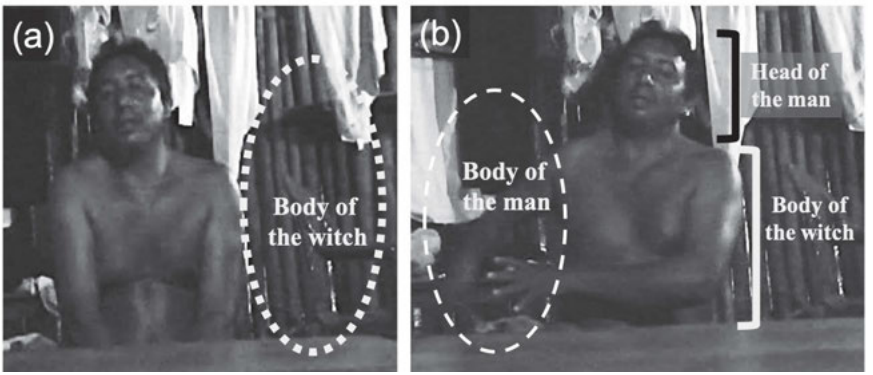


Figure 20: Mixed character perspective in a Yucatec Maya narrative.

Linguistically, because there is no gender in Yucatec Maya, the gestures also help disambiguate who is doing what to whom, especially in (3d) which means literally "someone is touching someone else". Also, we note an interesting use of passive and active forms. While the man is the subject of the utterance (3b-c), the verb is in a passive form "he is being touched", but when the speaker shifts to the perspective of the witch, he uses a transitive active form "she touches him" (3d). Prior to this extract, the speaker was taking the perspective of the man, sleeping in his hammock next to this person (the witch) who he located on his left side (Figure 20a). During the time of the extract (3), the speaker starts using the perspective of the man, with hand gestures shifting from the perspective of

the witch (now touching to his right), while the head of the speaker takes the perspective of the man (Figure 20b). This change in perspective from the man to the witch is reflected in the speech by a shift from passive to active construction in his speech. This use of character perspective is typical of Yucatec Maya narratives and can become quite elaborate as the speaker places characters in space, embodies them, shifts between them and, even in some cases mixes them, i.e. embodying both characters simultaneously.

Not surprisingly, the use of character perspective is also a productive device in YMSL narratives. Consider for instance, this extract from a narrative of a deaf signer from Nohkop, telling the story of when her grandfather decided to kill and eat her pet rabbit. Instead of telling the story from her current point of view, she decides to enact all the characters of the story, that is, talking from a first person perspective all the time. Interestingly, she also uses mixed character perspective like Yucatec Maya speakers, as in (4).

(4) The rabbit story[14]

F INTENS
DH PRO_1HUNGRY$_{[Figure\ 21a]}$EAT GRANDFATHER (HAT.name sign) HUNGRY
NDH GRANDFATHER (HAT)
PERSP : GdFather
"I'm hungry" said my grandfather"

F $SAD_{1[Figure\ 21b]}$ SAD_2 AGREE SAD
DH
NDH
PERSP : $S_{\_NE}$
"I was sad, (but) I agreed"

F $SCREAM_{[Figure\ 21d]}$
DH PLUG-EARS$_{[Figure\ 21c]}$ $EARS_1$ $EARS_2$
NDH PLUG-EARS $EARS_1$ $EARS_2$
PERSP : $S_{\_NE}$ $S_{\_NE}$+R
"I had to plug my hears, as the rabbit was screaming (a lot), as it was held by its ears"

14 In order to present the extract in a more detailed fashion, we consider the following articulators separately: F = Face, DH= dominant Hand, NDH = non-dominant Hand and propose an interpretation of the perspective (PERSP) the signer is taking: GdFather = Grandfather, R = Rabbit; $S_{\_NE}$ = the signer in the narrated event, $S_{\_SE}$ = the signer in the speech event.

F SCREAM
DH CUT-THROAT
NDH HOLD(by the hear)$_{[\text{Figure 21e}]}$ CUT-THROAT
PERSP: R+GdFather
"(the rabbit) was held by its ears and was screaming as its throat was cut"

F DISGUST INTENSE SCARED
DH DISGUST CUT-THROAT$_{[\text{Figure 21f}]}$ SCARED
NDH DISGUST CUT-THROAT
PERSP: R+observer
"I was disgusted when it got (suddenly) killed. I got so scared!"

F DISGUST FEAR
DH BLOOD-POUR (out of neck)$_{[\text{Figure 21g}]}$ FEAR
NDH FEAR
PERSP: R
"blood was pouring (from its neck)"

F DISGUST$_{[\text{Figure 21h}]}$ SAD$_{[\text{Figure 21j}]}$
DH TS'OK$_{1[\text{Figure 21i}]}$
NDH DISGUST TS'OK$_1$
PERSP: S$_{_NE}$ S$_{_SE}$
"I was scared and grossed out, and that was it, I was so sad"

Figure 21: Mixed character perspective in the 'rabbit story'.

Although the translation in (4) is done in the third person, in the sign language the signer always uses the first person and shifts among characters. She starts with taking the perspective of the grandfather (Figure 21a), the only character explicitly mentioned in the extract, saying that he is hungry. Then she changes to her own perspective at the time of the event, reacting to her grandfather's strange request (Figure 21b), and continues taking her own perspective in the narrated event, plugging her ears as the rabbit starts screaming (Figure 21c). After that, she shifts to the rabbit's perspective, now screaming (Figure 21d). In this moment (Figure 21e), she changes to mixed perspectives, enacting the rabbit screaming with her face and the grandfather holding the rabbit with her non-dominant hand. She then goes on enacting the rabbit with her face but, with her hands, shows how the rabbit got its throat cut (by the grandfather) (Figure 21f). This construction falls into the category of "double perspective" proposed by Perniss (2007: 227). She then uses her own body to explain how the blood was pouring out of the rabbit's neck, taking again the perspective of the rabbit (Figure 21g). After that, she returns to her perspective to express how much she was scared and grossed out (Figure 21h). She marks the end of the story using the discourse marker TS'OK$_1$ ("THERE-IT-ENDS", see section 4.1.2) (Figure 21i) and finally says that she was sad about the whole thing (Figure 21j), now expressing her feeling at the time of the speech event. According to Perniss (2007), the use of character perspective to retell the story is efficient, gives more vividness and also avoids more complex utterances at the syntactic level and tense coordination. Also, Perniss points out the benefit for expressing spatial relationships: "In exhibiting temporal iconicity with the event, the highly efficient construction also insures a high degree of informativeness, encoding multiple event components, and contributing to overall spatial coherence. With double-perspective constructions, signers maintain spatial coherence between perspectives creating an explicit mapping between them" (Perniss 2007: 219–220). As is clear in our example above, these constructions allow the producer to maintain coherence in discourse involving various characters interacting with each other simultaneously.

Although character perspective is nothing new to sign language or even gesture studies, the fact that Yucatec Mayas (and other non-Western speech communities) use it extensively (see for instance Quinto-Pozos 2007), undoubtedly facilitates not only comprehension of deaf signers' discourse by hearing people (especially those unfamiliar with the sign language) but also the very process of creation of the emerging sign language.

4.5 Linguistic calques and transfer of cultural concepts and communicative habits

Language is never separate from culture, and it often turns out to be one of its main channels of transmission (Schieffelin and Ochs 1986). It is no surprise then that many Mayan concepts have been transmitted to and linguistically encoded in YMSL, showing again the influence of the context on the evolution and emergence of the YMSL. In this section, we examine two phenomena, the first is cultural translation of local concepts, especially religious ideas and linguistic calques.[15] The second relates to cultural habits that have been adapted and are used in YMSL, such as pointing for space and time and the use of Frames of Reference.

In order to illustrate cultural translation of cultural transfers and linguistic calques, most of our examples will come from an extract from a conversation that involved the oldest signer in Chicán, Don Teodoro and his bimodal-bilingual nephew Don Dolores, as well as the researchers M. Pacheco and O. Le Guen. During this exchange, the deaf signer uses a number of linguistic calques from Yucatec Maya.

The first is the use of a copula for "deceased". In Yucatec Maya, to talk about the deceased, the name of the dead person has to be used in a construction with the word *áanima* (from the Spanish *ánima* "dead, soul") used as a nominal classifier, as in *áanima j Waan* "deceased John" or in a possessive construction like *áanima intiya Maariya* "my deceased aunt Mary". This construction is not obligatory in spoken Yucatec Maya, at least after the first mention, but certain speakers tend to use it consistently over the conversation (see also Hanks 2007: 156–157). In YMSL, the linguistic marking is similar, although the word order is different: the name of the person comes first and the ÁANIMA marker comes as a copula, as in the following example from Don Teodoro talking about his grandmother (Figure 22).

Interestingly, Don Teodoro, being from an older generation, tends to be more traditional as older Yucatec Maya speakers, and uses this copula (which seems to function as a nominal classifier) (see also Section 4.3) systematically in every mention of a deceased during the conversation.

15 A linguistic calque is a word, more often an expression, borrowed from another language and translated literally into the target language.

There are a number of linguistic calques from Yucatec Maya in YMSL. Just to mention a few more, consider for instance the one presented in Figure 12, "to die". In Yucatec Maya, the expression is *ts'ok* ERG-*kimil*, meaning "finishing to die/pass out". The same reverse word order can be noted here in YMSL with the perfective TS'OK appearing after the main root, as in KIMIL TS'OK "DIE FINISH". Another example is YA'AB ÚUCH "'in a long time in the future' (lit. 'a lot is to go')" a translation from the Mayan linguistic expression mixed with gesture *ya'ab ubin* "still a long way/time off" (see Le Guen 2012a: 231).

Another example of a linguistic calque that ties to a more complex phenomenon of cultural transfer comes from an extract in which Don Teodoro mentions supernatural entities, specifically the *nukuch báalam* or supernatural guardians of space, considered invisible among Yucatec Mayas, moving as *iik'* "wind" (Le Guen 2012b). As in Yucatec Maya, the sign in YMSL means "wind" (Figure 23) but is used in this context to described "invisible supernatural entities". The sign is performed with both hands moving back and forth in front of the chest to create and reproduce the flow of air sometimes accompanied by expulsing air with the mouth.

Don Teodoro says that when he was young and working in his field, he witnessed and participated in rituals dedicated to the supernatural entities performed by his father who was a ritual specialist. He says he believes in the existence of *nukuch báalam* and commonly asks a ritual specialist to perform rituals in his field, as it is customary among Yucatec Mayan farmers.

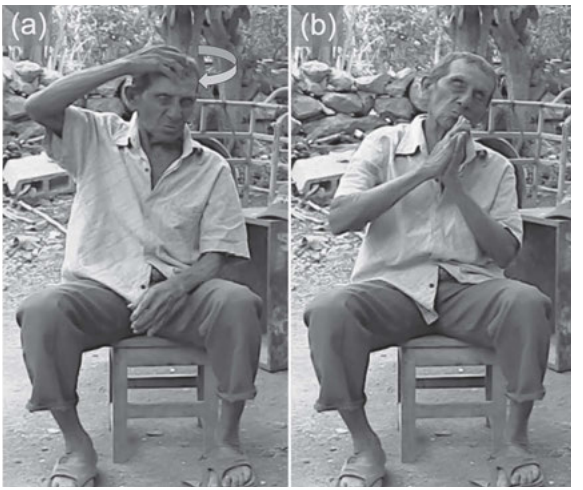


Figure 22: (a) GREY HAIR – (b) ÁANIMA: "my deceased grand-mother"

Figure 23: IIK' "wind, invisible supernatural entity"

Our next example is not a linguistic calque, but an invention of a sign in the YMSL of Chicán for another supernatural entity. We think it is relevant to mention it here as it reinforces how much Mayan culture is present in the sign language and among the signers. This entity, called *x táabay* in Yucatec Maya, has the body of a woman with long hair, a feature iconically reproduced in the sign with the open hand placed in front of the face and lowered to trace the hair (Figure 24).

Figure 24: The sign of *x Táabay* in Chicán, a local supernatural evil entity (see Le Guen 2012b).

The examples we examined above all are lexical items. In what follows, we want to illustrate how more subtle Yucatec Mayan communicational habits have been adapted and transferred into YMSL. Such features of the languages are crucial as they frame the communicative style and the form of the YMSL. Among these habits, that turn eventually into referential practices, we examine pointing for time, metonymic pointing for places and for people and the use of cardinal directions as well as the use of the geocentric Frame of Reference (FoR).

Le Guen explained elsewhere (Le Guen 2012a) how time signs in YMSL are adapted from time gestures from Yucatec Maya, and notices two phenomena. The first is how the conception of space in Yucatec Maya (speech and gesture) coincides with the conception of time in YMSL. Second, modifications and adaptations that gestures undergo when transformed into signs are often the results of the limitations of Yucatec Maya multimodal communication (for instance, the restriction of metaphorical use of the gesturing space). For instance, Yucatec Mayas point to the position of the sun to talk about a certain hour but would use linguistic rather than gestural strategies to refer to periods of time. YMSL signers, because there is no gestural strategy to represent time lapses in Yucatec Mayan gestures, adapted the pointing strategy, adding movement to it in order to represent the arc of the sun and to indicate periods of time, as in Figure 26 (see also Floyd 2016). Note that the movement of the signer (accompanied by his

eye gaze) indicates the actual path of the sun: the first point is done towards the East and indicates the position of the sun at around 11 a.m. (Figure 25a) and the signer traces an arc that ends pointing to the West indicating the position of the sun around 2–3 p.m. (Figure 25b).

Figure 25: Signer using the arc of the sun to represent a time lapse (from 11 a.m. (a) to 2–3 p.m. (b)).

As in Yucatec Maya (Le Guen 2011a) and many emerging sign languages (Bauer 2014; de Vos 2012a), signers rely heavily on metonymic pointing to refer to places and people (see also example 1 Figure 2a for Yucatec Maya). In a small-scale environment, this strategy is particularly easy and useful, although it does imply shared knowledge by both the speaker and his or her interlocutor. The following example is an enumeration from Don Teodoro of all his relatives. In this extract, he refers to his relatives only using pointing to the locations of their houses (Figure 26), although he did mention them by name earlier in the conversation.

In this example Don Teodoro uses 'list buoys' (Liddell 2003) to enumerate the list of all his relatives starting with the first located on the pinky, all the way to the last placed on the index finger. This strategy is also in use among Yucatec Mayas (Safar, Le Guen, Collí Collí, and Collí Hau 2018). In Figure 26a, he first does a self-reference point to his chest and counts himself as the first of the brotherhood using the pinky as the first buoy (Figure 26b). He then directly points to his own house (Figure 26c). Next, he goes on using the same strategy and refers to his relatives by pointing metonymically to them through the location of their houses (i.e. where they reside habitually) (Figure 26e, h, j), always placing each sibling on the buoys list (Figure 26d, f, i). Teodoro also relies on the "up is far" rule (Le

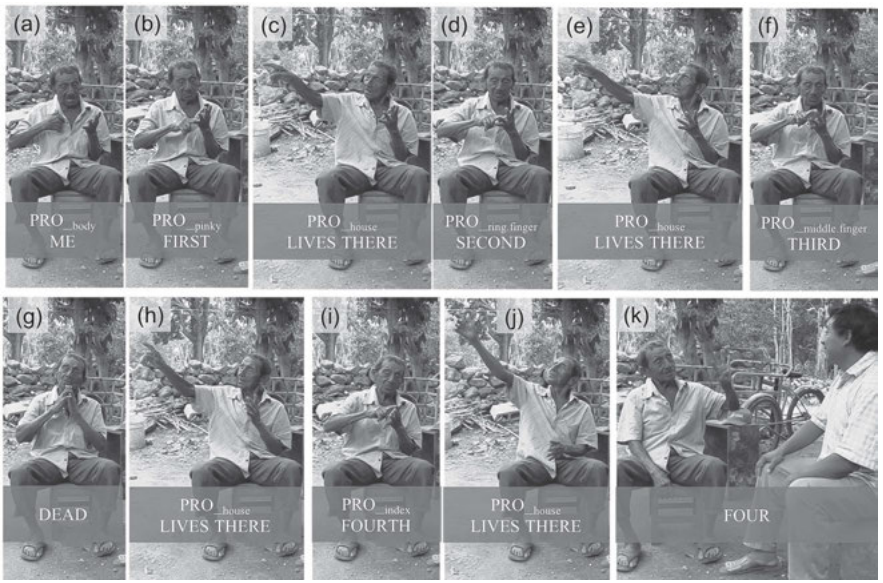


Figure 26: Metonymic pointing by Don Teodoro to refer to his relatives (alive and deceased). "Me, I'm the first (a-b), over there is my older sibling (c-d), over there, his older brother (e-f), the late (Don Carmen) (g), he lived there (h), the oldest lives over there (i-j). We are four (k)."

Guen 2011a) by pointing up higher as the distance is greater and also shifting to a looser handshape. Note that in Figure 26g, Teodoro specifies that one sibling is deceased, adding the ÁANIMA sign after pointing to the finger referring as a buoy to this sibling (see Figure 22b). This strategy (metonymic pointing and buoys) is very useful in a small-scale environment and is in common use among Yucatec Maya speakers too.

Finally, we want to mention the use of the geocentric Frame of Reference (FoR) in YMSL. Le Guen (2011b) showed in detail that Yucatec Maya rely on the geocentric FoR to locate one entity in relation to another (especially when distant from the speaker's position) and that this frame is mainly transmitted through gesture among Yucatec Maya speakers. Not surprisingly, YMSL signers share a similar conception of space. To illustrate this point, consider the following example of Teodoro talking about the ritual conducted by his father in the field. Such a ritual consists in offering gourds of maize beverage to the supernatural entities and is always conducted towards the East (Hanks 1993). In Figure 27a, Don Teodoro is representing, with the index and the thumb, the (round) form of the gourds placed on the altar (Figure 27c shows a picture of an actual ritual). In Figure 27b, he indicates with an open palm and extended arm the direction towards

which the altar was placed and the ritual performed. As it turned out, Teodoro was facing West during the interview, but because he relies on a geocentric FoR, in order to properly indicate how the gourds were placed on the altar, he has to do it in the "correct" orientation, in this case, towards the East. This is the reason why he chooses to turn away from the camera and his interlocutors. This kind of strategy is rarely (if never) in use among Western signers and gesturers who would have rather kept the signing space visible to all the participants and used instead an egocentric or an intrinsic FoR to represent the referent, placing it in front of the chest (Levinson 2003).

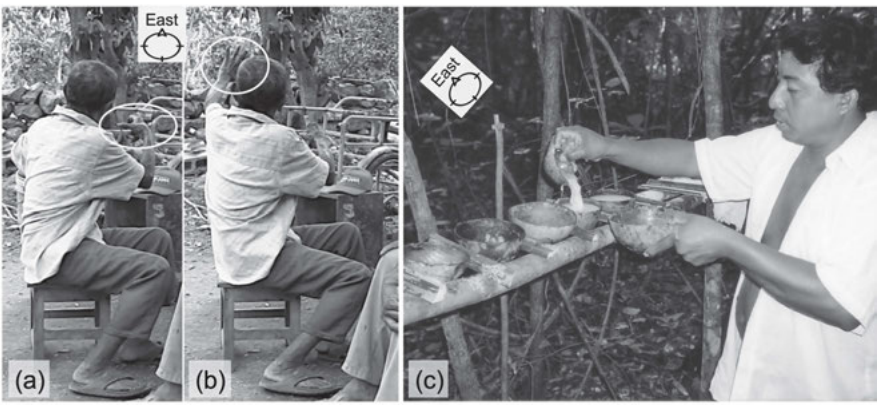


Figure 27: Don Teodoro showing how his father would conduct a ritual by placing gourds on the altar (a) towards the East (b). In (c) an actual photo (by O. Le Guen) of such a ritual.

Because YMSL signers share a cultural background with Yucatec Maya speakers and because the majority of signers and interlocutors are also hearing and speakers of Yucatec Maya, it not surprising to witness many linguistic calques as well as cultural transfers of local ideas into YMSL. We come back in section 5.4 on the various reasons why YMSL cannot be too separate from Yucatec Maya spoken language and communicational habits.

Note however that some calques or YMSL translations of Yucatec Mayan concepts have not been encountered in both villages. This is due to a number of reasons, many having to do with the type of population of each community. The deaf signers of Chicán represent 3 generations with many men, who are used to going to the fields and engaging in traditional activities. In contrast, the deaf signers of Nohkop are younger (below 24 years old) and mainly girls; this is why many traditional concepts and signs for field-related practices are encountered in

lesser number in Nohkop than in Chicán. In contrast, signers from Nohkop have invented many signs for colors and fashion-related items.

5 Discussion

Throughout this chapter, we examined the degree to which multimodal communication among Yucatec Maya can provide a productive foundation for the creation of varieties of sign languages that emerged independently and in parallel but that are still nonetheless related (the reason why we want to consider them varieties of the same language). So far, we have seen several examples of gestures and linguistic strategies that have been adapted in the same way in the YSML of both villages (Chicán and Nohkop) to produce identical or similar signs. With this analysis in mind, we now discuss several related issues in more detail.

6 Multimodal communication as linguistic input

In order to consider Yucatec Maya multimodal communication, and more specifically gestures, as a source of linguistic input, we should be able to show in the first place that gestures are linguistic in nature. In the last years, a growing body of research has been showing that in many cultures gesture and visual behavior can be considered part of the linguistic system (Enfield 2009; Floyd 2016; Vigliocco et al. 2014) and not just pragmatic or paralinguistic features. In the examples analyzed in this chapter we have considered several examples of gestures as linguistic.

In order to consider gesture as part of language, it is fundamental to free the analysis of the bias of modality. Okrent (2002) criticizes the term "gesture" for it has been limited to the visual modality. The author convincingly shows that there can be oral gestures (e.g. vocal lengthening, but see also the discussion in Dingemanse (2011) on ideophones) as well as linguistic visual behavior. Although we follow Okrent's theoretical proposal, we cannot, however, ignore an already long tradition of using the term gesture for movement of the hands, and therefore will make explicit whether we are talking about a linguistic manual gesture (visual) or an oral gesture (oral). In this account, manual gestures can be considered part of the linguistic system in two ways.

(1) Gestures on their own: certain gestures already have word-like or language like properties as we have been showing in this chapter. The most obvious examples are probably quotable gestures that have a stable form and meaning

and already resemble lexical items and certain speech acts, replacing speech without a problem. Certain specific gestures, here considered as manual classifiers, also have a stable form and function, showing size contrastively between types of entities and replicating gesturally what verbal classifiers do in speech. Certain iconic gestures also present dimensions of lexicality but lack form stability to be considered completely linguistic.

(2) Gestures along with speech: in this case, it is crucial to consider the complementary distribution of information between speech and gesture; specifically, the way gestures are grammatically integrated into speech. This strategy is less obvious and probably the reason why it has been overlooked. In this chapter, we examined several examples in which the main information is delivered visually in the form of a composite utterance. In these cases, the gesture does not have to be of a specific type, and can be pointing, placing, iconic, etc. As pointed out by Floyd (2016) for time gestures (but valid for a variety of gestures), manual gestures can be triggered or integrated in various ways into speech. Floyd indicates three possible strategies: (a) A deictic in speech points to the gesture, either it is a non-specific deictic (e.g. "like this") or, as in some languages like Yucatec Maya, a specialized deictic that is compulsorily accompanied by a gesture (e.g. "of this size/form"). (b) The gesture is performed and temporally aligned with a specific word (adverb, adjective, etc.) that complements or adds to its meaning (e.g. he "goes" + gesture specifying the direction and movement of the moving entity). (c) The gesture is not explicitly introduced by the speech and nonetheless provides the relevant information. This strategy is common in Yucatec Maya, as we have seen in the first example (Figure 1) and Le Guen (2011a) also shows how spatial information for cardinal directions is almost exclusively transmitted visually among women.

Taken from a sign language perspective, this second type of gesture integration, although linguistic, seems not to be readily available for deaf people, mainly because the type of gesture can just be a point or an iconic gesture, which are not often meaningful on their own (i.e. based solely on their form) without the context of the accompanying spoken language. This would indeed be a legitimate critique, but one crucial feature to consider when looking at sign languages emerging in small-scale societies like Yucatec Maya is that deaf people are immersed in the wider culture of hearing people (Johnson 1991). Because in composite utterances important information is transmitted visually, and because deaf people are aware of this fact, they are able to gather a part of what is communicated among hearing people (although to which extent is a question that still needs to be empirically tested more systematically).

Considering multimodal practices as linguistic is not a trivial issue and comes to revise claims that have been made regarding homesign systems (Goldin-Meadow 2003) and sign languages having emerged without any linguistic input, here understood as the absence of a fully formed language as input (A. Senghas and Coppola 2001; A. Senghas, Kita, and Özyürek 2004; R. J. Senghas, Senghas, and Pyers 2005). Although it is true that multimodal communication is not a language, it does provide some linguistic input, as shown in Goldin-Meadow, Mylander and Franklin (2007) among American and Chinese deaf children. However, what we argue here, is that Yucatec Mayan gestures provide many manual gestures readily transformable into signs in YMSL, oral linguistic structures easily adaptable to a sign language and many iconic forms of expressions that can be systematized into signs. This, combined with an ideology and a disposition of Yucatec Mayan hearing people to communicate without speaking, allows for mutual intelligibility between signers and non-signers using YMSL. But most importantly, it also suggests that deaf people may be less isolated communicationally as in other contexts (although a proper study along the line of Goldin-Meadow, Mylander and Franklin (2007) should be run).

For descriptivist linguists, prosody as well as manual gestures have generally been considered as "non-linguistic" features and are generally demoted to the rank of pragmatic or even paralinguistic elements. In fact, as pointed out by Enfield (2004: 119), many authors, including sign language linguists, tend to consider that spoken language is based on a single articulator that is speech, while many studies have been showing that speech and gesture are in fact a single system (McNeill 1992).

Considering that language is multimodal implies that meaning can be transmitted through both channels (oral and visual), but also that these elements should be grammatically integrated. Indeed Pfau, following Wilcox, fairly proposes that "for a gesture to be considered a linguistic/grammatical element, it would also have to be merged in the phrase structure, be it as part of a lexeme or as an independent element with scope properties" (Pfau 2015: 44). Much recent research has shown that indeed, some visual elements can be considered part of the grammatical system. For instance, Floyd (2016: 58) provides a detailed analysis of phrasal structures where gestures are integrated as grammatical elements (e.g., pointings functioning as adverbs), and we also showed several cases in this chapter for Yucatec Maya that offer converging evidence for this claim in other publications (Le Guen 2011b, 2018a) (see also Enfield, 2009 for Lao; Jouitteau 2004 for Atlantic French; Wilkins 2003 for Arrernte). Additionally, the fact that certain languages have specific deictics that introduce in a compulsory fashion a visual element (e.g., a gesture for size) offers additional evidence of

the extent to which visual elements are integrated with speech to form linguistic messages.

6.1 Some reflections on the paths of grammaticalization and lexicalization

A second consequence of taking multimodal communication as linguistic is that it imposes a revision of what has been regarded as paths of grammaticalization from gestures to signs. Authors who have been considering the issue of transformation of gestures into signs generally assumed that gestures are not linguistic in nature, especially when taken on their own. Wilcox (2005, 2009) for instance analyzes how gestures are integrated as signs, considering also some cases of quotable gestures in what he calls "route 1" of grammaticalization, but clearly dismisses the idea that gesture can be linguistic in the first place: "Route 1 may be understood as the incorporation of non-linguistic, manually-articulated gestural symbols into the linguistic system of a signed language" (S. Wilcox, 2009: 91).[16] Such a statement reflects (a once widely accepted) ideological and historical posture against sign language discrimination (see Stokoe 1960). It also clearly reveals how researchers interested in sign language have been considering gestures, i.e., regarding them, ironically, as non-linguistic solely based on their modality (see Goldin-Meadow and Brentari, 2017 for a more recent take on this issue). Although such a position cannot be too problematic for established sign languages, as it demotes the question of the gestural origin of signs to purely etymological matters, it is however a fundamental issue in considering the emergence of new sign languages. In this chapter, we have seen a number of examples of gestures being lexicalized and grammaticalized. Let us consider these processes in more detail.

For instance, the holophrastic quotable gesture *ts'ok "finish, there it ends"* seems to have been grammaticalized in YMSL along a grammaticalization path or "route" (following Wilcox 2005, 2009). In this chapter, we considered the form and meaning of the co-speech gesture and how it evolved or got modified in the sign language. In the case of the gesture *ts'ok*, the form and meaning remained similar to the gesture in YMSL (TS'OK$_1$). In this sense, we can consider that YMSL inherited the linguistic features already present in the gesture in Yucatec Maya and analyze

16 In his chapter, Wilcox (2009) considers that even conventionalized gestures are non-linguistic. He apparently means (because he never states it clearly) by linguistic, "incorporated syntactically" which is, as Floyd (2016) points out not adequate either.

this process simply as "transfer". Once in YMSL, the now sign underwent two more transformations, one as a discourse marker used as an independent sign and the other as a temporal marker used as a copula. Based on these grammatical features, we could be tempted to consider that the discourse marker was primary and then the perfective derived from it. However, this is speculative since both forms exist from the first generation of deaf signers and their existence in the language might just be the result of a synchronic process.

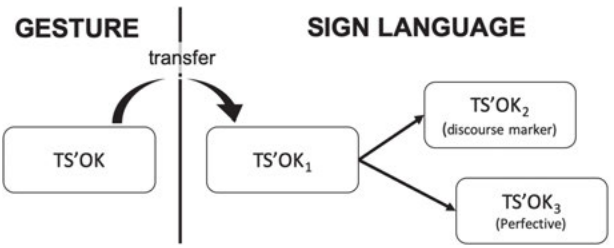


Figure 28: Path of grammaticalization of the gesture TS'OK "FINISH, THERE IT ENDS" in YMSL.

While Wilcox (2005: 12) considers that the grammaticalization path (route 1) goes as follows: gesture > Lexical morpheme > grammatical morpheme, our data suggests a different path. If we consider form, meaning and function, many gestures are readily integrated into sign language though syntactic integration, rather than going through a lexicalization to a grammaticalization, following a path closer to what borrowings from another language undergo. The next stages, not taken by all gestures turned into signs, is either a grammaticalization with a change of meaning and function (as in TS'OK$_{2-3}$) or in a construction with another sign, either a compound or a grammatical marker (such as lexical items used as verbs on their own and as nouns in conjunction with a SASS, see Section 4.1.1).

Although we will not go into detail, we present some other paths of integration of gestures into YMSL in Table 3. Some general tendencies seem to be taken by gesture types that are either transferred into YMSL (i.e., keeping their form and meaning without any modification), lexicalized (i.e., also keeping their form and meaning but being syntactically integrated in the sign language) and grammaticalized (i.e., modifying their meaning and/or function).

What we notice, as famously proposed by Givón (1971: 413), is that syntax is prior to grammar, i.e., that word order and syntactic position is prior to morphology. We also notice a similar phenomenon in multimodal communication where most gestures are syntactically integrated with speech (i.e., temporally aligned with it), although few actually replace speech. We also see that Wilcox's (2005) "route 1"

is not always realized and gestures that are grammaticalized are not always lexicalized first. Instead, our data shows that when gestures get integrated in the sign language they do not have to first change their form or function or need some morphology, but tend to be ("only") syntactically incorporated following the rule of the target language. In the case of transfers, the sign is still independent and behaves quite in the same way as the gesture (especially in the case of holophrastics). Lexicalization, because it is a step further into language integration, implies some syntactic adjustments and grammaticalization, i.e., a modification of the meaning and function (as far as form is concerned, a proper phonological analysis remains to be conducted). We also notice that some gesturing practices, such as metonymic pointing for person reference for instance are used in the same way in spoken Yucatec Maya as in YMSL.

Table 3: Some paths of integration of gesture types into signs in YMSL.

Gesture	Sign	Path of integration	Example
Lexical quotable gestures	lexicon (noun)	lexicalization	MONEY (see Figure 6)
Holophrastic quotable gestures	holophrastic, discourse & grammatical markers	transfer, grammaticalization	TS'OK$_{1\text{-}2\text{-}3}$ (see Figure 10, Figure 11, Figure 12)
Manual classifiers	classifiers	grammaticalization	SPEC-HEIGHT:HUMAN (see Figure 17)
SASS	determiner (copula for noun)	grammaticalization	MACHETE (CUT+SASS) Figure 18
Concept gestures	adverbial	lexicalization, grammaticalization	ÚUCH "A LONG TIME AGO"
Iconic gestures	verb (action) or noun(+SASS)	lexicalization, grammaticalization	(MAKE-)TORTILLA[17]
Metonymic pointing for person reference	metonymic pointing for person reference	transfer	(see Figure 26)

In considering grammaticalization, Wilcox also proposes a second route, he calls "route 2" that considers how some intonational or prosodic elements of the hearing gestural practices get integrated as grammatical elements in the sign

17 see http://ymslproject.org/VIDEOS_datos/ts'ap%20waah.mp4

language; route 2 goes as follows: gesture > prosody/intonation > grammatical morpheme (Wilcox 2005: 13). However, the author does not clearly refer to any gestural practices used in the surrounding hearing community but instead solely considers some prosodic features of signs that get conventionalized systematically (in some cases, in the same way in various sign languages over the world). Looking at non-systematic gestural elements in Yucatec Maya, we notice that some gestural habits indeed got grammaticalized.

Consider for instance an example comes from the classic "palm up gesture" (Gabarro-Lopez 2017; Kendon 2004; Müller 2004), also present in Yucatec Maya. According to Müller, with the palm-up gesture, the speaker is presenting "a discursive object, offering it for inspection, and inviting to join in the proposed view" (2004: 244). According to many authors, a sign derived from this gesture is also present in many sign languages (Engberg-Pedersen 2002; Hoza 2011; Loon 2012; McKee and Wallingford 2011). As pointed out by Van Loon et al. (2014) the gesture is transformed into a sign following a path of grammaticalization that goes as follows: gesture > turn taking marker/question particle > discourse marker > connective/epistemic marker. In YMSL, although a more detailed analysis remains to be conducted, it is worth noting that this sign is already used frequently (by certain signers more than others) at the end of an utterance as an epistemic marker that expresses the attitude of the signer towards the content of the utterance. This is the reason why we decided to gloss it in Maya as BEYO' meaning something like "it's like that!, isn't it the case!?", as illustrated in Figure 29. In this example, the signer used it at the end of an elicitation. She described the video using YMSL and, as she finished her explanation of the video, looked at the researcher performing the sign BEYO' "this is how it is", implying at the same time that this is an accurate description of the video and that this description was also obvious as both watched the video an instant before (i.e., pointing to the relative absurdity of the task).

In YMSL, the BEYO' sign does not function as a connector, but clearly as an epistemic marker which, according to Van Loon et al. (2014), should only arise at the end of the grammaticalization process. One explanation for why it skipped the whole lexicalization process in YMSL may have to do with the cultural context and the way speakers or signers are expected to present their knowledge to their interlocutor (see Le Guen (2018b) for a discussion on epistemicity in Yucatec Maya). In Yucatec Maya, the manner deictic *beyo'* "that it is!" is used for the same purpose, and its function might have been calqued into YMSL through the adaptation of the palm up gesture. However, a more thorough and systematic investigation of the sign BEYO' and its different uses in YMSL would shed more light on this issue (see Cooperrider, Abner, and Goldin-Meadow 2018; McKee and Wallingford 2011 inter alia).

Figure 29: Discourse marker glossed as BEYO' "that it is!".

What these two examples help show is that meaningful behaviors in the surrounding community quickly get systematized and grammaticalized in the sign language in order to become linguistic elements used to build a complex and useful linguistic system. In contrast to what is proposed in Wilcox (2005, 2009), the signs adapted from gestures seem to be able to be directly grammaticalized, and non-systematic gestural behavior (such as palm-up) are not limited to prosody but rapidly get recruited as grammatical markers.

It seems that the grammaticalization paths of various types of gestures happened very fast in YMSL. This might be explained by the pressure faced by deaf signers and their kin to build an efficient linguistic system in a few years. Obviously, the fact that multimodal communication is already very systematic and that hearing attitudes are positive towards the use of non-verbal communication certainly facilitates this process. It is important to emphasize that there is no tradition in the Yucatec Maya culture of silent gesturing or "alternate sign languages" (for mourning or hunting as it is the case in Australian aboriginal settings for instance, see Bauer (2014)).

6.2 Features of the Yucatec Maya multimodal communication that help (and limit) the creation of YMSL

So far, we mentioned various factors, some specific to the Yucatec Maya setting, that help in the construction of a sign language. However, it is also the case that Yucatec Maya spoken language and its communication setting share, by coincidence, several features with sign languages. Such grammatical features and communicational habits not only facilitate the creation and use of sign language

in these communities, but also make communication for bimodal-bilinguals more natural or obvious since some features are similar in both languages. Let us review some of these common characteristics and consider one major limitation that has to be overcome by signers.

One feature we already mentioned, is the strong tendency to use face-to-face communication and (at least up until now) the absence of disembodied communication (like writing, the use of phones, etc.) that makes Yucatec Maya and YMSL communication alike.

Second is the absence of grammatical tense (but see Vapnarsky (2016) for a discussion of future in Yucatec Maya). Sign languages, just like spoken Yucatec Maya, do not inflect verbs for tense. In Yucatec Maya, as in sign languages, tense realization is done through the use of temporal adverbs and aspects and modes (see Bohnemeyer (2009) for a discussion on Yucatec Maya and Pfau et al. (2012b) for sign languages). Because of this shared feature, translation of sentences in one language to the other follows a similar process.

Third, pointing strategies are also very similar to the ones used in sign languages. Among Yucatec Mayas, there are very few restrictions for pointing to objects and persons (pointing directly at someone is not incorrect or disrespectful). Metonymic pointing is frequently used to refer to people (though the location of their house, as in the example presented in Figure 26) and events. Pointing is also frequently used with imperatives and requests in Yucatec Maya (Pool Balam, 2011), which makes it easily transferable into YMSL.

Fourth, at the broad grammatical level, the Yucatec Maya lexicon is not based on words but roots (Bricker, Po'ot Yah, and Dzul de Po'ot 1998; Le Guen 2015), and many of these roots are verbo-nominal in nature (Lois and Vapnarsky 2006). In sign languages, as in Yucatec Maya, syntactic context and optionally the morphology, usually distinguish a verb from a noun. However, there is much cross-linguistic variation in the strategies that different sign languages use to mark a noun-verb distinction.

Fifth, many parts of speech in Yucatec Maya are predicative. In particular, adjectives are predicates, best known as statives (Vapnarsky 2013). The same applies to YMSL. In short, adjectives are also predicative; that means that when performed "in isolation" they are actually inflected for third person (in Maya) or first person (mostly in YMSL).

Finally, as we described in section 4.4, Yucatec Maya makes extensive use of character perspective, a device frequently used in sign languages.

But not all features of Yucatec Maya manual strategies are favorable to the emergence of a linguistic system in a sign language. In fact, one significant limitation is the very restricted use of the gesturing space as metaphoric. A corpus analysis of Yucatec Maya natural interaction reveals that metaphoric pointing to

track referents is virtually absent. Its only use is in narrative where speakers point to empty spaces to place referents but they rarely come back to them anaphorically. This lack of use of metaphorical pointing turns to be a problem for signers that have to basically develop a use of signing space as metaphoric. Specifically, it prevents them from using the signing space for topological relations and syntactic constructions (Pfau, Steinbach, and Woll 2012a: 413–416). Le Guen and Safar (in prep.) are showing how the second generation of Chicán signers tends to use spatial relations in the signing space for ditransitive constructions more systematically while the first generation of Chicán and Nohkop prefers the use of character perspective. Such a use of the signing space for syntactic relations is attested in many sign languages and turns out to be very practical for a visual language.

6.3 Innovations in YMSL

Although we have seen a number of examples of sign creation strategies that derive from Yucatec Maya gestures or communication strategies, a great part of the lexicon of the YMSL has also been invented arbitrarily by signers. This fact leads to two conclusions. The first is that language has, from the start, the tendency of being a system of linguistic symbols that link meaning and the form arbitrarily (Saussure 1995). The second conclusion, although it could seem to go against our purpose (which is to show that signs are derived from gestures), actually validates our hypothesis; specifically, that in domains where there is no gestural precursor, an arbitrary sign is invented, and, as a consequence, important differences arise in the YMSL used in various villages (see e.g. Safar et al. 2018 for higher cardinal numbers; Safar, forthcoming).

Several processes are at stake and signs are not completely created out of the blue either. Let us consider some of these processes.

The first is creation of sign through metaphors (Liddell 2003; P. P. Wilcox 2001; S. Wilcox 2009) where some signs are adapted or derived from existing ones. Le Guen (2012a) documented this process in the case of time signs. Also, as we have shown above (4.2), transfer of iconicity is also a powerful factor for sign creation. In both villages, many signs were created based on a personal experience from a signer or his/her family with objects or actions. For instance, WHITE-BEAN in YMSL of Chicán is expressed by placing the tip of the index finger and the middle finger on the nose (as if putting the skin of the bean on the nose), reproducing the game deaf children used to do while preparing them. In Nohkop, SUNDAY is produced with the fist knocking the top of the head, reproducing a typical scene from characters of a show aired on Sunday (“El chavo de Ocho”).

Although on the surface those signs seem to be arbitrary, they have an etymology that is only known or remembered by some members. Finally, other signs seem to be completely arbitrary, and signers themselves ignore their etymology and are unable to provide any explanation based on iconicity. This is the case of the signs for WHITE in Chicán[18] and Nohkop (Figure 30). In Nohkop, the sign is done with the thumb rubbing on the index and major fingers with a non-manual component, pursing of the lips. In Chicán, the sign is a tracing from up to down on the chest, pointing to the cloth, which can be repeated (without changing its meaning or adding intensity). In both villages, the sign can be performed with one or two hands.

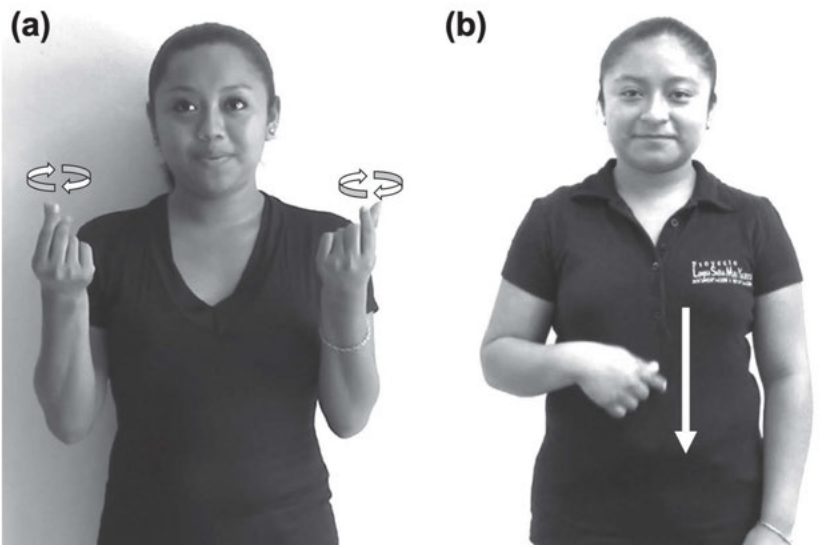


Figure 30: WHITE in (a) Nohkop and (b) Chicán.

However, if the sign language in these communities would be completely arbitrary, it would have severe consequences for its users, due to the restricted number of deaf and proficient hearing signers and the sociologic composition of the signing community. Because the majority of signers is constituted of hearing

18 Some signers in Chicán mention that the sign for WHITE originates from the typical colour of the huipil (the sign resembling touching the cloth). Although it is correct to say that there is some folk etymology the question remains if this explanation is accurate or if it is only a reconstruction made by informants.

people who only have basic knowledge of the sign language (or rely only on their gestures), having a completely obscure sign language would alienate too many communicative partners. Obviously, this is a hypothesis, and further studies among recent and older emerging sign languages would need to be conducted cross-linguistically to see if it can be validated.

Finally, we also notice some innovations, not so much in the form or the language content itself, but as adaptations of Yucatec Mayan interactional principles for signed language purposes. Although they rely on face-to-face communication, Yucatec Mayas are usually positioned seated side by side (i.e., looking in the same direction but not at each other), a characteristic of many Mesoamerican cultures. Additionally, the positioning of hammocks in front of each other (in some house configurations), sometimes creates the potential for speakers to converse while lying down without having visual contact (especially at night). In this situation, speakers rely on auditory back-channel cues to maintain conversational flow. Obviously, this communicative principle had to be adapted by deaf signers who need to be constantly looking directly at each other to have a fluid conversation. Signers also favor physical contact, an almost proscribed behavior among hearing Yucatec Mayas. Touching is used instead of auditory back-channel cues and can be used to get attention and start an interaction.

7 Conclusion: One or several languages?

From the analysis of the various examples provided in this chapter, we can conclude that the linguistic systems of the two villages considered greatly overlap not only at the lexical level (see Le Guen 2012) but also in their communicative strategies (use of pointing strategies, frames of reference, etc.). The main argument in this chapter is that the Yucatec Mayan cultural background and multimodal communication explain similarities between, and the parallel emergence of the YMSL in Chicán and Nohkop. The analysis of the data reveals systematic overlaps in the lexicons of both villages. We showed that the more gestures are conventionalized in Yucatec Maya, the more they tend to be directly integrated as signs in YMSL, and in the same way in both villages (section 4.1). Paths of lexicalization and grammaticalization are not random but follow specific rules, identical in both villages (see sections 4.2, 4.3, 4.5). This overlap is not limited to existing conventionalized gestures, but similar communicative strategies are applied in the two communities in the creation of new signs (see also Safar et al. (2018)). Furthermore, similar constructions for grammatical markers in the different villages derive from the same signs and are used in the same way.

This phenomenon is not the result of chance or universal processes[19] but can be traced and explained by several features of the language emergence.

First, the systematic use of the visual channel in Yucatec Maya communication allows deaf people to understand some of the content of what hearing people are communicating and provides a strong basis for creation of a lexicon. Second, the positive attitude of hearing people towards deafness and the use of gestures eases non-verbal communication. Third, the fact that most of the YMSL signers are hearing Yucatec Maya speakers provides more homogeneity to the linguistic systems (choice of gestures to be transformed into signs) and its communicative strategies (linguistic calques, types of pointing, etc.). Finally, and this point has been made by other authors (Johnson 1991; Nyst 2007: 200; Washabaugh 1986 inter alia), the deaf signers live in a community where most of the people are hearing and deaf people do not form a special sub-community but follow the family cluster, i.e., interact with hearing people from their kin (who can be signers with various degree of proficiency) more than with other deaf signers. Because of this constraint, they cannot invent a language that would be radically different and, unintelligible for non-signers; for instance, by creating signs not taking into account frequent lexical gestures, suppressing all iconicity from signs, or by using a distinct frame of reference.

One consequence of having similar contexts for the emergence of the YMSL is the creation of very similar languages, at the lexical but also at the grammatical level.[20] Based on a primary linguistic comparison (that awaits more thorough investigation), we argue for considering the sign languages used in Chicán and Nohkop as varieties of the same language, the YMSL.

But why not just consider the sign languages from the two villages different? Taking such a stance would seem easier indeed. One main reason is that it would fail to explain the similarities and origin of the languages. Recent studies conducted by Safar and colleagues indicate more differences in some linguistic strategies (numerals, size-and-shape specifiers) between some deaf interactional groups from the community of Chicán than between Chicán and Nohkop. Additionally, both languages are mutually intelligible. An anecdotal but revealing fact is that

19 Because of word limit constrains we did not discuss this issue, but a quick comparison with well described sign languages from Europe, North America, and other emerging sign languages (de Vos, 2012a; Nyst, 2007), even those spatially closer to Yucatan (see Haviland (2011, 2013a)) show that there are specific cultural processes at stake in the creation of YMSL not replicated (or at least systematically) in these other SLs.

20 Again, we did not devote space to tackle this issue properly because of length limitations, but word order, agreement and other syntactic features are similar in the sign languages used in both villages. But see Le Guen (2019) for more arguments.

when one hearing bimodal-bilingual signer (Rossy Kinil) from Nohkop visited Chicán, she was able to have extended conversations (sometimes for more than 45 minutes) with deaf people from this village, only being limited in some specific lexical items proper to this community. Although there were accommodations, this situation is in fact no different from, say, two Spanish speakers from Mexico and Argentina. The same YMSL signer has also been in contact with Mexican SL and said that she could not understand it.

Finally, a framework of analysis in which these two linguistic systems (at least in the case of Chicán and Nohkop) are considered varieties of the same language allows for a more productive comparison between multimodal communication of the hearing community, and the sign languages in use in both communities.

Acknowledgements

We are indebted to all the users of YMSL and the informants for their generosity and patiencia. They are who made this study and this chapter possible.

References

Barzini, Luigi. 1964. *The Italians*. London: Hamish Hamilton.

Bauer, Anastasia. 2014. *The use of signing space in a shared sign language of Australia* (Sign Language Typology 5). Berlin: de Gruyter Mouton & Ishara Press.

Bohnemeyer, Jürgen. 2003. The unique vector constraint: The impact of direction changes on the linguistic segmentation of motion events. In Emile van der Zee & Jon Slack (eds.), *Representing direction in language and space*, 86–110. Oxford: Oxford University Press.

Bohnemeyer, Jürgen. 2009. Temporal anaphora in a tenseless language. In Wolfgang Klein & Li Ping (eds.), *Expression of time*, 83–128. Berlin, New York: Mouton de Gruyter.

Bricker, Victoria R., Eleuterio Po'ot Yah & Ofelia Dzul de Po'ot. 1998. *A dictionary of the Maya language as spoken in Hocabá, Yucatán*. Salt Lake City: University of Utah Press.

Brookes, Heather J. 2004. A repertoire of South African quotable gestures. *Journal of Linguistic Anthropology* 14(2). 186–224.

Coppola, Marie & Ann Senghas. 2010. Deixis in an emerging sign language. In Diane Brentari (ed.), *Sign languages: A Cambridge language survey*, 543–569. Cambridge: Cambridge University Press.

Cooperrider, Kensy. 2017. Foreground gesture, background gesture. *Gesture* 16(2). 176–202.

Cooperrider, Kensy, Natasha Abner & Susan Goldin-Meadow. 2018. The palm-up puzzle: Meanings and origins of a widespread form in gesture and sign. *Frontiers in Communication* 3.

Couper-Kuhlen, Elizabeth & Margret Selting (eds.). 1996. *Prosody in conversation: Interactional studies*. Cambridge: Cambridge University Press.

Dingemanse, Mark. 2011. *The meaning and use of ideophones in Siwu* (Max Planck Institute for Psycholinguistics). Vol. 64. Nijmegen, The Netherlands: Max Planck Institute for Psycholinguistics dissertation.

Earis, Helen & Kearsy Cormier. 2013. Point of view in British Sign Language and spoken English narrative discourse: The example of "The Tortoise and the Hare." *Language and Cognition* 5(4). 313–343.

Efron, David. 1972. *Gesture, race and culture*. The Hague: Mouton.

Ekman, Paul (ed.). 2006. *Darwin and facial expression: A century of research in review*. Los Altos, CA: Malor Books.

Emmorey, Karen (ed.). 2003. *Perspectives on classifier constructions in sign languages*. Mahwah, NJ: Erlbaum.

Enfield, Nicholas J. 2004. On linear segmentation and combinatorics in co-speech gesture: A symmetry-dominance construction in Lao fish trap descriptions. *Semiotica* 149. 57–123.

Enfield, Nicholas J. 2009. *The anatomy of meaning speech, gesture, and composite utterances*. Cambridge, UK: Cambridge University Press.

Engberg-Pedersen, Elisabeth. 2002. Gestures in signing: The presentation gesture in Danish Sign Language. In Rolf Schulmeister & Heimo Reinitzer (eds.), *Progress in sign language research: In honor of Siegmund Prillwitz*, 143–162. Hamburg: Signum Press.

Escobedo Delgado, Cesar Ernesto. 2012. Chican Sign Language: A sociolinguistic sketch. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 377–380. Berlin: Mouton de Gruyter & Ishara Press.

Fauconnier, Gilles. 1985. *Mental spaces: Aspects of meaning construction in natural language*. Cambridge; New York: Basic Books.

Floyd, Simeon. 2016. Modally hybrid grammar? Celestial pointing for time-of-day reference in Nheengatú. *Language* 92(1). 31–64.

Foster, George McClelland. 1973. Westport, Conn: *Empire's children*. Greenwood Press.

Fox Tree, Erich. 2009. Meemul Tziij: An Indigenous sign language complex of Mesoamerica. *Sign Language Studies* 9(3). 324–366.

Gabarro-Lopez, Silvia. 2017. *Discourse markers in French Belgian Sign Language (LSFB) and Catalan Sign Language (LSC): BUOYS, PALM-UP and SAME: Variation, functions and position in discourse*. Namur, Belgium: University of Namur dissertation.

Givón, Talmy. 1971. Historical syntax and synchronic morphology. An archeologist's field trip. *Chicago Linguistic Society* 7. 394–415.

Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language* (Essays in Developmental Psychology Series). New York, Hove: Psychology Press.

Goldin-Meadow, Susan, Carolyn Mylander & Amy Franklin. 2007. How children make language out of gesture: Morphological structure in gesture systems developed by American and Chinese deaf children. *Cognitive Psychology* 55(2). 87–135.

Goldin-Meadow, Susan & Diane Brentari. 2017. Gesture, sign, and language: The coming of age of sign language and gesture studies. *The Behavioral and Brain Sciences* 40. 1–59.

Hanks, William F. 1993. The five gourds of memory. In Aurore Becquelin Monod & Antoinette Molinie Fioravanti (eds.), *Mémoire de la tradition*, 330–319. Paris: Société d'Ethnologie.

Hanks, William F. 2007. Person reference in Yucatec Maya conversation. In Nick J. Enfield & Tanya Stivers (eds.), *Person reference in interaction* (Language Culture and Cognition), 149–171. Cambridge: Cambridge University Press.

Haviland, John B. 2011. Nouns, verbs, and constituents in an emerging 'Tzotzil' sign language. In Rodrigo Gutiérrez-Bravo, Line Mikkelsen & Eric Potsdam (eds.), *Representing language: Essays in honor of Judith Aissen*, 157–171. University of Santa Cruz: Language Research Center.

Haviland, John B. 2013a. Xi to vi: "Over that way, look!" (Meta)spatial representation in an emerging (Mayan?) sign language. In Peter Auer, Martin Hilpert, Anja Stukenbrock & Benedikt Szmrecsanyi (eds.), *Space in language and linguistics. Geographical, interactional, and cognitive perspectives*, 334–400. Berlin: Mouton DeGruyter.

Haviland, John B. 2013b. (Mis)understanding and obtuseness: "Ethnolinguistic borders" in a miniscule speech community. *Journal of Linguistic Anthropology* 23(3).

Hoza, Jack. 2011. The discourse and politeness functions of hey and well in American Sign Language. In Cynthia B. Roy (ed.), *Discourse in Signed Languages*, 69–95. Washington, D.C.: Gallaudet University Press.

Hunn, Eugene S. 1977. *Tzeltal folk zoology: The classification of discontinuities in nature*. New York: Academic Press.

Hwang, So-One, Nozomi Tomita, Hope Morgan, Rabia Ergin, Deniz İlkbaşaran, Sharon Seegers, Ryan Lepic & Carol A. Padden. 2017. Of the body and the hands: patterned iconicity for semantic categories. *Language and Cognition* 9(4). 573–602.

Johnson, Robert E. 1991. Sign language, culture and community in a traditional Yucatec Maya village. *Sign Language Studies* 73. 461–474.

Jouitteau, Mélanie. 2004. Gestures as Expletives: Multichannel Syntax. In Vineeta Chand, Ann Kelleher, Angelo J. Rodríguez & Benjamin Schmeiser (eds.), *Proceedings of the West Coast Conference on Formal Linguistics 23*, 101–114. Somerville, MA: Cascadilla Press.

Kendon, Adam. 1988. How gestures can become like words. In Fernando Poyatos (ed.), *Crosscultural perspectives in nonverbal communication*, 131–141. Toronto: C. J. Hogrefe, Publishers.

Kendon, Adam. 1992. Some recent work from Italy on quotable gestures (emblems). *Journal of Linguistic Anthropology* 2(1). 92–108.

Kendon, Adam. 2004. *Gesture: Visible action as utterance*. Cambridge: Cambridge University Press.

Kendon, Adam. 2017. Pragmatic functions of gestures. Some observations on the history of their study and their nature. *Gesture* 16(2). 157–176.

Kita, Sotaro (ed.). 2003. *Pointing: where language, culture, and cognition meet*. Mahwah, NJ: Lawrence Erlbaum.

Klima, Edward & Ursula Bellugi. 1979. *The signs of language*. Cambridge: Harvard University Press.

Lacadena, Alfonso. 2004. *El Corpus Glífico de Ek' Balam, Yucatán, México*. FAMSI. http://www.famsi.org/reports/01057/index.html (16 November, 2017).

Le Guen, Olivier. 2011a. Speech and gesture in spatial language and cognition Among the Yucatec Mayas. *Cognitive Science* 35(5). 905–938.

Le Guen, Olivier. 2011b. Modes of pointing to existing spaces and the use of frames of reference. *Gesture* 11(3). 271–307.

Le Guen, Olivier. 2012a. An exploration in the domain of time: from Yucatec Maya time gestures to Yucatec Maya Sign Language time signs. In Ulrike Zeshan & Connie de Vos (eds.), *Endangered sign languages in village communities: Anthropological and linguistic insights*, 209–250. Berlin: Mouton de Gruyter & Ishara Press.

Le Guen, Olivier. 2012b. The place of supernatural entities in Yucatec Maya daily life and socialization. In Philippe Nandedeo & Alain Breton (eds.), *Maya daily life. Proceedings of the 13th European Maya Conference (Paris, december 2008)* (Acta MesoAmericana (Volume N° 21)). Verlag Anton Saurwein. Markt Schwaben, Germany.

Le Guen, Olivier. 2015. Expressive morphology in Yucatec Maya. In Jean-Léo Léonard & Alain Khim (eds.), *Patterns in Mesoamerican morphology* (Colloques), 178–211. Paris: Michel Houdiard Editeur.

Le Guen, Olivier. 2018a. La importancia de la gestualidad en el estudio del maya yucateco actual. *Cuadernos de Lingüística de El Colegio de México* 5(1). 331–373.

Le Guen, Olivier. 2018b. Managing epistemicity among the Yucatec Mayas (Mexico). In Joëlle Proust & Martin Fortier (eds.), *Metacognitive diversity: An interdisciplinary approach*, 193–222. Oxford; New York: Oxford University Press.

Le Guen, Olivier & Lorena Ildefonsa Pool Balam. 2012. No metaphorical timeline in gesture and cognition among Yucatec Mayas. *Frontiers in Psychology* 3(271).

Le Guen, Olivier & Josefina Safar. in prep. Intergenerational evolution in the use of space for pronominal reference and verbal agreement in Yucatec Maya Sign Language.

Levinson, Stephen C. 2003. *Space in language and cognition: Explorations in cognitive diversity* (Language, Culture and Cognition 5). Cambridge: Cambridge University Press.

Levinson, Stephen C. & Judith Holler. 2014. The origin of human multi-modal communication. *Philosophical Transactions of the Royal Society B: Biological Sciences* 369(1651).

Liddell, Scott K. 2003. *Grammar, gesture, and meaning in American Sign Language*. Cambridge University Press.

Lois, Ximena & Valentina Vapnarsky. 2006. Root indeterminacy and polyvalence in Yukatekan Mayan languages. In Ximena Lois & Valentina Vapnarsky (eds.), *Lexical categories and root classes in amerindian languages*, 69–116. Bern: Peter Lang.

Loon, Esther van. 2012. *What's in the palm of your hands? Discourse functions of palm-up in Sign Language of the Netherlands*. Amsterdam, The Netherlands: University of Amsterdam MA thesis.

Loon, Esther van, Roland Pfau & Markus Steinbach. 2014. The grammaticalization of gestures in sign languages. In *Handbücher zur Sprach- und Kommunikationswissenschaft / Handbooks of Linguistics and Communication Science (HSK) 38/2*, 2133–2149. Berlin, Boston: De Gruyter Mouton.

McKee, Rachel & Sophia L. Wallingford. 2011. 'So, well, whatever': Discourse functions of palmup in New Zealand Sign Language. *Sign Language & Linguistics* 14(2). 213–247.

McNeill, David. 1992. *Hand and mind*. Chicago: University of Chicago Press.

McNeill, David & Elena Levy. 1982. Conceptual representations in language activity and gesture. In Robert J. Jarvella & Wolfgang Klein (eds.), *Speech, place and action: Studies in deixis and related topics*, 271–295. New York: Wiley.

Meir, Irit, Carol A. Padden, Mark Aronoff & Wendy Sandler. 2007. Body as Subject. *Journal of Linguistics* 43(3). 531–563.

Meir, Irit, Wendy Sandler, Carol A. Padden & Mark Aronoff. 2010. Emerging Sign Languages. In Marc Marschark, Patricia Elizabeth Spencer & Peter E. Nathan (eds.), *The Oxford Handbook of Deaf Studies, Language, and Education, Volume 2*, 267–280. Oxford: Oxford University Press.

Meo-Zilio, Giovanni & Silvia Mejía. 1980. *Diccionario de gestos: España e Hispanoamérica*. Bogotá, Colombia: Instituto Caro y Cuervo.

Müller, Cornelia. 2004. Forms and uses of the Palm Up Open Hand: A case of a gesture family? In Cornelia Müller & Roland Posner (eds.), *The Semantics and Pragmatics of Everyday Gestures*, 233–256. Berlin: Weidler.

Nyst, Victoria Anna Sophie. 2007. *A descriptive analysis of Adamorobe sign language (Ghana)*. Amsterdam: University of Amsterdam dissertation.

Nyst, Victoria Anna Sophie. 2012. Shared Sign Languages. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language*, 552–574. Berlin: Mouton De Gruyter.

Okrent, Arika. 2002. A modality-free notion of gesture and how it can help us with the morpheme vs. gesture question in sign language linguistics (Or at least give us some criteria to work with). In Richard P. Meier, Kearsy Cormier & David Quinto-Pozos (eds.), *Modality and structure in signed and spoken languages*, 175–198. Cambridge: Cambridge University Press.

Padden, Carol A., So-One Hwang, Ryan Lepic & Sharon Seegers. 2015. Tools for language: Patterned iconicity in sign language nouns and verbs. *Topics in Cognitive Science* 7(1). 81–94.

Padden, Carol A., Irit Meir, So-One Hwang, Ryan Lepic, Sharon Seegers & Tory Sampson. 2013. Patterned iconicity in sign language lexicons. *Gesture* 13(3). 287–308.

Perniss, Pamela M. 2007. *Space and iconicity in German Sign Language (DGS)*. Radboud University Nijmegen: MPI Series in Psycholinguistics 45.

Perniss, Pamela M., Robin L. Thompson & Gabriella Vigliocco. 2010. Iconicity as a general property of language: evidence from spoken and signed languages. *Frontiers in Language Sciences* 1(227).

Petatillo Balam, Rebeca. 2015. *Los gestos espontáneos que acompañan el habla entre los hablantes de maya yucateco*. Jose Maria Morelos, Quintana Roo: UIMQROO MA thesis.

Pfau, Roland. 2015. The grammaticalization of headshakes: From head movement to negative head. In Andrew D.M. Smith, Graeme Trousdale & Richard Waltereit (eds.), *Studies in Language Companion Series*, vol. 166, 9–50. Amsterdam: John Benjamins.

Pfau, Roland, Markus Steinbach & Bencie Woll. 2012a. Tense, aspect, and modality. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language: An international handbook*, 186–204. Berlin, Boston: Mouton De Gruyter.

Pfau, Roland, Markus Steinbach & Bencie Woll (eds.). 2012b. *Sign Sign language: An international handbook*. Berlin, Boston: Mouton De Gruyter.

Pool Balam, Lorena Ildefonsa. 2011. *Accounts for requests in Yucatec Maya*. Nijmegen: Radboud University MA thesis.

Quinto-Pozos, David. 2007. Can constructed action be considered obligatory? *Lingua* 117(7). 1285–1314.

Safar, Josefina. Forthcoming. *Variation in Yucatec Maya Sign Languages*. Stockholm: University of Stockholm dissertation.

Safar, Josefina. 2017. Translanguaging in Yucatec Maya signing communities. *Applied Linguistics Review* 10(1). 31–53.

Safar, Josefina, Olivier Le Guen, Geli Collí Collí & Merli Collí Hau. 2018. Numeral variation in Yucatec Maya Sign Languages. *Sign Language Studies* 18(4). 488–516.

Saussure, Ferdinand de. 1995. *Cours de linguistique générale*. Paris: Payot.

Schieffelin, Bambi & Elinor Ochs. 1986. *Language socialisation across cultures*. Cambridge: Cambridge University Press.

Senghas, Ann & Marie Coppola. 2001. Children creating language: How Nicaraguan Sign Language acquired a spatial grammar. *Psychological Science* 12(4). 323–328.

Senghas, Ann, Sotaro Kita & Asli Özyürek. 2004. Children creating core properties of language: Evidence from an emerging sign language in Nicaragua. *Science* 305(5691). 1779–1782.

Senghas, Richard J., Ann Senghas & Jennie E. Pyers. 2005. The emergence of Nicaraguan Sign Language: Questions of development, acquisition, and evolution. In Sue Taylor Parker, Jonas Langer & Constance Milbrath (eds.), *Biology and knowledge revisited: From neurogenesis to psychogenesis,* 287–306. Mahwah, NJ: Erlbaum.

Shuman, Malcolm K. 1980. The sound of silence in Nohya: A preliminary account of sign language use by the Deaf in a Maya community in Yucatan, Mexico. *Language Sciences* 2(1). 144–173.

Shuman, Malcolm K. & Mary Margaret Cherry-Shuman. 1981. A brief annotated sign list of Yucatec Maya sign language. *Language Sciences* 3(1). 124–185.

Sidnell, Jack & Tanya Stivers. 2005. Multimodal interaction. *Semiotica [Special Issue]* 156.

So, Wing Chee. 2010. Cross-cultural transfer in gesture frequency in Chinese–English bilinguals. *Language and Cognitive Processes* 25(10). 1335–1353.

Stokoe, William C. 1960. Sign language structure: An outline of the visual communication systems of the American Deaf. *Studies in linguistics: Occasional papers. Buffalo: Dept. of Anthropology and Linguistics, University of Buffalo* (8).

Supalla, Ted & Elissa L Newport. 1978. How many seats in a chair? The derivation of nouns and verbs in American Sign Language. In Patricia Siple (ed.), *Understanding language through sign language research*, 91–132. New York: Academic Press.

Supalla, Ted R. 1986a. The classifier system in American Sign Language. In Colette Craig (ed.), *Noun classes and categorization*, 181–214. Philadelphia: John Benjamins Publishing.

Supalla, Ted R. 1986b. The classifier system in American Sign Language. In Colette Craig (ed.), *Noun classes and categorization: Proceedings of a symposium on categorization and noun classification* (Typological Studies in Language), vol. 7, 181–214. Eugene, Oregon: John Benjamins.

Tano Angoua, Jean-Jacques & Victoria Anna Sophie Nyst. 2018. Tracing the emergence of Size and Shape Specifiers: Body-Part SASS Signs in a young and an old village sign language. *Sign Language Studies* 18(4). 517–545.

Taub, Sarah. 2001. *Language from the body: iconicity and metaphor in American Sign Language*. Cambridge: Cambridge University Press.

Tkachman, Oksana & Wendy Sandler. 2013. The noun–verb distinction in two young sign languages. *Gesture* 13(3). 253–286.

Tozzer, Alfred M. 1941. *Landa's relación de las cosas de Yucatán*. Cambridge: Papers of the Peabody Museum of American Archaeology and Ethnology 18, Harvard University.

Unsworth, Sara J., Wallis Levin, Megan Bang, Karen Washinawatok, Sandra R. Waxman & Douglas L. Medin. 2012. Cultural differences in children's ecological reasoning and psychological closeness to nature: Evidence from Menominee and European American children. *Journal of Cognition and Culture* 12(1–2). 17–29.

Vapnarsky, Valentina. 2013. Is Yucatec Maya an omnipredicative language? Predication, the copula and focus constructions. *STUF - Language Typology and Universals* 66(1). 40–86.

Vapnarsky, Valentina. 2016. No escape from the future. Temporal frames and prediction in Yucatec Maya. In Zlatka Guentchéva (ed.), *Aspectuality and temporality: Descriptive and theoretical issues* (Studies in Language Companion Series 176), 643–678. Amsterdam/ Philadelphia: John Benjamins.

Vigliocco, Gabriella, Pamela M. Perniss & David Vinson. 2014. Language as a multimodal phenomenon: implications for language learning, processing and evolution. *Phil. Trans. R. Soc. B* 369(1651). 20130292.

Vos, Connie de. 2012a. *Sign-spatiality in Kata Kolok: How a village sign language of Bali inscribes its signing space*. Nijmegen, The Netherlands: Max Planck Institute for Psycholinguistics dissertation.

Vos, Connie de. 2012b. The Kata Kolok perfective in child signing: Coordination of manual and non-manual components. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic Insights*, 127–152. Berlin: Walter de Gruyter & Ishara Press.

Vos, Connie de & Roland Pfau. 2015. Sign language typology: The contribution of rural sign languages. *Annual Review of Linguistics* 1. 265–88.

Washabaugh, William. 1986. *Five fingers for survival: The Galapagos of signing*. Ann Arbor, MI: Karoma.

Wilcox, Phyllis Perrin. 2001. *Metaphor in American Sign Language*. Gallaudet University Press.

Wilcox, Sherman. 2005. Routes from gesture to language. *Revista da abralin* 4(1). 11–45.

Wilcox, Sherman. 2009. Symbol and symptom. Routes from gesture to signed language. *Annual Review of Cognitive Linguistics* 7. 89–110.

Wilkins, David. 2003. Why pointing with the index finger is not a universal (in sociocultural and semiotic terms). In Sotaro Kita (ed.), *Pointing: Where language, culture, and cognition meet*, 171–215. Mahwah, NJ: Erlbaum.

Zavala, Roberto. 2000. Multiple classifier systems in Akatek (Mayan). In Gunter Senft (ed.), *Systems of nominal classification*, 114–146. Cambridge: Cambridge University Press.

Zeshan, Ulrike & Connie de Vos (eds.). 2012. *Sign languages in village communities: Anthropological and linguistic insights*. Berlin: Walter de Gruyter & Ishara Press.

Marie Coppola

Gestures, homesign, sign language: Cultural and social factors driving lexical conventionalization

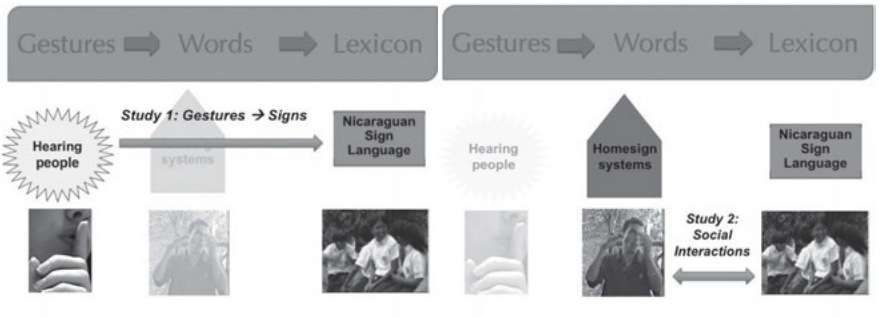
> At any given period, however far back in time we go, a language is always an inheritance from the past. The initial assignment of names to things, establishing a contract between concepts and sound patterns, is an act we can conceive in the imagination, but no one has ever observed it taking place... In fact, no society has ever known its language to be anything other than something inherited from previous generations, which it has no choice but to accept. That is why the question of the origins of language does not have the importance generally attributed to it. It is not even a relevant question as far as linguistics is concerned. The sole object of study in linguistics is the normal, regular existence of a language already established. (Saussure [1916: 105] 1983: 71)

The question of where words come from has a long history. In addition to the Saussure quote above, this question has also been raised in the context of child language acquisition (see, for example, Brown, 1958; 1968). The current work asks which factors influence the emergence of lexical forms and their conventionalization in an emerging language. This question is notoriously difficult to address, given that extant (spoken) languages generally have very long histories, quantified by millennia rather than by centuries. The study of spoken languages that have emerged as the result of language contact (e.g., pidgins, creoles) do not address this question directly because they have access to both the lexicons and the grammars of the existing contributing languages in contact. Further, as noted, today's spoken languages are temporally too far from their origins to be informative about the origins of their words. In contrast, sign languages are very young relative to spoken languages. A form of Turkish Sign Language used at the Ottoman court 500 years ago has been reported to be the earliest possible sign language (Zeshan, 2003). Most recently researchers have documented the emergence of Nicaraguan Sign Language (~40 years old, Kegl and Iwata, 1989), Kenyan Sign Language, around 45 years old (Morgan et al., 2015) and Al-Sayyid Bedouin Sign Language (~80 years old, Kisch, 2004), as well as others currently being studied, some of which are reported on in this volume.

Thus, the present work uses emerging sign languages as a window into the origins of lexical items, and their conventionalization. Specifically, we use two novel methodological approaches to investigate the contributions of shared

https://doi.org/10.1515/9781501504884-008

cultural knowledge (i.e., emblems and conventional gestures) (Figure 1a) and social interaction patterns (Figure 1b) to this phenomenon of how gestures become words. This chapter offers a unique account of these phenomena via almost-contemporaneous observations and documentation of Nicaraguan Sign Language (NSL), an indigenous sign language that began emerging via the natural interactions among the first members of the Nicaraguan Deaf community in the late 1970s, and detailed analyses of four homesign gesture systems used by deaf individuals in Nicaragua who are not part of this Deaf community. The next section provides brief introductions to these emerging language situations; also see the Sociolinguistic Sketch (this volume) for more details regarding Nicaraguan homesigners, NSL, and the Deaf community in Nicaragua.



Figures 1a and 1b: Study 1 (left) examines the relationship between culturally conventional gestures used by hearing, non-signing Nicaraguan Spanish speakers and the signs of Nicaraguan Sign Language (NSL) used by the Deaf community. Study 2 (right) investigates the impact of different social interaction patterns in homesign gesture systems and NSL users on the rate of conventionalization of lexical items.

The Nicaraguan Deaf community began forming in the late 1970s in multiple centers for education and training attended by Deaf people in Managua, the capital (e.g., Senghas, 1995; Senghas and Coppola 2001; Senghas, Senghas, and Pyers 2005; Polich, 2005). NSL is still developing and changing over time, as all languages do. The Deaf community now numbers approximately 1,500 signing Deaf members. The individuals who became the first members of the Deaf community, and who were the initial creators of the sign language, were likely homesigners (R. Senghas et al., 2005; Coppola and Senghas, 2010). Homesigners are deaf individuals who do not have access to linguistic input, or to a signing Deaf community. That is, they grow up in families whose members are hearing and speak Spanish (which they cannot hear), and who do not know a sign language. Homesigners in Nicaragua (and many other countries) also do not have

access to education using sign language. Thus, each homesigner creates and uses a system of gestures with their family members and neighbors, that resembles a very small, rudimentary sign language. Accordingly, homesign systems have their roots in the gestures produced by hearing speakers of Spanish (Newport and Supalla, 2000; Coppola and Senghas, 2010). These include both culturally conventional gestures[1] (also called emblems; these will be described in more detail below), as well as other gestures produced along with speech that may not be conventional. In this chapter, Study 1 examines how culturally conventional gestures contribute to the formation of lexical items in sign languages. Study 2 examines social factors that influence the conventionalization of lexical items in sign languages, specifically, the role of particular social interaction patterns.

1 Study 1: Gestures to signs

1.1 Emblems and culturally conventional gestures

Gestures are manual movements that often accompany and are tightly integrated with spoken language (McNeill 1992; Kendon 2004). Gestures may reinforce the meaning of the spoken part of the message, they may supplement it, or they may be produced without accompanying speech. Many gesture forms are ad hoc, that is, invented on the spot as needed. However, some gestures have conventional form-meaning mappings that are shared in a community or region. Authors use a variety of terms to describe such culturally conventional gestures, including *Emblems*; *Autonomous*; *Conventional*; *Symbolic*; *Lexical*; and *Quotable* (Kendon 1992, 2004; Poggi 1983, 1987; Müller and Posner 2004; Ricci-Bitti and Contento 2004; Payrató 1993). Emblems, because of these regular form-meaning mappings, are easily interpretable in the absence of accompanying speech; however, they may also be produced with speech. Ekman and Friesen (1972) define emblems as deliberate, communicative non-verbal acts that have a direct verbal translation (a word or two, or a phrase), whose meaning is known by all or most members of a group. Further, "a touchstone of an emblem is whether it can be replaced by a word or two, its message verbalized without substantially modifying

1 While this study has documented the conventional nature of such forms as they are used in Nicaragua, we do not claim here that all of these conventional gestures are unique to Nicaragua. Several of them are used in other Latin American countries (see, for example, Meo-Zilio and Mejía, 1980).

the conversation." Ekman and Friesen say only that "the person who sees the emblem usually not only knows the emblem's message but also knows that it was deliberately sent to him." In this chapter, I generally use the more neutral term "culturally conventional gesture" to refer to the forms being examined; I hope that the results reported here will serve as an evidence base for identifying emblems used in Nicaragua.

From the perspective of language emergence, emblems and conventional gestures can be viewed as "raw material" for homesign and sign language. On this view, the changes that take place as conventional (and non-conventional) gestures become incorporated into a shared community sign language can reveal humans' language-making and language-learning tendencies, and increase our understanding of how forms that are traditionally seen as non-linguistic acquire linguistic properties. This is a view outlined by Senghas, Coppola, and colleagues (e.g., Senghas et al., 2004; Coppola and So, 2005; Coppola and Senghas, 2010; Brentari et al., 2012; 2017).

Prior work has investigated how gestures become part of sign languages used by Deaf communities, as well as by village sign language communities (e.g., Marsaja, 2008; Nyst, 2007). Culturally conventional gestures may enter a sign language as lexical items, or as morphological or grammatical markers (described in more detail below). Examples include influences on number systems (e.g., as reported in *Semantic Fields in Sign Languages*, edited by Zeshan and Sagara 2016); and certain iconic gestures (Frishberg, 1975). The work described in the first part of this chapter focuses on the synchronic relationship between conventional gestures and the lexicon of an emerging language, an area that has not been documented previously. I now review some prior work describing systematic changes that have been characterized in the transition between gestures used in the hearing culture and grammatical elements in sign languages. Though the scope of this chapter does not include the developmental origins of such grammatical elements, I will argue that many of the same grammaticalization processes are evident in the gesture forms used within the non-signing hearing community, as well as in the transition from emblems and other conventional gestures to lexical items in an emerging language.

Previous research by Wilcox (e.g., 2004, 2009, among others) has discussed the developmental path of grammaticalization, beginning with gesture, and tracing how gestures may become lexical morphemes, and then grammatical morphemes. Cross-linguistically and cross-modally, certain words and gestures tend to serve as sources for these grammaticalization paths; the current work focuses on just the first part of this path, that of gesture to lexical morpheme. Wilcox (2004) has suggested two routes for how gestures may become

morphological or grammatical markers in sign languages.[2] In Route 1, a manual gesture serves as a source of a lexical or grammatical morpheme in the sign language. For example, the French gesture meaning "to go" became a lexicalized future marker in American Sign Language (ASL) (Janzen and Shaffer, 2002). Similarly, the Arab emblem indicating "Wait a moment" became a negative completive marker in Jordanian Sign Language (Hendriks, 2007). In Route 2, non-manual gesture elements, such as head movements and facial expressions, become incorporated into grammatical elements in signed languages, without ever passing through a lexical stage (Wilcox 2004; Wilcox et al., 2010). McClave (2001) argues that the subtle shifts in head position produced by hearing non-signing people in the United States became grammaticized in ASL to mark direct quotes. Pyers and Emmorey (2008) suggest that the conditional marker in ASL may have its origins in hearing non-signers' use of raised brows while producing conditional phrases in English. This chapter focuses on the process by which conventional manual gestures make the transition to lexical items; it does not address the morphological or grammatical functions of manual or non-manual gestural forms once they are part of the language.

Here we ask whether conventional gestures (emblems) commonly used by hearing Nicaraguan Spanish speakers are adopted into Nicaraguan Sign Language, and if so, whether their forms or meanings change as a consequence. The approach taken here was inspired by repeated incidents of witnessing NSL signs being produced in conversations with hearing Nicaraguan Spanish speakers who professed to be naïve to the sign language. My friend and colleague Ann Senghas and I finally realized that many of the forms we had learned as NSL signs were in widespread use by hearing Nicaraguans. After many years of field work studying NSL, I decided to document these culturally conventional gestures. Much of the prior work on culturally conventional gestures (cited above) relies on a recognition paradigm in which speakers are presented with images of conventional gestures and asked to identify or rate them (e.g., Parrill, 2008). Johnson and colleagues (1975) refined the manner of identifying a repertoire of emblems using a three-step process: emblem encoding; visual analysis of encoding; and emblem decoding.

2 Following Wilcox et al. (2010), we use the term "grammaticalization" in a broad sense "to include processes that begin not only with lexical items (the classical sense of grammaticalization in spoken languages) but also processes that begin with non-lexical material such as *visible gestures* [emphasis added] or non-lexical vocalizations including prosody and which may not have gone through a lexical stage (Heine and Kuteva, 2007; Wichmann, 2006).

The current study adds to the approach of previous work, and to the work of Johnson and colleagues specifically, in two important ways: first, it uses an elicited production paradigm instead of only a recognition paradigm (Johnson et al. used both encoding and decoding techniques, but this is relatively rare in emblem studies). Second, in contrast to the "visual analysis approach" followed by Johnson and colleagues, in which the authors used a global judgment of similarity across the motor action patterns produced by 15 informants, the gestured responses in the current study were coded in a detailed way, following the parameters underlying the formation of signs in sign languages (though, as explained later, these data are not presented here). Thus, the current work is most parallel to Morgan's (2016) study of the contributions of conventional gestures used by hearing people in the surrounding Luo culture (previously studied by Creider, 1977) to Kenyan Sign Language (KSL), another case in which gestures can be studied relatively contemporaneously with the emergence of the sign language. Though in the current work, the forms were elicited from the hearing gesturers, and compared to dictionary forms of the sign language, whereas Morgan (2016) took the converse approach.

1.2 Method

The participants were 11 hearing, monolingual Spanish-speaking Nicaraguans who have had no contact with signers of Nicaraguan Sign Language.[3] Most (9) were from a medium-sized city, and two were from a small town. Three were men and 8 were women, and they ranged in age from 18–26 years (mean age: 22.9) and had a mean education level of 1 year at university. Two hearing native Nicaraguan Spanish speakers and I collaborated to develop a list of Spanish words and phrases to elicit gesture responses. This list was intended to include both concepts that did and did not have common, culturally conventional gestures associated with them. We included words and phrases expressing a range of semantic categories and functions, which will be described in more detail below. Over the course of the study, we elicited additional familiar gesture-word associations from participants, and added them to the elicitation list. Thus, the list became quite

3 Three participants reported occasional contact with deaf individuals whose hearing loss prevents them from acquiring the spoken language around them, and who have not acquired an existing sign language. These individuals are known as homesigners, and their circumstances and gesture systems will be addressed in more detail in Study 2; also see the Sociolinguistic Sketch (this volume).

broad and contained 82 items at its maximum. Due to this procedure, and to the vagaries of fieldwork, not all items were presented to all participants. Nine items were eliminated because too few participants responded, and 8 were omitted because they were not in the NSL dictionary and their form could not be verified by other means, leaving 65 elicitation items.

I elicited gesture responses using the following simple instructions (presented in spoken Spanish): *"We have observed that Nicaraguans use their hands to say some things. I will give you some words and I would like you to show me the gestures or signs that can be used with them."* The instructions and complete list of Spanish words and phrases used in the study, along with their English translations, semantic/pragmatic category, and inclusion status is provided in Appendix A. All responses were videotaped and transcribed.

1.3 Coding

We coded each gesture form according to parameters of description drawn from the literature on sign language phonology.[4] Table 1 presents the formal parameters that were coded, as well as the reliability achieved for each parameter by independent coders. The results reported in this chapter focus on the gesture-sign relationship; however, the detailed coding of gesture forms described above also allows us to quantify the degree of conventionalization of gesture forms among hearing Nicaraguans (Coppola, in preparation), an approach that is rarely followed in the literature on culturally conventional gestures[5] (though see Nyst, 2016 for examples of detailed coding of iconic gestures produced by hearing speakers cross-linguistically).

4 The current coding scheme is relatively modest, especially with respect to handshape, and does not reflect the fine-grained distinctions made in new handshape taxonomies developed for the study of sign languages. For example, the model developed by Eccarius and Brentari (2008) contains ~150 distinct handshape configurations.

5 Nyst (2016) notes work by Sowa and Wachsmuth (2002, 2003, 2005) who use the HamNoSys annotation (Hamburg Notation System) initially developed for German Sign Language to characterize iconic gestures at the articulatory level. Bergmann and Kopp (2009) also provide the distribution of five handshapes in their dataset of the gestures used by participants while giving directions.

Table 1: Coding categories and reliability.

Parameter (and subparameters)	Reliability
Handshape	
Handshape (modified Stokoe notation)	0.94
Change of handshape (yes or no)	1.00
Number (1-handed or 2-handed)	0.90
Movement	
Direction (e.g., away from body, up and down, contact)	0.80
Type (e.g., circular, repeated, restrained)	0.80
Orientation (of palm) (e.g., toward body, toward out)	0.82
Location	0.98
Mean across categories	0.89

1.4 General characterization of responses

If every participant had been presented with all 82 elicitation items, the total number of responses would have been 902. Because not every item was presented to every participant, as described earlier, the total number of potential responses was 739. Just 34 (4.6%) of these items elicited no gesture response. Indeed, when we focus on just the 65 elicitation items that were included in the analyses, we observe that just 25 out of 637, or 4%, of elicitation items failed to elicit a gesture response overall. The number of items that did not elicit a gesture response ranged from 1 to 7 across participants, and the median was 2.5.

Thus, all together, the participants produced a total of 612 responses to these 65 elicitation items. In general, participants responded to all of the elicitation words and phrases with relative ease. Participants required occasional prompting by the experimenter to produce a gesture (27 instances total), with the experimenter prompting one participant a maximum of 8 times (the median across participants was 1.5). The ad hoc responses (those that did not match the expected conventional form) tended to be produced as quickly and effortlessly as emblems/conventionalized forms, indicating participants' high degree of comfort in using their hands to express such meanings.

Participants occasionally produced multiple responses, and some responses contained multiple gestures. In such cases, we selected for analysis the form that used the same semiotic base as the expected conventionalized form. For example, if a gesturer produced a pantomimic form depicting reaching into their

pocket and offering money to express the meaning "pay", and also produced a form resembling the conventionalized gesture meaning "pay", we selected the more conventional form for analysis. This selection process occurred for 92 out of 612 total responses or 15% (range of 4 to 15 across participants, median of 7). Participants rarely or never spoke while producing their gesture responses (even when they produced sequences of gestures), consistent with studies of hearing family members of deaf Nicaraguan children and adults who communicate using a homesign system (Coppola, 2002; Coppola, Goldin-Meadow and Mylander, 2006).

The overall gesture response rate was very high (96%). However, some classes of items appeared a bit easier for participants to produce gestures for than others (Table 2). Two categories, Object and Location, yielded a 100% response rate from all gesturers. The Object category contained the items 'rain', 'money', and 'computer', and the Location category contained the items 'outside', 'over there', and 'way over there'. Surprisingly, the Person category showed the lowest response rate (88%); participants sometimes struggled to produce gestures to refer to 'man' and 'relative' despite these being frequently discussed concepts. Note that this measure only captures *whether* a participant produced a gesture response, not the degree to which the gesture responses were similar across participants.

Table 2: Response rate for items in different semantic/pragmatic classes, in descending order. See Appendix A for the full description of elicitation items.

Type	Proportion of items that elicited any gesture response	Number of elicitation items
Object	1.00	3
Location	1.00	3
Modulator	0.99	9
Attribute	0.98	13
Function	0.97	8
Temporal	0.96	3
Action	0.95	11
State	0.94	8
Person	0.88	7
Overall	0.96	65

1.5 Analysis

To address the first research question, whether conventional gestures used by hearing Nicaraguans are adopted into Nicaraguan Sign Language (NSL), I compared the gesture forms produced by these hearing participants to the forms found in the NSL Dictionary (López Gómez et al., 1997). The National Deaf Association of Nicaragua published this first dictionary of NSL in 1997, following a series of standardization seminars that were held in the late 1980s (R. Senghas, 1997). The forms in the dictionary are quite reliable; however, it contains only about 1,000 signs. Note that the dictionary was published only about 20 years after the language began emerging in earnest in the late 1970s. Thus, some signs likely changed between then and when we collected the gesture data for this study in 2007. To identify conventional/acceptable forms for meanings that did not appear in the dictionary, or to identify forms that changed significantly since the dictionary was published, I consulted deaf and hearing informants who are fluent in NSL. Of the 19 meanings in these two categories, the NSL consultants expressed confidence in and agreement about which forms are acceptable for 11 meanings; the remaining 8 were excluded from the analysis. The items that had NSL dictionary entries (54) and the items for which the consultants felt confident about the NSL forms (11) totaled 65; these were coded according to the same parameters that were used to code the gesture responses.

1.6 Results

Despite their lack of contact with Deaf signers who use NSL, hearing gesturers in Nicaragua very often produced manual forms that are identical to those observed in Nicaraguan Sign Language signs, and these forms convey the same meanings. Figure 2 shows the distribution of the relationships between sign language and gesture forms. Ninety-two percent (60/65) of the NSL sign forms corresponding to the spoken Spanish prompts were produced by at least one gesturer in response to that specific prompt. Of those 60, 10 of the dictionary sign forms (17%) were produced by at least 80% of the gesturers who responded; 20 sign forms (33%) were produced by at least 60% of the gesturers, and fewer than half of the 11 gesturers produced the exact form for the remaining 30 sign forms (46% of the list of 65 signs associated with the elicitation items).

Only two elicitation items, *silencio* (“silence” or “be quiet”, category: modulator) and *loco* (‘crazy’, category: attribute) elicited the exact NSL sign form from every participant who produced a response. I speculate that these forms are universal among Nicaraguan gesturers and signers alike both because they

are frequently used, their forms are formationally quite simple, and also because these emblems are in use cross-culturally (they are at least shared between Central America and North America).

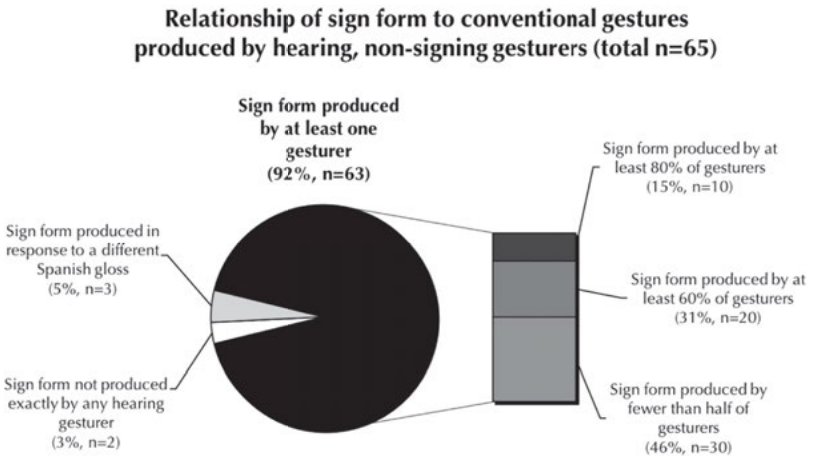


Figure 2: Distribution of gesture forms produced by sign-naïve hearing Nicaraguan participants based on overlap with NSL dictionary forms. The vast majority (92%) of NSL dictionary forms for the elicited meanings were produced by at least one hearing gesturer who has not been exposed to the sign language.

Out of the 65 NSL signs corresponding to the meanings of the elicitation items, only two NSL signs were not produced *exactly* by any gesturer for any meaning: FALL and MAN (Figure 3). For FALL, gesturers tended to produce a form with a neutral handshape, instead of the "V" handshape of the NSL sign FALL, in which the index and middle fingers are extended, pointing down, depicting the two legs of the human form. The remaining participants produced a whole-body gesture in which they mimed falling using their entire body. Although no hearing person used the 2-legs classifier-like form, of the 8 participants who produced a manual form, 8/8 participants produced the same movement and orientation on the dominant hand, and 3/8 produced a 2-handed form. For MAN, some gesturers produced a gesture (or series of gestures) indicating a man's mustache or beard. Interestingly, three of the four adult Nicaraguan homesigners studied longitudinally by the author also use the conceptual target of mustache to refer to "man" (Coppola, 2002). The NSL sign MAN appears to take as its conceptual base the broad shoulders and upper body strength of the male form (see Figure 3). However, it does not depict a physical attribute (like mustache or beard), and is

far from transparent; thus, it is unsurprising that no hearing gesturer produced it. Notably, some concepts, such as woman and man, showed little agreement among the gesture responses, despite being frequent topics of discourse.

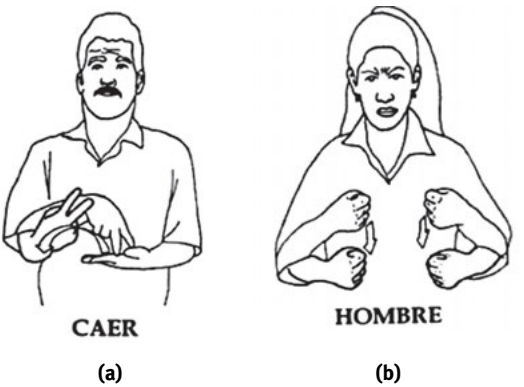


Figure 3: The NSL dictionary forms for FALL (CAER) (a) and MAN (HOMBRE) (b). Note the "V" handshape of the sign for "fall" (a).

The results reported above highlight the similarities between the forms produced by sign-naïve gesturers and the NSL forms. While many gesturers produced the exact form corresponding to the NSL sign, there was considerable variability in many of the forms produced by hearing gesturers. It is fair to say that there is a strong 'family resemblance' between many of the gesture forms and their associated sign form. Some NSL sign forms were produced by hearing gesturers in response to a Spanish prompt that differs from the meaning of the NSL sign. Examples of this type of gesture-sign relationship include the NSL sign WOMAN produced in response to the spoken Spanish prompt "you have a sexy body"; the sign KILL in response to the prompt "dead"; and the sign for SIBLING produced in response to "family". This type of "mismatch" will be discussed further in the next section.

This brings us to the second part of the research question: As forms transition from gestures to signs, do their meanings and or semantic ranges and/or shift, and if so, how? While a large proportion of gestures and signs shared a referent or gloss, we did observe some interesting shifts in meaning/reference. We explore a few examples, and what they tell us about conventionalization and grammaticalization processes, in this section.

1.7 Changes in form

As alluded to earlier, we observed changes in both form and in meaning as gestures entered the NSL lexicon. The form changes we observed with lexicalization in NSL included many of the tendencies toward arbitrariness, and away from iconicity, described in Frishberg's (1975) study of historical changes in sign form in ASL. These tendencies toward arbitrariness are manifested by systematic changes in the form of a sign; here we will discuss the following processes described by Frishberg: Displacement (e.g., centralization in the horizontal or vertical planes, see Figure 4); Assimilation/Fluidity; Symmetry (see Figure 5); and Lexical content moving to the hands (i.e., distalization, see Figure 6). As discussed by Frishberg, these tendencies "... serve to create a system of signs. Were they not present, we would find a fairly random set of gestures, without relationships between them. Rather than unstructured gestures, then, what we find [in ASL] is a regularized, interrelated, systematized set of signs which is undergoing regular, formationally based change." Surely the signs in NSL are continuing to undergo such change, as new lexical items and forms continue to be introduced into the language. The discussion here attends to the systematic changes that are already observable as gestures have become more conventionalized among non-signers. The current study capitalizes on the young age of Nicaraguan Sign Language, using the gesture forms produced by non-signers to document the intermediate stages of lexicalization evident in their journey toward becoming NSL signs.

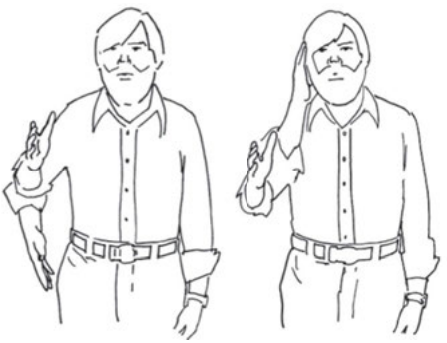


Figure 4. An ASL example from Frishberg (1975) illustrating *body displacement* (reprinted with permission). The old sign for WILL/FUTURE (a) moves upward, from the waist level, whereas the newer sign (b) shows centralization of the movement in the vertical dimension; the sign now begins at the cheek and moves forward.

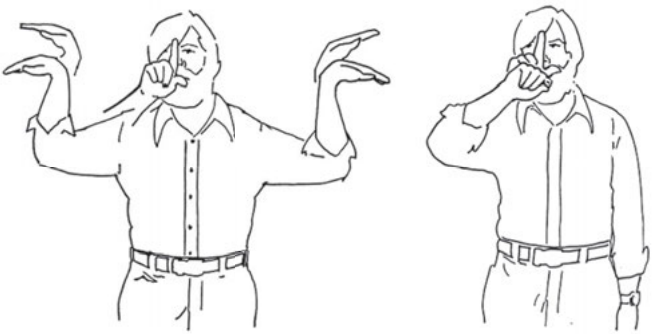


Figure 5: An ASL example Frishberg (1975) illustrating *fluidity* (reprinted with permission). The old sign for BIRD (a) was a compound of the two signs CHIRP + FLY, whereas the newer sign (b), has been shortened to just the FLY segment, reflecting the principle of fluidity. It is argued here that a similar process resulted in the simplification of the NSL sign PINCHE from two-handed to one-handed (see Figure 8).

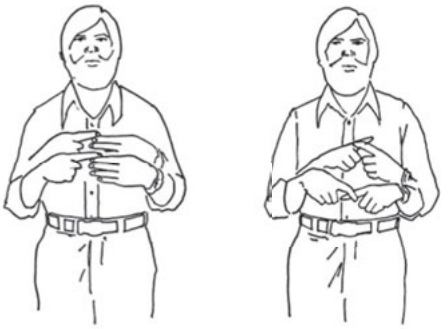


Figure 6: An ASL example from Frishberg (1975) illustrating *symmetry of hand configuration and palm orientation* (reprinted with permission). The old sign for DEPEND (a) shows a 1-handshape contacting a B-handshape with a repeated downward movement. In contrast, the newer sign (b) shows that the non-dominant hand has assimilated the 1-handshape and downward palm orientation of the dominant hand.

We consider three examples here of gestures that exemplify a subset of the grammaticalization processes described by Frishberg. We provide dictionary

images for the NSL forms and still images (and videos, where noted) of selected gesture productions, as they relate to the points discussed below.

The first example is CHILD (Figure 7). All 11 gesturers produced the same movement and orientation found in the NSL sign, as well as similar handshapes. However, we observed variation in the Location parameter for a subset of gesturers. Some gesturers produced the form much higher, much lower, or even farther away from the body, out to the side, than in the citation form in NSL, which is produced in a centralized vertical location. These gesture articulations at different heights and locations reflect the pantomimic or depictive nature of the gesturers' representation of a child, presumably corresponding to the height and/or location of an imagined child. The adaptations observed between the gesture forms and the NSL sign reflect Frishberg's principle of displacement (described above). Frishberg notes that a consequence of this formational change is a loss, or bleaching, of the semantic and indexical content of the more descriptive/iconic gesture forms.

Figure 7: The NSL sign glossed CHILD (NINO/NINA) (a) is articulated in a vertically neutral space, relatively close to the torso. While some gesture responses showed similarly neutral locations, one gesturer produced a form articulated well above her head (b), and a second gesturer produced a form that extended to the side so far away from his body that his hand went off-camera (c). For all video files, see https://www.degruyter.com/view/title/523378.

The second example is STINGY. The NSL sign for STINGY (Figure 8a) is simpler and more centralized compared to the forms produced by gesturers. Two-handed and one-handed forms were common in the gesture responses – at least two of the two-handed forms depict the notion of "the golden elbow," demonstrated by the palm of one hand tapping or otherwise indicating the bent elbow of the other arm, the hand of which is closed in a fist. The meaning of the gesture derives from the depiction of a stingy person who is unable or unwilling to bend their arm in order to reach into their pocket for their money. Here the variations in location

produced by the gesture participants (mainly in the horizontal plane, to the side of the body) become more centralized, toward the midline. This centralization appears to be simultaneous with the dropping of one hand/arm, also reflecting the influence of ease of production and pressure towards clarity and distinctiveness of forms (Slobin, 1985), as well as Frishberg's process of Fluidity.

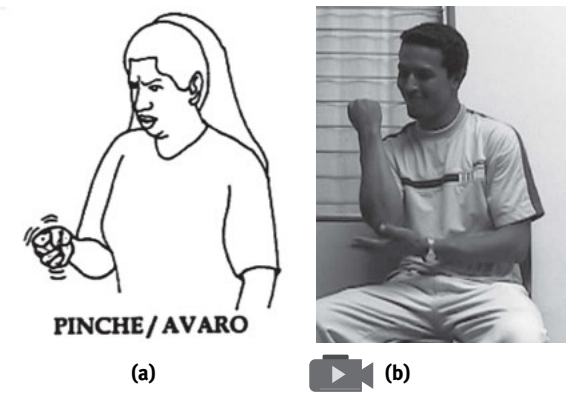


Figure 8: The NSL sign glossed STINGY (PINCHE/AVARO) (a). An example of a gesture response using two hands, that includes the closed fist of the NSL sign but also features the additional (perhaps original) component of the open palm contacting the elbow (b).

In both examples, we observed variation among gesture participants in the vertical and horizontal location of gestures. Generally, gesturers used non-neutral locations (high, low, or lateral signing space), whereas the NSL sign is produced in a more neutral location. In the CHILD example, the semiotic content contained in the location of the gesture, that is, the indication of the child's height, is "bleached". Likewise, in the case of STINGY, these grammaticalization processes have the effect of obscuring the "golden arm" source of the STINGY gesture, further distancing it from its pantomimic origins, and making it even more arbitrary. The change from two-handed to one-handed, as well as the change in vertical location, both reflect simplification of the sign form, and result in the lexical content of the sign moving to the hands (i.e., dropping the elbow component), another aspect of the transition discussed by Frishberg (1975). As in the previous example (CHILD), the centralization of the gesture, as well as the omission of the second hand, both result in a loss of semiotic information; see Coppola and Senghas (2010) for a discussion of this semantic "bleaching" in the context of indexical points becoming nominals in the evolution of Nicaraguan Sign Language.

1.8 Changes in meaning

When gesturers respond to the Spanish prompt "sibling/relative/member of one's family", they tend to produce the form that now means "sibling" in NSL (Figure 9a). That is, the same form, tracing the vein on one's arm, indicating genetic relatedness, has a wide variety of meanings for gesturers, but only a single meaning (sibling) in NSL. This shift reflects a systematic restriction or narrowing of meaning as the conventional gesture entered the NSL lexicon. In a similar vein (no pun intended), one response to the "sibling/relative" prompt was a one-handed form produced with a U-handshape with a wiggling movement of the fingers, which turns out to be the current NSL sign meaning SIMILAR (Figure 9b). The use of this form by a non-signer to indicate "sibling" reflects a metaphorical extension of the idea of sibling similarity to indicate general alikeness.

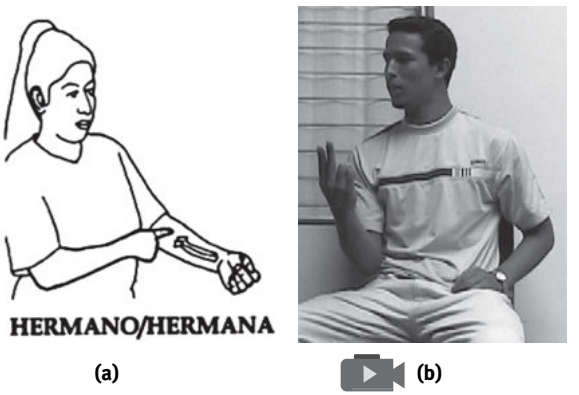


Figure 9: The NSL sign glossed SIBLING (HERMANO/HERMANA) (a) and a gesturer producing a form in response to 'sibling' whose form resembles the NSL sign SIMILAR (PARECIDO), in which two fingers are extended and alternately wiggle (b).

One large difference that drives discontinuities between co-speech gesture and emerging languages (including both individual homesign systems, village sign languages, and Deaf community sign languages, is the "density" of manual forms. That is, in a manual system that serves as a primary language (vs. gestures produced along with speech), the signs must bear the full burden of communication. Thus signs must exist in paradigmatic relation to each other instead of in relation to speech. In a paradigm, forms are systematically related to each other, and distinct from each other. One way that paradigms form is in the segmentation or separation of particular elements of a gesture or gestures, that are then recombined to express many more meanings (see Senghas et al., 2004

and Senghas, 2019 for how this plays out in the emergence of structures to express manner and path in motion events, as well as in other linguistic structures in the emergence of Nicaraguan Sign Language). These are phonological processes that we observe here, but they parallel the kinds of mechanisms that we see evidence for in the emergence of morphological and syntactic devices. For an example of how paradigms emerge and take shape in the domain of morphology, see Goldin-Meadow et al. (2007)'s analysis of how homesigning children in the US and Taiwan take the gestures they see produced by the hearing people around them and segment out different handshape and movement parameters, and begin to recombine them in productive ways that are not observed in the gestures of their hearing, non-signing parents.

This study of how conventional gestures (emblems) are adopted into the sign language emerging in Nicaragua offers an opportunity to see how such paradigms develop. In the case described above, the conventional gesture form that hearing people used to refer to relative, or a person related to one by blood, now has a much more restricted meaning, referring only to siblings. This is because the emerging sign language now takes on the role as a primary language, rather than functioning as gestures that accompany and supplement spoken language. In accord with the larger culture, the emerging language must develop terms to refer to the major kinship relations, and not only distinguish sets of individuals to whom one is or is not related by blood. That is, the users of the sign language must develop the set of kinship terms that correspond to the distinctions that are culturally relevant, including *mother, father, sibling, aunt, uncle, cousin, mother-in-law*, etc.

1.9 Changes in form illustrating the lexicalization process

We present the final example, PAY, last, because it exemplifies many of the grammaticalization processes proposed by Frishberg (1975) (see summary in Table 3). I will argue in the discussion that each participant, in a sense, represents a different stage of the lexicalization of this form. First I will describe the responses, which can be seen in the following video. One gesturer produced a gesture that pantomimed reaching into one's pocket, removing money, and offering it to another person (example A). One gesturer produced a conventionalized gesture indicating MONEY (example B), and the MONEY gesture was also incorporated into another participant's multi-gesture response that included two repetitions of the non-symmetric, two-handed gesture described in the next sentence (example C). One gesturer produced a two-handed form that matched the movement of the NSL sign, but the orientation of the non-dominant hand differed slightly from

the NSL sign, with the palm facing the body (example D). Seven out of the eleven gesturers who responded to this item produced the NSL form exactly (example E); that is, with two symmetrical index-finger handshapes, as well as the same location, orientations, and movement.

Table 3 summarizes the "progression" of different forms produced by the various hearing gesturers, beginning with a highly pantomimic production in which the participant acts out the event of paying (A). This production contains multiple segments and is very un-compact (his hand actually reaches into his pocket). This analysis serves as a kind of cross-sectional study of the grammaticalization processes operating on this gesture that is not conducted over time, but rather through analyzing the variability among gesture participants in the degree of grammaticalization of this form. In example B, the participant provides related semiotic content but does not explicitly characterize the act of paying. Example C reflects a reduction of the pantomime form described in A; this response is articulated in neutral space with more distal articulators, and reflects Frishberg's processes of fluidity and content moving to the hands.

Table 3: Summary of gesture forms produced in response to the elicitation item PAY and notes on grammaticalization processes. A video showing the forms can be viewed here.

	Description of form and number of gesturers producing this form (total = 11)	**Relationship to conventional gestures or NSL signs**	**Relevant grammaticalization principle and notes**
A	Pantomime of pulling money out of pocket and offering it (1)	Raw material for gesture/sign conventionalization.	Starting point: acting out of event; contains multiple segments, very un-compact (hand actually reaches into pocket).
B	HS:B closed, palm-up, thumb contacts fingertips rapidly (1)	Conventional "money" emblem.	Related semiotic content but does not explicitly characterize the act of paying.
C	HS:5 palm-down taps HS:5 palm-up (1)	Same location, different, symmetrical handshapes, different location, one different orientation with respect to NSL PAY.	The 'pay' component reflects a reduction of the pantomime form, even though she adds the 'money' emblem; all elements articulated in neutral space with more distal articulators. Reflects Frishberg's processes of fluidity and content moving to the hands.

Table 3: (continued)

	Description of form and number of gesturers producing this form (total = 11)	Relationship to conventional gestures or NSL signs	Relevant grammaticalization principle and notes
D	HS:U palm-down sweeps away from body across HS:U palm-toward-body repeatedly (1)	Same location, different, symmetrical handshapes, one different orientation with respect to NSL PAY.	Handshapes becoming the same reflects Frishberg's tendency toward symmetry.
E	HS:1 palm-down sweeps away from body across HS:1 palm-down repeatedly (7)	Same handshape, location, movement, and orientations as NSL PAY.	Reflects Frishberg's tendency toward symmetry for both handshape configuration and palm orientation; iconicity has been largely bleached.

In example D, the handshapes become the same, reflecting Frishberg's tendency toward symmetry (though this form, unlike the following example, retains the more iconic upward palm orientation depicting the hand holding the money). The final example, E, shares all formational features with the NSL sign and reflects Frishberg's tendency toward symmetry for both handshape configuration and palm orientation (as observed by Frishberg for the ASL sign DEPEND shown in Figure 6). An outstanding issue, given this methodological approach, is how the form came about in the NSL community context. The fact that the majority of hearing gesturers produced this form suggests that if NSL Cohort 1 signers began with this same range of forms in their multimodal input, they would have converged on the symmetrical, 2-handed, HS:1 form relatively quickly.

1.10 Prescriptive processes

Nicaraguan gesturers produced the commonly used, highly conventional forms for DRINK and EAT (Figure 10), which were the forms used by NSL signers in the earliest years of the emergence of the Deaf community. However, these are not the forms used in the dictionary, because they were deemed too iconic and gesture-like (!) during the standardization seminars held in the 1980s.

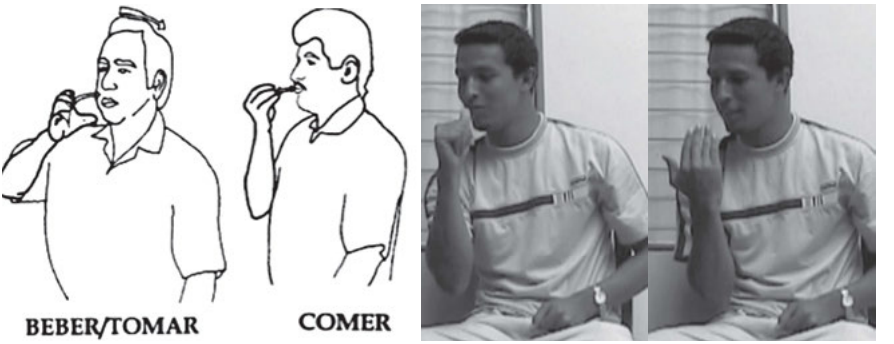


Figure 10: The NSL signs DRINK (BEBER/TOMAR) (a) and EAT (COMER) (b), compared with the highly conventionalized gesture forms DRINK (BEBER/TOMAR) and (c) EAT (COMER) (d) that were also in wide use by NSL signers in the initial period of emergence.

1.11 Discussion

One of the most striking findings of this study is that it reveals tendencies toward and processes of grammaticalization and the resulting tendencies toward arbitrariness operating on non-linguistic elements (iconic gestures) among hearing non-signers in Nicaragua. The closeness in time between the observations of these gesture forms and the emergence of Nicaraguan Sign Language permits insight into how these grammaticalization and lexicalization processes operate, particularly with respect to their time course.

The findings reported here accord with the proposal put forward by Wilcox and colleagues (2010) based on observed relationships between gestures common among hearing non-signers and the lexicons of four sign languages (ASL, Catalan Sign Language (CSL), French Sign Language (LSF), and Italian Sign Language (LIS). Specifically, they propose "that gestures in common use in the local society often enter the linguistic system of signed languages as lexical signs." These findings also support Wilcox et al.'s (2010) claim that "gestures may undergo somewhat comparable processes of changes in form and meaning (as those in grammaticalization), irrespective of whether they become integrated into a linguistic system such as LIS." They cite as an example the gesture commonly used by Southern Italians to mean 'dead', in which two straight movements become one circular movement. In a second example, they characterize the change in form between the benediction gesture (the two movements involved

in making the sign of the cross) and the gesture expressing 'dead' (one circular movement), as phonetic reduction.

Wilcox and colleagues also note that another characteristic of grammaticalization is semantic generalization (i.e., from "death" to epistemic impossibility). Note that the emerging language context offers new perspective on these processes. For example, the change in the meaning of the Nicaraguan gesture 'relative/family member' on the surface would appear to constitute a counterexample to the semantic generalization characteristic of grammaticalization to "sibling." However, a more accurate interpretation might be that this difference (from a more general meaning to a more restricted one) is a consequence of grammaticalization in the context of sparse lexical items in general, that is, tension between semantic generalization of forms and a competing need to create new lexical items in a new language.

While the synchronic perspective offered here sheds some light on how conventional gestures are recruited for sign language lexicons, some questions remain. The conventional gesture forms analyzed here could have become NSL signs in two different ways, reflecting two different time courses. Of course, this may vary across categories of semantic meaning, or even at the level of individual form-meaning pairings. The analysis presented here does not directly address the time component, that is, when the forms became fully conventionalized. Another way of asking this is: To what degree were the NSL signs conventionalized before they became used regularly by NSL signers? Specifically, the two possibilities are: 1) conventional emblems could have been adopted by signers from the uses of the "matching" NSL forms – direct importation into NSL, or 2) conventional gestures could have undergone an accelerated grammaticalization process and ended up at the same endpoint of the simplified, less iconic gesture emblem forms. This second proposal aligns with Janzen and Shaffer's (2002) argument that the gesture used in France to mean 'to go' (referred to in French as *'on se tire'*) is the original source of both the ASL and LSF (French Sign Language) forms expressing FUTURE.

The variability exhibited in the gesture forms described here represents different stages of the emergence of a conventional form, and can be considered substages of the forms' history/etymology. Different people are at different points in this process, depending on a number of factors, including, for example, frequency of the use of that gesture in various contexts. One way to distinguish these two possibilities would be to look at a larger sample of signers of Nicaraguan Sign Language to assess the variability in the form of such signs as they were produced in the very earliest stages of the emergence of the language. Study 2, described in the second part of this chapter, offers evidence that at least some lexical items were already highly conventionalized in the early stages of

the language. However, the number of participants is small and the data were not collected in the very initial stages of the language's emergence, but rather approximately 25 years after the signing community began to form.

Overall, these results are quite consistent with the findings from Morgan (2015) on the contributions of hearing Luo gesture to the lexicon of Kenyan Sign Language. She found that little from the gestural repertoire is completely lost, but that when gestures become signs, they "become more specific semantically and are subject to syntactic and phonotactic constraints" as described here for Nicaraguan gestures. In conclusion, the conventionalized gestures produced by hearing people who do not sign generally find their way into NSL; however, these forms are not always adopted faithfully into NSL.

The path from gesture to language was likely mediated by homesigners (Morford and Kegl 2000). Homesigners are deaf individuals whose limited or nonexistent exposure to sign and spoken language is not adequate for them to acquire an existing language. Homesigners across many cultures nevertheless develop a system of gestures that they use as their primary communication systems (Goldin-Meadow, 2003). In Nicaragua, the vast majority of deaf people do not have access to NSL and continue to use their homesign systems into adulthood (Coppola, 2002). Indeed, the deaf people who started the Nicaraguan Deaf community were homesigners when they met; through their interactions the language began to emerge (Senghas et al., 2005; Coppola and Senghas, 2010). Unsurprisingly, homesigners interacting with each other exploited the culturally available conventional form-meaning mappings that were being used by the hearing people around them, including their family members and friends. Of course, these forms were also available to the signers who later came to be known as Cohort 1, whose interactions formed the basis for the initial version of NSL. Present-day child and adult homesigners who have not participated in the NSL signing community also produce these culturally conventional forms.[6]

One characterization of emerging languages is that they have come out of thin air, exemplified by the title of an article about Nicaraguan Sign Language in Harvard Magazine titled "A Language Out of Nothing" (Bolotnikova, 2017).[7] The analysis presented here, as well as a number of other works that carefully compare

6 When homesigners produce NSL forms that have shifted in meaning upon adoption into NSL (such as RELATIVE becoming more restricted to mean only SIBLING), the homesigners usually retain the more general "gesture" meaning rather than the restricted NSL meaning, again reflecting the multiple layers of semiotic interpretations of sign forms, and how they are influenced by linguistic and social contexts discussed by Hoffman-Dilloway (2008).

7 Also see LeGuen et al. (this volume) for additional discussion of this point.

the visually accessible elements of multimodal communication available to deaf people who are building language systems, belies this characterization.

In sum, language creation and historical language change show similar tendencies and processes both across and within modality. For example, changes in sign languages parallel those in the grammaticalization of spoken languages (Pfau and Steinbach, 2006). Within modality, we see that Nicaraguan gestures have already undergone changes in accord with Frishberg's tendencies, presumably because they are frequently used and widely understood. The variation across individuals demonstrates that some forms are not (yet?) fully conventionalized. This analysis accords with the claim made by Wilcox and colleagues (2010) for Italian gestures, and supports Janzen and Shaffer's (2002) argument that gestures produced by hearing non-signers are a common source for lexical (and grammatical) morphemes in modern sign languages. The difference between these previous works and the current work is the greater closeness in time between the conventionalization of the gesture forms and the emergence of the sign forms, due to the relatively recent emergence of NSL. Thus, the current analysis also adds synchronic evidence for Wilcox's theory of grammaticalization in sign languages, which is based on diachronic data. Finally, these results support Wilcox et al.'s (2010: 350) suggestion that "common cognitive processes and structures underlie the development of both gestural meaning and linguistic function."

2 Study 2: The role of social interaction in conventionalization of the lexicon

Study 1 showed that culturally conventional gestures play a type of "substrate" role in seeding an emerging lexicon, though there is not always a direct mapping between the gesture forms and their meanings and the forms and meanings of the signs based in these gestures. Several factors have been hypothesized to influence the process of conventionalization of lexical items, such as community size and the degree of shared knowledge among language users. We turn now to examining the role of social interaction patterns (in particular, social network structure) in conventionalizing lexical items. Study 2a compares the process of conventionalizing lexical forms in two types of language emergence situations in which groups of people communicate on a regular basis over an extended period of time: 1) deaf homesigners and their hearing communication partners and 2) early members of the Nicaraguan Deaf community. Study 2a compares these naturalistic data and Study 2b uses a computational model to provide

additional insight into the factors driving the robustness and rate of lexical conventionalization (Richie et al., 2014). Before describing each study, we first offer some background on both types of systems.

In the literature, homesign systems have been characterized in various ways, with reference made to the availability of accessible language input or a linguistic community, level of complexity in the gesture system, number of (primary) users, and even age. Indeed, Horton (this volume) is among the first to lay out distinctions among homesigners situated in different sociocommunicative contexts. The participants in the studies reported here are all "individual" homesigners. That is, they do not regularly interact with any other deaf individuals, and they do not have regular (or indeed any) access to a community sign language, regardless of its stage of emergence. This participation in a linguistic community distinguishes homesigners from the signers of Cohort 1 of Nicaraguan Sign Language, described below. In the late 1970s in Managua, deaf students came together in two institutional contexts, an elementary school and a vocational program (Polich, 2005; Senghas et al., 2005, also see the Sociolinguistic Sketch, this volume). The first group, or cohort, of students, formed a rudimentary sign system via their interactions; these signers are referred to as Cohort 1 of Nicaraguan Sign Language. While the language had yet to develop many aspects of its structure, all of the users relied on it for communication, and the language itself emerged in the context of a linguistic community (R. Senghas et al., 2005). These conditions do not hold for any of the types of homesign systems characterized by Horton, and especially not for the individual homesigners in Nicaragua whose systems we characterize here, who do not even have access to another deaf individual in their regular communication context.

Despite the scarcity of their language input, homesigners in Nicaragua who continue to use their gesture systems into adulthood innovate a great deal of linguistic structure, which has been documented by myself and my colleagues over the last two decades, e.g., grammatical relation of subject (Coppola and Newport, 2005); pro-forms (Coppola and Senghas 2010); morphologically contrastive handshape types in adult homesigners (Brentari et al., 2012) and in a child homesigner (Coppola and Brentari, 2014); plural morphology (Coppola et al., 2013); an argument-predicate distinction (Goldin-Meadow et al., 2015); and marking of agentivity and number (Horton et al., 2015). Adult homesigners also develop lexical items in the gesture systems they use with their hearing communication partners. In a longitudinal lexical elicitation study conducted over a period of 9 years, Richie et al. (2014a) showed that while the lexical items used by homesigners and their communication partners had become more similar to each other, none of the homesigning families had fully converged on lexical

items for common objects and concepts.[8] This result is particularly striking given that each homesigner and their family members had been interacting on a daily basis for periods of time ranging between 15 and 25 years.

Many of the studies described in the previous paragraph compare the emergence and use of linguistic structures in homesign systems and Nicaraguan Sign Language. Such comparisons highlight the impact of participating in a linguistic community in which all individuals use the system as their primary language. How might being part of a linguistic community affect the process and timing of lexical conventionalization? We compared these two language emergence settings in terms of their rates of lexical conventionalization. We selected samples of individual homesign systems and NSL signing such that each would have been in use for about the same period of time. The data from the earliest NSL signers (Cohort 1) were collected in 2003, which is about 25 years after the Deaf community formed in 1978 in Managua. The data from the four mature family homesign systems were collected in 2011, by which time these homesign systems had been used in each of the four families for at least 25 years.

2.1 Elicitation Study (Study 2a)

Deaf homesigners and hearing communication partners from four Homesign family groups were included in the study. In total, these comprised four adult homesigners [3 male; aged 24 to 33 years (M=29)] and nine of their hearing family members and friends [4 male; aged 17 to 59 (M=30)]. The distribution of hearing communication partners, and their relationships to the homesigners in their families, are shown in Table 4. We compared these Homesign family groups to eight NSL Cohort 1 signers (2 males; 21–32 years, M=27).[9] The homesigners and the Cohort 1 signers were similar in age, and as noted above, each person had participated in either the family homesign system or NSL for approximately the same length of time.

The lexicon elicitation stimuli selected for comparison were 9 line drawings depicting common objects (see Figure 11 for examples). All items were familiar to the participants, and most were drawn from prior studies investigating

8 Lexical items were elicited from homesigners and their hearing communication partners in 2002, 2004, 2006, and 2011. This comparison uses the forms collected in 2011 to most closely match the length of time of use for both homesign systems and NSL.

9 We thank Ann Senghas for contributing these production data from her archive of early Nicaraguan Sign Language.

lexicalization in undocumented languages (e.g., Osugi et al., 1999), which itself was derived from Swadesh, 1971). The drawings depicted the following objects: cat, dog, cow, rain, sun, ice, egg, fish, and orange (the fruit) and were presented one at a time to each participant in order to elicit the name of each object. Participants were videotaped individually and were not allowed to see each other's productions in order to minimize the possibility that their responses would influence each other. All responses were videotaped for later analysis.

Table 4: Each homesigner serves as the center of their family's individual homesign network. Each homesign network in the current study consisted of the homesigner and 1, 2, or 3 family members. All family members are hearing and while all use the homesign system with the homesigner, none rely on the homesign system as a primary means of communication; they speak Spanish among themselves.

Family 1	Family 2	Family 3	Family 4
Homesigner	Homesigner	Homesigner	Homesigner
Mother	Mother	Mother	
Older brother	Younger brother		Younger brother
Friend	Younger sister		Younger sister

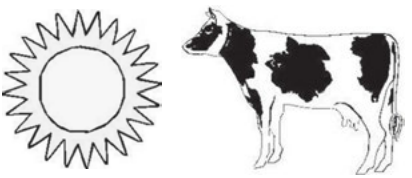


Figure 11: Examples of line drawings used as elicitation stimuli.

Each participant produced at least one gesture or sign in response to each line drawing. In line with Sandler et al.'s notion of an "iconic prototype" (2011), for the analyses presented here we used the iconic motivation for a form, rather than its phonetic realization, to categorize responses. This decision was also a practical one: the variability in the overall character of the gesture responses, reflecting different iconic motivations, would have skewed an analysis based solely in formal features. Thus, we glossed each form according to its *conceptual component*, that is, the property of the referent it encoded (e.g., we assigned the gloss HORNS to a sign that indicated horns protruding from the sides of the head of a cow). All responses could be labeled in this way, offering support for

Perniss et al.'s (2010) claim that iconicity was "an essential ingredient in the transformation of early forms of communicative interaction into the complex language systems we master today." However, as Morgan (2015) notes, both the choice of iconic motivation for depicting a referent (e.g., the salient feature for 'dog' may be *snout*, *begging paws*, or *floppy ears*) as well the ways of manifesting that choice phonologically, vary across sign languages.

2.2 Results

Each data point represents the distance between the responses produced by a pair of individuals (Figure 12), averaged across the 9 objects. For details of how this distance was calculated, see Richie et al. (2014b). The points on the right, for the homesign systems, indicate the average distance, across objects, produced by each Homesigner-Communication Partner pair (9 total). The points on the left represent the average distance, across objects, produced by every possible pair of NSL signers (because there are four NSL signers, there are six unique pairs). The distances between the NSL signer-NSL signer pairs were significantly smaller than the distances between the Homesigner-Communication Partner pairs, indicating greater degrees of conventionalization in the forms used to represent these meanings. Given that NSL and each homesign gesture system had been used for similar periods of time by the time the data were collected from participants, these findings indicate that NSL conventionalized faster than the homesign systems.

Richie and colleagues (2014a) showed that deaf homesigners slowly converge on form-meaning mappings with their hearing communication partners, but that convergence was not complete by 2011, the latest year in which this set of lexical items was elicited. This lack of full convergence is very different from what seems to have taken place in the emergence of Nicaraguan Sign Language (as described in the results and discussion sections of Study 1). These developments indicate that the NSL signers in Managua must have converged on a lexicon, at least a basic one, in less than 15 years after beginning to interact with each other. By 2011, all of the homesigners had been using their respective systems for more than 15 years, yet none of them had converged completely with any of their communication partners. What might explain this difference in rate of conventionalization between homesign and NSL? Here we consider the differences in the patterns of interaction between users of homesign systems and users of NSL. In order to determine whether social interaction patterns drive the differences we observed in the rate of lexical conventionalization between these two groups, we developed a computational model, which we describe briefly in the next section.

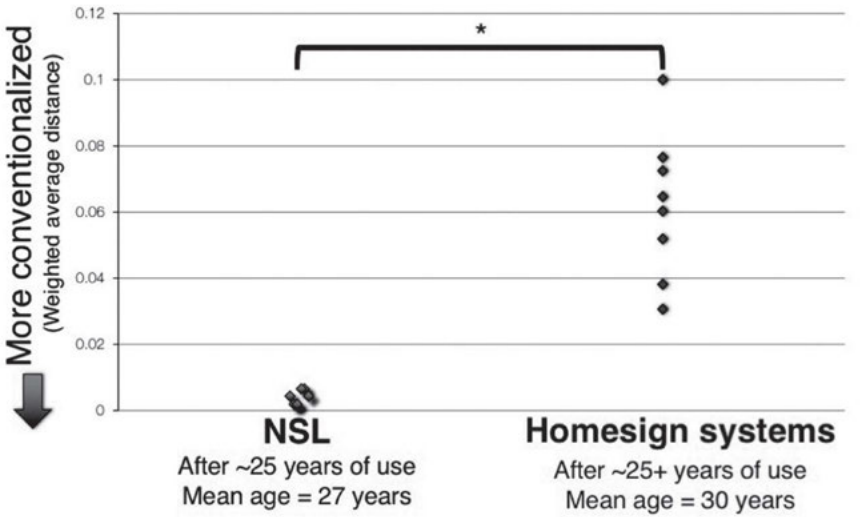


Figure 12: Average weighted distances between responses for NSL signers and Homesigners and their Communication Partners. The average distance (i.e., difference) between responses produced by NSL signers was smaller than the median distance between responses produced by Homesigners and their Communication Partners, indicating greater conventionalization among the NSL signers ($W=36$, $p < 0.01$, one-sample Wilcoxon Signed Rank test). Note that a distance of 0 reflects identical responses produced by both members of each pair.

Importantly for the present approach, these two situations, homesign and NSL, differ in one striking way (though of course other differences exist, and will be discussed later). In the Nicaraguan Deaf community, all members use NSL to communicate with each other. That is, even though not every individual interacts with every other individual, when members of the community interact, they use the shared community sign language (NSL) (as is the case with other Deaf community sign languages, Woll and Ladd, 2003; Meir et al., 2010). We call this the "richly-connected" network, or the NSL-type network. This is in sharp contrast to the homesign situation. In the homesign-type network, while each hearing family member uses the homesign system with the deaf homesigner, the hearing family members use spoken Spanish, and not the homesign, to communicate with each other. Thus, the deaf homesigner is situated at the center of a "sparsely-connected", star-type configuration, positioned as the only person who uses the homesign system as their primary language. In other words, the homesign interactive structure is one-to-many, while the NSL/Deaf community structure is many-to-many. Figure 13 depicts this salient difference in social network structure and interaction patterns that we examine closely here.

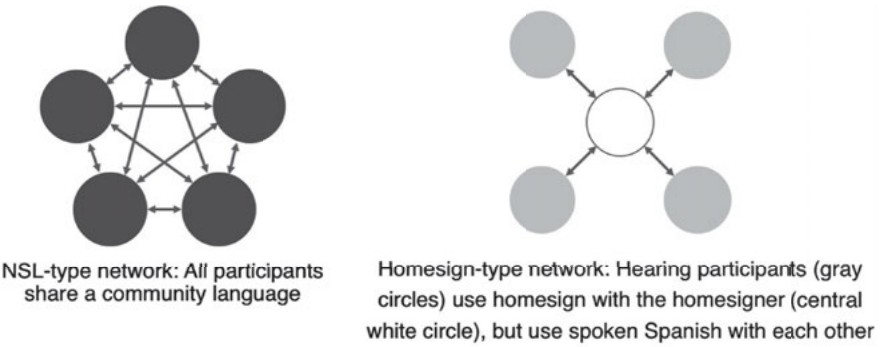


Figure 13: Members of the Nicaraguan Sign Language community are part of a "richly-connected" network, typical of most sociolinguistic settings, including in Deaf communities. In this type of network, all participants have the ability and opportunity to converse with all other participants, because they use a shared community language. In sharp contrast to this richly-connected network, in the homesign-type network, while each hearing family member and friend (referred to as "communication partners") uses the homesign system with the deaf homesigner, the communication partners use spoken Spanish, and not the homesign, to communicate with each other (note the lack of arrows connecting the light gray circles to each other). Thus, the deaf homesigner is situated at the center of a "sparsely-connected", star-type configuration, positioned as the only person who uses the homesign system as their primary language.

2.3 Computational model (Study 2b)

We developed a relatively simple agent-based computational model that captures two fundamental aspects of the process of lexical conventionalization (Richie et al., 2014b). First, the agents must be able to store a list of form-meaning mappings. Second, the individuals must be able to learn, or modify, their lexicon as the result of communicative interactions. We used a probabilistic model of language acquisition (Yang 2002, 2004) to study the dynamics of learning and social interactions in lexicon emergence. Finally, we used the model to test the hypothesis that social interaction patterns drive the observed difference in the rate of conventionalization between homesign systems and NSL.

Our simulations of the communicative interactions of agents naming a particular object used a population of 5 agents. Agents started out preferring either the use or the non-use of each conceptual component, with random probabilities, and updated their probabilities of producing a particular gesture or sign according to a set learning rate (see Richie et al., 2014b for details of the model

and its parameters). For each simulation, we ran the simulations over 2 million communication interactions.

2.4 Results

We recorded the number of interactions required for convergence, which was achieved when all 5 agents produced the same conceptual component in their response (Table 5). Recall that conceptual components were assigned based on the iconic base of a form, so that different gesture forms invoking the idea of 'horns' to express the meaning *cow* were all coded as HORNS in terms of conceptual component, regardless of the specific handshape configuration or location used. We found a significant difference in convergence time (measured in number of interactions) between the Homesign-type model and the NSL-type model ($p < 10^{-12}$). We also found a difference between the percentage of models of each type that achieved convergence: all of the NSL-type simulations converged, whereas only 80% of the Homesign-type models converged. We interpret these results to reflect the important role of a linguistic community, in which all participants use the system as a primary language, and in which all users have the opportunity to interact with one another, in the rapid convergence on lexical items. These findings offer a potential explanation for the difference in rates of conventionalization between Homesign family groups and Nicaraguan Sign Language.

Table 5: The average number of iterations required for model convergence, followed by the percentage of simulations reaching convergence in 2 million iterations (in parentheses).

Nicaraguan Sign Language	Homesign
260K (100%)	698K (80%)

2.5 Discussion

These results represent the first comparison of longitudinal or cross-sectional empirical data of naturally emerging languages with computational models of language emergence. Furthermore, results from an experimental semiotics version of this experimental design, in which hearing non-signers organized into sparsely-connected or richly-connected networks communicate meanings to

each other in the lab using gesture only, also converge with the findings from the naturalistic fieldwork data and the computational models described here (Hall et al., 2020). As suggestive as these findings may be, we must acknowledge that a different social network structure, that is, the different interaction patterns between Homesign family groups and NSL signers, is not the only way that homesign systems and NSL signers differ. NSL signers have had the benefit of formal education, whereas the homesigners have not. Formal education has been associated with greater standardization of language forms, though this has mainly been studied in the context of written forms of language, which is not what is being examined here.

However, some differences between homesigners and NSL signers do not obviously favor NSL signers in terms of predicting more rapid conventionalization. For example, the NSL signers do not live in the same households as each other, unlike the homesigners and their communication partners, who do. Indeed, the center for special education in Managua, which served as the original magnet drawing NSL signers together, was only in session in the mornings, in accord with most public schooling in Nicaragua, including schools serving hearing children. Furthermore, in the early years of the school, all instruction was in spoken Spanish, and the deaf students were discouraged from signing in the classroom, further limiting the time available for free interaction. Another possible scenario is that the homesign family networks are small enough that each individual's preferred form can be tracked, thus obviating the need for conventionalization.

Based on the convergent findings from these different methodological approaches, then, we conclude that lexical conventionalization depends on, or is at least hastened by, typical rich socio-linguistic community structures that allow interaction among a number of users who all use the language as their primary language. While we currently don't have much comparative data because few emerging languages have been documented from such early stages, and usually with varying methods, we look forward to working with our colleagues to further illuminate the influences of these social, cultural, and communicative factors in future work. To conclude, the findings of Studies 1 and 2, taken together, suggest that conventional gestures may function as "lexical" input for homesigners who are generating a linguistic system with little linguistic input, and that social interaction patterns have a measurable impact on the degree and speed of lexical conventionalization.

Acknowledgements

I thank the homesigners and their family members and friends, the Nicaraguan Sign Language participants, and the hearing gesture participants for allowing me and my team to learn from them. I thank Dra. Claudia Molina, Jenny Ojeda, and Leybi Tinoco for assistance with data collection and Julia Fanghella Adell for assistance with coding. I especially thank Ann Senghas and the Language Acquisition and Development Laboratory for providing the lexicon data from Cohort 1 of Nicaraguan Sign Language used in Study 2. I am also grateful to Ann Senghas, Molly Flaherty, and two NSL signers for consultation on lexical items in Nicaraguan Sign Language. I thank the Sign Language Research and Discussion Group at the University of Connecticut for constructive feedback, and Emily Carrigan, Laura Horton, and Pamela Perniss for comments on the manuscript. This research was supported by a National Institutes of Health (NIH) National Research Service Award to the author; NIH P30 DC010751 to the author and Diane Lillo-Martin; NIH R01 DC0049 to Susan Goldin-Meadow; NIH R01 DC00167 to Elissa Newport; National Science Foundation (NSF) grants EHR/BCS 1553589 to the author, BCS 0112391 and BCS 0547554 to Diane Brentari and the author; and by NSF IGERT grant DGE-1144399, which supported Russell Richie, a collaborator on the experiments reported in Study 2.

References

Bergmann, Kirsten & Stefan Kopp. 2009. Increasing the expressiveness of virtual agents: Autonomous generation of speech and gesture for spatial description tasks. In Keith S. Decker (ed.), *Proceedings of the 8th International Conference on Autonomous Agents and Multiagent Systems* (Volume 1), 361–368. Richland, SC: International Foundation for Autonomous Agents and Multiagent Systems.

Bolotnikova, Marina N. 2017. A language out of nothing: Searching for the nature of speech, sign, and universal grammar. *Harvard Magazine,* May-June. Cambridge, MA: Harvard University.

Brentari, Diane, Marie Coppola, Laura Mazzoni & Susan Goldin-Meadow. 2012. When does a system become phonological? Handshape production in gesturers, signers, and homesigners. *Natural Language & Linguistic Theory* 30(1). 1–31.

Brentari, Diane, Marie Coppola, Pyeong Whan Cho & Ann Senghas. 2017. Handshape complexity as a precursor to phonology: variation, emergence, and acquisition. *Language Acquisition* 24(4). 283–306.

Brown, Roger. 1958. How shall a thing be called? *Psychological Review* 65(1). 14–21.

Brown, Roger. 1968. *Words and things*. New York: Free Press.

Coppola, Marie. 2002. The emergence of the grammatical category of Subject in home sign: Evidence from family-based gesture systems in Nicaragua. Rochester, NY: University of Rochester dissertation.
Coppola, Marie. In preparation. Quantifying gesture conventionalization among hearing Nicaraguans.
Coppola, Marie & Elissa L. Newport. 2005. Grammatical subjects in home sign: Abstract linguistic structure in adult primary gesture systems without linguistic input. *Proceedings of the National Academy of Sciences* 102(52). 19249.
Coppola, Marie and Wing Chee So. 2005. Abstract and object-anchored deixis: Pointing and spatial layout in adult homesign systems in Nicaragua. In Alejna Brugos, Manuella R. Clark-Cotton & Seungwan Ha (eds.), *Proceedings of the Boston University Conference on Language Development* 29, 144–155. Somerville, MA: Cascadilla Press.
Coppola, Marie, Susan Goldin-Meadow & Carolyn Mylander. 2006. How do hearing parents communicate with deaf children? Comparing parents' speech and gesture across five cultures. Poster presented at the Society for Research on Child Language Disorders. University of Wisconsin, Madison, 1–3 June.
Coppola, Marie & Ann Senghas. 2010. Deixis in an emerging sign language. In Diane Brentari (ed.), *Sign languages: A Cambridge language survey,* 543–569. Cambridge, UK: Cambridge University Press.
Coppola, Marie, Elizabet Spaepen & Susan Goldin-Meadow. 2013. Communicating about quantity without a language model: Number devices in homesign grammar. *Cognitive Psychology* 67(1–2). 1–25.
Coppola, Marie & Diane Brentari. 2014. From iconic handshapes to grammatical contrasts: Longitudinal evidence from a child homesigner. *Frontiers in Psychology* 5. 830.
Coppola, Marie. 2020. Sociolinguistic sketch: Nicaraguan Sign Language and Homesign Systems in Nicaragua. In Olivier LeGuen, Marie Coppola & Josefina Safar (eds.), *Emerging Languages of the Americas* (Sign Language Typology 9)*,* Berlin: DeGruyter.
Creider, Chet. 1977. Towards a description of East African gesture. *Sign Language Studies* 14. 10–20.
Eccarius, Petra & Diane Brentari. 2008. Handshape coding made easier: A theoretically based notation for phonological transcription. *Sign Language & Linguistics* 11(1). 69–101.
Ekman, Paul & Wallace V. Friesen. 1972. Hand movements. *Journal of Communication* 22(4). 353–374.
Frishberg, Nancy. 1975. Arbitrariness and iconicity: Historical change in American Sign Language. *Language* 51. 676–710.
Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language*. New York: Psychology Press.
Goldin-Meadow, Susan, Carolyn Mylander & Amy Franklin. 2007. How children make language out of gesture: Morphological structure in gesture systems developed by American and Chinese deaf children. *Cognitive Psychology* 55. 87–135.
Goldin-Meadow, Susan, Diane Brentari, Marie Coppola, Laura Horton & Ann Senghas. 2015. Watching language grow in the manual modality: Nominals, predicates, and handshapes. *Cognition* 136. 381–395.
Heine, Bernd & Tania Kuteva. 2007. *The genesis of grammar: A reconstruction*. Oxford: Oxford University Press.
Hendriks, Bernadet. 2007. Negation in Jordanian Sign Language: A cross-linguistic perspective. *Trends in Linguistics Studies and Monographs* 188. 103.

Hoffman-Dilloway, Erika. 2008. Metasemiotic regimentation in the standardization of Nepali Sign Language. *Journal of Linguistic Anthropology* 18(2). 192–213.

Horton, Laura, Susan Goldin-Meadow, Marie Coppola, Ann Senghas & Diane Brentari. 2015. Forging a morphological system out of two dimensions: Agentivity and number. *Open Linguistics* 1(1).

Janzen, Terry & Barbara Shaffer. 2002. Gesture as the substrate in the process of ASL grammaticalization. In Richard P. Meier, Kearsy Cormier & David Quinto-Pozos (eds.), *Modality and structure in signed and spoken languages,* 199–223. Cambridge, UK: Cambridge University Press.

Johnson, Harold G., Paul Ekman & Wallace V. Friesen. 1975. Communicative body movements: American emblems. *Semiotica* 15. 335–353.

Kegl, Judy & Gayle A. Iwata. 1989. Lenguaje de Signos Nicaragüense: A pidgin sheds light on the "creole?" ASL. In Robert Carlson, Scott DeLancey, Spike Gildea, Doris Payne & Anju Saxena (eds.), *Proceedings of the Fourth Annual Meeting of the Pacific Linguistics Conference,* 266–294. Eugene: University of Oregon, Department of Linguistics.

Kendon, Adam. 1992. Abstraction in Gesture + Article Review of Semiotics of French Gesture. *Semiotica* 90(3–4). 225–50.

Kendon, Adam. 2004. Review of *Hearing gesture: How our hands help us think* by Susan Goldin-Meadow. *Gesture* 4. 91.

Kisch, Shifra. 2004. Negotiating deafness in a Bedouin community. In John Vickrey Van Cleve (ed.), *Genetics, disability and deafness,* 148–173. Washington, D.C.: Gallaudet University Press.

López Gómez, Javier J., Adrian M. Perez Castellón, Johana M. Rivera Rostrán & Jimmy F. Baltodano Baltodano. 1997. Diccionario del Idioma de Señas de Nicaragua. ANSNIC [National Deaf Association of Nicaragua]. Managua, Nicaragua.

Marsaja, I Gede. 2008. *Desa Kolok: A deaf village and its sign language in Bali, Indonesia.* Nijmegen, Netherlands: Ishara Press.

McClave, Evelyn Z. 2001. The relationship between spontaneous gestures of the hearing and American Sign Language. *Gesture* 1(1). 51–72.

McNeill, David. 1992. *Hand and mind: What gestures reveal about thought*. Chicago: University of Chicago Press.

Meo-Zilio, Giovanni & Silvia Mejía. 1980. *Diccionario de gestos: España e Hispanoamérica*. Bogotá, Colombia: Instituto Caro y Cuervo.

Meir, Irit, Wendy Sandler, Carol Padden & Mark Aronoff. 2010. Emerging sign languages. In Marc Marschark & Patricia Spencer (eds.), *Oxford Handbook of Deaf Studies, Language, and Education*, Volume 2, 267–280. Oxford: Oxford University Press.

Morford, Jill P. & Judy Kegl. 2000. Gestural precursors to linguistic constructs: How input shapes the form of language. In David McNeill (ed.), *Language and gesture,* 358–387. Cambridge: Cambridge University Press.

Morgan, Hope E. 2015. When does a word emerge? Lexical and phonological variation in a young sign language. *San Diego Linguistic Papers* 5. https://escholarship.org/uc/item/0dg64753 (accessed January 15, 2017).

Morgan, Hope E., Shane K. Gilchrist, Evans N. Burichani & Jared O. Osome. 2015. Kenyan Sign Language. In Julie Bakken Jepsen, Goedele De Clerk, Sam Lutalo Kiingi & William B. McGregor (eds.), *Sign languages of the world: A comparative handbook*, 529–552. Berlin: De Gruyter Mouton.

Morgan, Hope E. 2016. Language from gesture: A case study from East Africa. Paper presented at the Theoretical Issues in Sign Language Conference 12, Melbourne, Australia, 4–7 January.

Müller, Cornelia & Roland Posner (eds.). 2004. *The semantics and pragmatics of everyday gestures: Proceedings of the Berlin conference April 1998* (Körper, Zeichen, Kultur 9). Berlin: Weidler.

Newport, Elissa L. & Ted Supalla. 2000. Sign language research at the millennium. In Karen Emmorey & Harlan Lane (eds.), *The signs of language revisited: An anthology in honor of Ursula Bellugi and Edward Klima,* 94–103. Mahwah, NJ: Lawrence Erlbaum Associates.

Nyst, Victoria. 2007. *A Descriptive Analysis of Adamorobe Sign Language (Ghana)*. Utrecht, The Netherlands: LOT.

Nyst, Victoria. 2016. The depiction of size and shape in gestures accompanying object descriptions in Anyi (Côte d'Ivoire) and in Dutch (The Netherlands). *Gesture* 15(2). 156–191.

Osugi, Yutaka, Ted Supalla & Rebecca Webb. 1999. The use of word lists to identify distinctive gestural systems on Amami Island. *Sign Language & Linguistics* 2(1). 87–112.

Parrill, Fey. 2008. Form, meaning, and convention: A comparison of a metaphoric gesture with an emblem. In Alan Cienki & Cornelia Müller (eds.), *Metaphor and gesture*, 195–217. Amsterdam: John Benjamins.

Payrató, Lluís. 1993. A pragmatic view on autonomous gestures: A first repertoire of Catalan emblems. *Journal of Pragmatics* 20(3). 193–216.

Perniss, Pamela, Robin Thompson & Gabriella Vigliocco. 2010. Iconicity as a general property of language: evidence from spoken and signed languages. *Frontiers in Psychology* 1. 227.

Pfau, Roland & Markus Steinbach (eds.). 2006. *Modality-independent and modality-specific aspects of grammaticalization in sign languages* (Linguistics in Potsdam 24). Potsdam: Universitätsverlag Potsdam.

Poggi, Isabella. 1983. La Mano a Borsa: Analisi semantica di un gesto emblematico olofrastico. In Grazia Attili & Pio E. Ricci Bitti (eds.), *Comunicare senza parole.La comunicazione non-verbale nel bambino e nell'interazione sociale tra adulti,* 219–238. Roma: Bulzoni.

Poggi, Isabella. 1987. *Le parole nella testa. Guisa a un'educazione linguistica cognitivista.* Bologna: Il Mulino.

Polich, Laura. 2005. *The emergence of the Deaf community in Nicaragua: With sign language you can learn so much*. Washington, DC: Gallaudet University Press.

Pyers, Jennie E. & Karen Emmorey. 2008. The face of bimodal bilingualism: Grammatical markers in American Sign Language are produced when bilinguals speak to English monolinguals. *Psychological Science* 19(6). 531–535.

Ricci Bitti, Pio E. & Silvana Contento. 2004. Symbolic gestures and gesturing in communication. In Cornelia Müller & Roland Posner (eds.). *The semantics and pragmatics of everyday gestures: Proceedings of the Berlin Conference April 1998* (Körper, Zeichen, Kultur 9), 89–102. Berlin: Weidler.

Richie, Russell, Julia Fanghella & Marie Coppola. 2013. Emergence of lexicons in family-based homesign systems in Nicaragua. In Leah Geer (ed.), *Proceedings of the 13th Annual Texas Linguistics Society Meeting.* Austin, TX.

Richie, Russell, Marie Coppola & Charles Yang. 2014a. Emergence of natural language lexicons: Empirical and modeling evidence from homesign and Nicaraguan Sign Language. In Will Orman & Matthew James Valleau (eds.), *BUCLD 38: Proceedings of the Boston University Conference on Language Development,* 355–367 Somerville, MA: Cascadilla Press.

Richie, Russell, Charles Yang & Marie Coppola. 2014b. Modeling the emergence of lexicons in homesign systems. *Topics in Cognitive Science* 6(1). 183–195.
Richie, Russell, Matthew Hall, Pyeong Whan Cho & Marie Coppola. 2020. Converging evidence: Enhanced conventionalization of gestural referring expressions in richly-connected networks. *Language Dynamics and Change*.
Sandler, Wendy, Mark Aronoff, Irit Meir & Carol Padden. 2011. The gradual emergence of phonological form in a new language. *Natural Language & Linguistic Theory* 29(2). 503–43.
De Saussure, Ferdinand. 1983. *A course in general linguistics*. Charles Bally & Albert Sechehaye (eds.). (R. Harris, Trans.) La Salle, IL: Open Court. (Original work published 1916).
Senghas, Ann. 1995. *Children's contribution to the birth of Nicaraguan Sign Language*. Massachusetts Institute of Technology dissertation. Cambridge MA.
Senghas, Ann. 2019. How language learns: Linking universals to acquisition. In Megan M. Brown & Brady Dailey, *Proceedings of the 43rd Boston University Conference on Language Development,* 1–10. Somerville, MA: Cascadilla Press.
Senghas, Ann & Marie Coppola. 2001. Children creating language: How Nicaraguan Sign Language acquired a spatial grammar. *Psychological Science* 12(4). 323–328.
Senghas, Ann, Sotaro Kita & Aslı Özyürek. 2004. Children creating core properties of language: Evidence from an emerging sign language in Nicaragua. *Science 305*(5691). 1779–1782.
Senghas, Richard J. 1997. An "unspeakable, unwriteable" language: Deaf identity, language & personhood among the first cohorts of Nicaraguan signers. Rochester, NY: University of Rochester dissertation.
Senghas, Richard J., Ann Senghas & Jennie E. Pyers. 2005. The emergence of Nicaraguan Sign Language: Questions of development, acquisition, and evolution. In Sue Taylor Parker, Jonas Langer & Constance Milbrath (eds.), *Biology and knowledge revisited: From neurogenesis to psychogenesis,* 287–306. Mahwah, NJ: Erlbaum.
Slobin, Dan I. (ed.). 1985. *The crosslinguistic study of language acquisition: Volume 2: Theoretical issues*. Hillsdale, NJ: Erlbaum.
Sowa, Timo & Ipke Wachsmuth. 2002. Interpretation of shape-related iconic gestures in virtual environments. In Ipke Wachsmuth & Timo Sowa (eds.), *Gesture and sign language in human-computer interaction,* 21–33. Berlin & Heidelberg: Springer.
Sowa, Timo & Ipke Wachsmuth. 2003. Coverbal iconic gestures for object descriptions in virtual environments: An empirical study. In Monica Rector, Isabella Poggi & Nadine Trigo (eds.), *Proceedings of the Conference "Gestures, Meaning and Use",* 365–376. Porto, Portugal: Universidade Fernando Pessoa.
Sowa, Timo & Ipke Wachsmuth. 2005. A model for the representation and processing of shape in coverbal iconic gestures. In Klaus Opwis & Iris K. Penner (eds.), *Proceedings of KogWis 05: The German Cognitive Science Conference,* 183–188. Basel, Switzerland: Schwabe Verlag.
Swadesh, Morris. 1971. *The origin and diversification of language*. New York: Routledge.
Wichmann, Søren. 2006. Mayan historical linguistics and epigraphy: a new synthesis. *Annual Review of Anthropology* 35. 279–294.
Wilcox, Sherman. 2004. Cognitive iconicity: Conceptual spaces, meaning, and gesture in signed languages. *Cognitive Linguistics* 15(2). 119.
Wilcox, Sherman & Phyllis Perrin Wilcox. 2009. The analysis of signed languages. In Bernd Heine & Heiko Narrog (eds.), *The Oxford Handbook of Linguistic Analysis,* 1st edn., 843–864. Oxford: Oxford University Press.

Wilcox, Sherman, Paola Rossini & Elena Antinoro Pizzuto. 2010. Grammaticalization in sign languages. In Diane Brentari (ed.), *Sign languages: A Cambridge language survey,* 332–354. Cambridge: Cambridge University Press.

Woll, Bencie & Paddy Ladd. 2003. Deaf communities. In Marc Marschark & Patricia Spencer (eds.), *Oxford Handbook of Deaf Studies, Language, and Education*, Volume 2, 151–163. Oxford: Oxford University Press.

Yang, Charles D. 2002. *Knowledge and learning in natural language*. New York: Oxford University Press.

Yang, Charles D. 2004. Universal grammar, statistics or both? *Trends in Cognitive Sciences* 8(10). 451–456.

Zeshan, Ulrike. 2003. Indo-Pakistani Sign Language grammar: A typological outline. *Sign Language Studies* 3(2). 157–212.

Zeshan, Ulrike & Keiko Sagara (eds.). 2016. *Semantic fields in sign languages: Colour, kinship and quantification* (Sign Language Typology 6). Berlin: De Gruyter Mouton & Ishara Press.

Appendix A.

Instructions and elicitation items used in Study 1, their English translations, semantic/pragmatic type, inclusion status, and result.

Spanish version: "Observamos que la gente aquí en Nicaragua usa las manos para decir algunas cosas. Voy a decirte algunas palabras y quiero que me muestres los gestos o señas que se puedan hacer con ellas."
English translation: "We have observed that Nicaraguans use their hands to say some things. I will give you some words and I would like you to show me the gestures or signs that can be used with them."
The experimenter said each word or phrase aloud in Spanish to elicit a gesture associated with that meaning. The Status column indicates whether the item was included in the analyses, or excluded ("ex: few" indicates that too few participants were presented with the item or responded to the item; "ex: unverifiable" indicates that we were unable to verify the form of the NSL sign). The Result column indicates whether the NSL sign form was produced by at least one of the hearing, non-signing participants (i.e., "attested").

	Spanish word/phrase	English translation	Type	Status	Result
1	beber	to drink	action	included	attested
2	caerse	to fall	action	included	not attested
3	caminar	to walk	action	included	attested
4	comer	to eat	action	included	attested
5	dar un beso	to give a kiss	action	included	attested
6	escribir	to write	action	included	attested
7	fumar	to smoke	action	included	attested
8	pagar	to pay	action	included	attested
9	se fue	s/he left	action	included	attested
10	terminar una relación	to break up with someone	action	included	attested
11	trabajo	work	action	included	attested
12	bueno	good	attribute	included	attested
13	casado	married	attribute	included	attested
14	pinche/avaro	stingy	attribute	included	attested

	Spanish word/phrase	English translation	Type	Status	Result
15	cuerpo bonito (sobre una mujer)	nice body (about a woman)	attribute	included	attested
16	de prisa/de repente/ rápido	in a hurry/suddenly/ rapidly	attribute	included	attested
17	gordo	fat	attribute	included	attested
18	loco	crazy	attribute	included	attested
19	medio	half	attribute	included	attested
20	mucho/lleno	many/full	attribute	included	attested
21	no hay nada	there aren't any	attribute	included	attested
22	pereza/boludo	lazy	attribute	included	attested
23	rico (dinero)	rich (wealthy)	attribute	included	attested
24	rodando	rolling	attribute	included	attested
25	adios	goodbye	function	included	attested
26	dame un chat	send me a text	function	included	attested
27	dámela	give it to me	function	included	attested
28	detener un taxi	to hail a taxi	function	included	attested
29	hablamos luego	we'll talk later	function	included	attested
30	necesito que me preste dinero	I need you to lend me money	function	included	attested
31	¿qué hora es?	what time is it?	function	included	attested
32	te llamo	I'll call you	function	included	attested
33	afuera	outside	location	included	attested
34	al otro lado	way over there	location	included	attested
35	allá	over there	location	included	attested
36	cuidado	careful	modulator	included	attested
37	¡espera!	wait!	modulator	included	attested
38	no	no	modulator	included	attested
39	ojo/observar	I'm watching you	modulator	included	attested
40	¡silencio!	be quiet	modulator	included	attested
41	tranquilo/calmate	calm down	modulator	included	attested

	Spanish word/phrase	English translation	Type	Status	Result
42	vas a ver	you'll see	modulator	included	attested
43	vení	come here	modulator	included	attested
44	vete	go away	modulator	included	attested
45	computadora	computer	object	included	attested
46	dinero	money	object	included	attested
47	lluvia	rain	object	included	attested
48	bebé	baby	person	included	attested
49	cochón	gay man	person	included	attested
50	hermano/pariente	sibling/relative	person	included	attested: other meaning
51	hombre	man	person	included	not attested
52	ladrón	thief	person	included	attested
53	mujer	woman	person	included	attested: other meaning
54	niño	child	person	included	attested
55	enfermo	ill	state	included	attested
56	está haciendo calor	it's hot	state	included	attested
57	frio	cold	state	included	attested
58	miedo	afraid	state	included	attested
59	muerto	dead	state	included	attested: other meaning
60	que mal olor	what a bad smell	state	included	attested
61	tal vez	maybe	state	included	attested
62	te quiero	I love you	state	included	attested
63	ahora	now	temporal	included	attested
64	después	after	temporal	included	attested
65	ya	that's it/already	temporal	included	attested
66	abrazar	to hug	action	ex: few	

	Spanish word/phrase	English translation	Type	Status	Result
67	gritar	to shout	action	ex: few	
68	vaca	cow	animal	ex: few	
69	que interrogantes tienen las otras personas	people are nosy	attribute	ex: few	
70	alegre	happy	state	ex: few	
71	dolor de cabeza	headache	state	ex: few	
72	frustrado	frustrated	state	ex: few	
73	preocupado	worried	state	ex: few	
74	triste	sad	state	ex: few	
75	bien vestido	well-dressed	attribute	ex: unverifiable	
76	cabezón	large head	attribute	ex: unverifiable	
77	cuernudo (te fueron infiel)	cuckold/to be unfaithful	attribute	ex: unverifiable	
78	trasero bien grande	big rear end	attribute	ex: unverifiable	
79	dame ride	give me a ride	function	ex: unverifiable	
80	pedir la cuenta	to ask for the check	function	ex: unverifiable	
81	pedir una cerveza	to order a beer	function	ex: unverifiable	
82	espiealo	I am watching you	modulator	ex: unverifiable	

Part II: **Sociolinguistic sketches**

John B. Haviland

Zinacantec family homesign (or "Z")

In 2008, I began intensive research[1] with the deaf members of a family I have known well over the roughly fifty years of my ongoing ethnographic work with Tzotzil (Mayan) speakers in the highland village of Zinacantán, in the state of Chiapas, Mexico (see Map 1). "Z"—my abbreviation for Zinacantec Family Homesign—has emerged in a single extended Tzotzil-speaking family. It has developed among three deaf siblings, their hearing sister and niece, and several hearing children in a second signing generation. According to their own accounts, the members of the family have never interacted with any other deaf people. Z does not, therefore, draw on any previous sign language, although it appears to make some use of visible gestures frequent in Tzotzil conversations among hearing household members and their village-mates. A complete bibliography of publications to date about Z appears below.

Figure 1: Map showing the location of the Z signers in Mexico.

1 Thanks are due to the editors for suggesting and providing a template for this brief sociolinguistic sketch; and to Elena Collavin for helpful suggestions.

https://doi.org/10.1515/9781501504884-009

The *municipio* or township of Zinacantán is one of a dozen or so predominately Tzotzil-speaking communities in Chiapas, with a total population, according to the 2015 Mexican intercensus survey (INEGI 2016: 252) of just over 41,000 inhabitants, living in around three dozen small *parajes* or hamlets, the largest of which is the *cabecera* or civil and religious town center, also called Zinacantán. It is a community with a long and intense history of anthropological research, which in the modern period of ethnography since the 1960s, has ranged from economics and the ritual *cargo* system (Cancian 1965), kinship and marriage (J. Collier 1968), law (J. Collier 1973), and agriculture (G. Collier 1975), to shamanistic curing (Fabrega and Silver 1973), ritual (Vogt 1976), and gossip (Haviland 1977), to mention only monograph-length studies. There are also general ethnographies of the community (Vogt 1969, 1970), and historical treatments of colonial, post-colonial, and also post-revolutionary eras in the region (Wasserstrom 1983, Rus 2012). The Tzotzil (Mayan) language of Zinacantán is also well studied, with published grammars (Haviland 1981, Aissen 2012), a study of language socialization (de León 2005), and comprehensive dictionaries, both modern (Laughlin 1975, 2007) and colonial (Laughlin 1988).

Zinacantecs, in the last century, largely dedicated themselves to peasant corn farming, although for most modern Zinacantecs slash and burn sharecropping has given way to other trades: flower-growing and trading, transport, masonry and construction work, and, even more recently, other sorts of wage labor in Chiapas towns and cities, as well as emigration farther afield. In the case of the family where Z originated and whose simplified genealogy appears in Figure 2, the father was both a corn farmer and a truck owner, who mainly delivered building timber from the Chiapas highlands to various furniture factories in the Yucatán peninsula, while his recently deceased wife maintained the household at home in the village. The deaf children grew up without schooling, unlike their hearing sisters who attended some years of primary school, and they spent much of their childhoods either aiding their mother with childcare and domestic endeavors, or working for neighbors at such tasks as washing, cooking, and, for example, candlemaking, or repackaging commercial yarns and thread for resale to village weavers. Swelling debt and financial disasters eventually meant that the family had to leave their natal home, to become landless renters in the *cabecera* or "administrative center" of the township, where their income derives from casual labor (the father, although now in his seventies, often serves as a night watchman), re-selling foodstuffs, fruit and vegetables, charcoal etc., or backstrap-loom weaving and embroidery, and, in the case of the two deaf men, irregular contract labor in local construction.

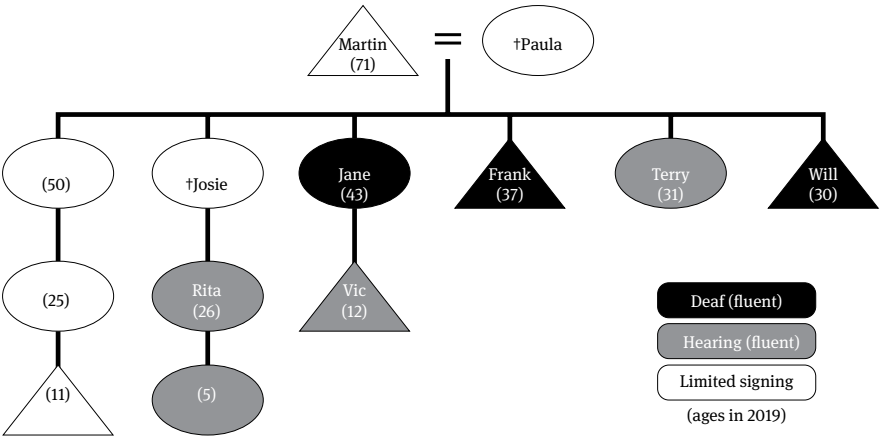


Figure 2: Simplified genealogy of the Z signers, 2019.

Z originates with Jane, born in 1976, who is, as one says in Tzotzil, *uma'*—a Tzotzil word with almost the same range of meanings as the English word 'dumb.' She is the daughter of my long-time friend Martín, whose second oldest daughter became my goddaughter at her baptism. Jane and her siblings were born and originally grew up in a smaller village on the western side of the township territory, but, as mentioned, for a variety of reasons almost the entire family moved when she was a young adult to the *cabecera* of Zinacantán. Although there are doubtless other deaf individuals elsewhere in the township (as well as in other nearby Tzotzil-speaking townships), I know of no others in either the Z family's original hometown (of around 3,000 people) nor in the somewhat larger *cabecera* where they now reside.

As the Tzotzil word *uma'*—derived from a root that suggests "hold in the mouth" (Laughlin 1975: 74)—suggests, unlike her older sisters, Jane never learned to speak. It was not until her brother Frank was born, and likewise did not talk, that the family began to suspect that both children were deaf. There followed another sister, Terry, who hears but who did not herself begin to speak Tzotzil until she was about three, and then Will, also deaf, born several years later. At some point when he was a child, one of his father's non-indigenous acquaintances (about whom I have no further information) evidently offered Frank a hearing aid. Frank quickly rejected its use, and it fell into disrepair (although he sometimes recalls and describes it).

Figure 2 shows the three deaf siblings, their hearing sister, and two further hearing native signers (a niece Rita and a nephew Vic) who grew up in this extended household with Z and spoken Tzotzil as their primary means of communication. Jane's son Vic was raised with both Z and spoken Tzotzil as his

native languages. Rita's young daughter is evidently able to understand signed interactions, but so far, she rarely attempts to sign herself; nor is she encouraged to do so. There is also a niece and her young son who have lived sporadically in the household, thereby learning some signing. The other adults in the family—the older sisters and their spouses and grown children—largely do not attempt more than minimal signing.

Z is the exclusive medium of communication for the deaf signers, and it is routinely used as well by both Terry and Rita, although mostly only in conversation with the deaf individuals. Both the parents and the other older siblings have interacted at least partially in sign with the deaf individuals over the entire course of the latter's lives, but they frequently claim to be unable to follow in detail the signed conversations between the fluent signers, and, when they feel the need, they often ask Terry or Vic for interpretation, bi-directionally. (I had the impression that Jane could at least partly lip-read the speech of her late mother, whereas neither deaf brother seemed to have developed nor been interested in such a capacity.) By contrast, Z is never used by outsiders, and, indeed, rarely performed in its efflorescent form in the presence of non-family members. None of the Z signers has attended school for more than a few weeks, and all are illiterate, although the men are able to read numbers and interpret calendars. In their work as masons, and occasionally as assistants in flower selling operations with their father's siblings, the two men sometimes travel and interact with people outside the immediate extended family. Their parents have rejected suggestions from me that the deaf brothers might earn more by joining construction crews outside the village (on the not unreasonable presumption that such crews drink up most of their wages on weekends). The parents were reluctant even to send the boys on distant selling trips, lest they become stranded and unable to return home alone. Nonetheless, in 2016 the elder deaf brother Frank (usually assisted by his younger brother Will and attended by his father, who himself had once enjoyed a distinguished ritual career as both a civil authority and in service to religious institutions) was dragooned into an official year-long *cargo* or ritual office in the Zinacantec public ritual hierarchy (see Vogt 1969, Cancian 1965). Mostly in that context, a group of Zinacantecs outside the family who were engaged in the same ritual activities had regular interactions with both men, using what amounted to nonce gestural systems to communicate with the deaf individuals.

A first generation sign language like Z is particularly compelling, especially since it has arisen in such a short time. Jane, now in her late thirties, spent the first six years of her life as the only deaf person in her community. Her deaf brother Frank was followed by a hearing sister Terry and then by Will, also deaf, born when Jane was already thirteen. Jane thus became one of Will's primary caregivers. Jane's linguistic experience, as the only deaf person in her household

(and, indeed, in her entire village) for her first 6 years, stands in marked contrast to that of Will: born into a household where his three immediate older siblings already signed. The experience of young Vic, Jane's son, was different again, as he was born hearing with a deaf mother in a household where he was surrounded by spoken Tzotzil but where most of his early caregivers communicated exclusively or by preference in the family homesign. Indeed, the proximate motive for me to begin to study Z in 2008 was that Vic, at 11 months of age, had clearly already begun to sign, even before uttering his first Tzotzil words (see Meier 2016). I made a trip to the village explicitly to ask my friend Martín if his children would work with me to teach me about their language. Although my ignorance of sign linguistics had previously made me reluctant, if not terrified, to venture into the study of Z, the challenge of working with the first—and perhaps the last—generation of a brand new language was something I as a linguistic anthropologist could not responsibly continue to ignore.

Z builds on a lexicon of invented conventional signs, supplemented by an extensive system of deictic indications, to produce highly structured, interactive, and collaborative conversation. Patterns of grammaticalized utterance structure have also emerged, with corresponding emerging grammatical categories—signed analogues of "parts of speech," for example. At the same time, variation in lexicon and apparent morphosyntax—for example, diverse patterns of use with emergent "size and shape specifiers" (Safar and Petatillo Chan, this volume)—can be observed in even this tiny sign community, along with clear metalinguistic discourses and ideologies. (See Haviland, 2011, 2013a, 2013b, 2013c, 2013d, 2014, 2015, 2016, 2017, 2019.) My own entry into the research, conducted entirely in Tzotzil and more recently in my own halting use of Z, was clearly dependent on interpretation by Terry, Rita, and more recently Vic, who also routinely serve in such a mediating role between the deaf signers and the rest of the family, not to mention with outsiders.

As mentioned, Tzotzil speakers categorize the deaf signers as *uma'* 'dumb.' As in English, the word carries the further connotation of reduced intellectual capacity. There are multiple Tzotzil expressions that mean 'deaf' but they tend to characterize the growing hearing loss that people experience as they age. One such expression—the humorously critical *pak'-jol* (literally, "daubed/patched head" [Laughlin 1975: 263])—invokes the idea that hard-of-hearing people "answer sideways" because they misunderstand what other people are saying to them. (Tzotzil is heavily endowed with disrespectful and mocking epithets for disabilities of various kinds—blindness, intellectual and physical incapacities—which, like the one just cited, often combine the rich affective or positional lexical resources of the language with particular body parts.) Another epithet, equally critical, that even family members sometimes hurl at the deaf signers, perhaps

because they routinely vocalize as they sign, is *chich* which means 'foolish,' most commonly used in the context of overly talkative children. Laughlin (1975: 117) glosses the word as "extremely loquacious, saying everything that occurs to one." Given the emphasis in Zinacantec social life placed on verbal skill and dexterity, deafness is considered a severe disability, and it diminishes the social prospects of those affected. One explanation offered for the reluctance of the Z signers to sign in the presence of non-kin is expressed by the Tzotzil word *k'exlal* 'shame.' A central dilemma for both deaf men is whether, and from where, they will ever manage to find wives because of their deafness, which seems to make them undesirable as spouses. Jane, as a single mother whose child's father refuses to acknowledge him, is considered unsuitable for marriage.

A central topic of my own ethnographic research has been the attitude toward deafness evinced by the immediate family members themselves. The deaf siblings' late mother expressed concern that the infant Vic, Jane's son, would—like his mother and uncles—never learn to speak Tzotzil, and that he should not be encouraged in his acquisition of Z signing. She frequently scolded her own children when they encouraged Vic to sign at all. At a certain point, when Vic was about three, she decreed, in fact, that he should be separated from his mother and sent to live with an older aunt who had already raised her own child, and who could teach him proper Tzotzil. The resulting experiment lasted less than half a year.

More relevant to the interactions I routinely observe between the deaf signers themselves is the fact that Jane is often ignored and dismissed by her own siblings, part of the miniature sociopolitics of talk in this tiny speech/sign community (see Haviland 2013b, 2016). As I argue in the main chapter on Z in this volume, there are both social tensions as well as humor and mutual affection in the occasional alignment of the boys (and sometimes Terry) against their sister, Jane. There is an asymmetric power structure in even the tiny Z signing community, and Jane—despite being the oldest and first signer—clearly occupies a subordinate role within it, in ways and for reasons that remain an active topic of investigation. Part of the explanation, in addition to gender inequalities more widely in the community, is surely that Z has evolved rapidly in the context of the small sign-community, with at least some innovations in lexicon and grammar that have clearly left Jane behind.

Whether Z will survive the deaf individuals, something I once was hopeful about, seems ever more dubious as Vic distances himself from his mother's native language, learns to read and write in Spanish, and moves potentially ever farther from his natal speech-sign community. Although a newly created language, Z is already severely imperiled.

References

Aissen, Judith. 2012. *Tzotzil clause structure*. Dordrecht, Boston: D. Reidel.

Cancian, Frank. 1965. *Economics and prestige in a Maya community: The religious cargo system in Zinacantán*. Stanford, CA: Stanford University Press.

Cancian, Frank. 1992. *The decline of community in Zinacantán: Economy, public life, and social stratification, 1960–1987*. Stanford, CA: Stanford University Press.

Collier, George A., 1975. *Fields of the Tzotzil: The ecological bases of tradition in highland Chiapas*. Austin, TX: University of Texas Press.

Collier, Jane Fishburne. 1968. *Courtship and marriage in Zinacantan, Chiapas, Mexico* (Vol. 25). New Orleans: Middle American Research Institute, Tulane University.

Collier, Jane Fishburne. 1973. *Law and social change in Zinacantan*. Stanford, CA: Stanford University Press.

De León Pasquel, Lourdes. 2005. *La llegada del alma: lenguaje, infancia y socialización entre los mayas de Zinacantán*. Mexico, D.F.: CIESAS.

Fábrega, Horacio & Daniel B. Silver. 1973. *Illness and shamanistic curing in Zinacantan: An ethnomedical analysis*. Stanford, CA: Stanford University Press.

Haviland, John B. 1977. *Gossip, reputation, and knowledge in Zinacantan*. Chicago: University of Chicago Press.

Haviland, John B. 1981. *Sk'op Sotz'leb: El Tzotzil de San Lorenzo Zinacantan*. México, D.F.: Universidad Nacional Autónoma de México.

Haviland, John B. 2011. Nouns, verbs, and constituents in an emerging 'Tzotzil' sign language. In Gutiérrez-Bravo, Rodrigo, Line Mikkelsen & Eric Potsdam (eds.), *Representing language: Essays in honor of Judith Aissen*, 157–171. California Digital Library eScholarship Repository. Linguistic Research Center,University of California, Santa Cruz. (http://escholarship.org/uc/item/0vf4s9tk and http://escholarship.org/uc/lrc_aissen.

Haviland, John B. 2013a. Xi to vi: "Over that way, look!" (Meta)spatial representation in an emerging (Mayan?) sign language. In Peter Auer, Martin Hilpert, Anja Stukenbrock & Benedikt Szmerecsanyi (eds.), *Space in Language and Linguistics*. 334–400. Berlin/Boston: Walter De Gruyter.

Haviland, John B. 2013b. (Mis)understanding and obtuseness: "Ethnolinguistic borders" in a miniscule speech community. *Journal of Linguistic Anthropology* 23(3). 160–191.

Haviland, John B. 2013c. Where does 'where do nouns come from?' come from? Introduction to special issue on "where do nouns come from?" *Gesture* 13(3). 245–252.

Haviland, John B. 2013d. The emerging grammar of nouns in a first generation sign language: Specification, iconicity, and syntax. *Gesture* 13(3). 309–353. (Reprinted in *Where do nouns come from?* Edited by John B. Haviland. Benjamins Current Topics #70, 2015. John Benjamins Publishing Co.: Amsterdam/Philadelphia.)

Haviland, John B. 2014. Different strokes: Gesture phrases and gesture units in a family homesign from Chiapas, Mexico. In Mandana Seyfeddinipur & Marianne Gulberg (eds.), *From gesture in conversation to visible action as utterance*. 245–288. Amsterdam: John Benjamins.

Haviland, John B. 2015. "Hey!" *Topics in Cognitive Science* 7: 124–149.

Haviland, John B. 2016. "But you said 'four sheep'.!": (sign) language, ideology, and self (esteem) across generations in a Mayan family. *Language & Communication 46: 62–94*.

Haviland, John B. 2017. Mayan conversation and interaction. In Judith Aissen, Nora C. England & Roberto Zavala (eds.), *The Mayan languages*, 401–432. Oxford: Routledge.

Haviland, John B. 2019. Grammaticalizing the face (as well as the hands) in a first generation sign language: The case of Zinacantec Family Homesign. In Claudia Fabrizio & Michela Cennamo (eds.), *Papers from the International Conference of Historical Linguistics* 22 [Current Issues in Linguistic Theory, 348], 520–560. Amsterdam: John Benjamins.

INEGI 2016. *Encuesta intercensal 2015: Panorama sociodemográfico de Chiapas 2015*. México: Instituto Nacional de Estadística y Geografía.

Laughlin, Robert M. 1975. *The Great Tzotzil Dictionary of San Lorenzo Zinacantan*. Washington, D.C.: Smithsonian Institution Press.

Laughlin, Robert M. & John B. Haviland. 1988. *The great Tzotzil dictionary of Santo Domingo Zinacantán: With grammatical analysis and historical commentary*. Washington, D.C.: Smithsonian Institution Press.

Laughlin, Robert M. 2007. *Mol cholobil k'op ta sotz'leb: El gran diccionario tzotzil de San Lorenzo Zinacantán*. Mexico, D.F.: Centro de Investigaciones y Estudios Superiores en Antropología, Consejo Nacional para la Cultura y las Arte.

Meier, Richard P. 2016. Sign language acquisition. Oxford Handbooks online. DOI: 10.1093/oxfordhb/9780199935345.013.19

Rus, Jan, 2012. *El ocaso de las fincas y la transformación de la sociedad indígena de Los Altos de Chiapas, 1974–2009*. Tuxtla Gutiérrez, Chiapas, México: Universidad de Ciencias y Artes de Chiapas, Centro de Estudios Superiores de México y Centroamérica.

Vogt, Evon Z. 1969. *Zinacantán: a Maya community in the highlands of Chiapas*. Cambridge, MA: Belknap Press of Harvard University Press.

Vogt, Evon Z. 1970. *The Zinacantecos of Mexico: A modern Maya way of life*. New York: Holt, Rinehart and Winston.

Vogt, Evon Z. 1976. *Tortillas for the gods: A symbolic analysis of Zinacanteco rituals*. Cambridge: Harvard University Press.

Vogt, Evon Z. 1994. *Fieldwork among the Maya: Reflections on the Harvard Chiapas Project*. Albuquerque: University of New Mexico Press.

Wasserstrom, Robert. 1983. *Class and society in central Chiapas*. Berkeley: University of California Berkeley Press.

Laura Horton

A sociolinguistic sketch of deaf individuals and families from Nebaj, Guatemala

Characteristics of Nebaj, Guatemala

Nebaj[1] is a municipio[2] located in the Western region of the Quiche Department of Guatemala. Nebaj is the largest of three towns in the region known as the Ixil triangle, which shares its name with the local Mayan language. The municipio of Nebaj has 106,237 inhabitants[3] (INE 2002), with approximately 70% of the population living in rural *aldeas*, or hamlets, surrounding Nebaj. The remaining population – over 30,000 people – reside within the bustling town of Nebaj. Ixiles have been in contact with other Maya groups since the 11th century (Colby and van den Berghe 1969: 40), but the town was more isolated from Guatemala City and Quetzaltenango until a paved road was constructed to Nebaj in 1942 (Stoll 1993: 11).

Nebaj and its *aldeas* were heavily affected by Guatemala's prolonged civil war which officially began in 1960 and lasted through the 1996 signing of peace accords. During the war, more than 200,000 people died or disappeared (83% estimated to be Maya) and more than 1.5 million people were displaced (CEH 2004; Sanford 2003: 149). In Nebaj, many families fled into the surrounding mountains, where they lived for months or years, to avoid the military presence in town. Many of these Ixiles starved in the mountains or were "disappeared" (García 2014; Sanford 2003; Stoll 1993). After the war, Nebaj was the focus of significant aid and intervention from both the Guatemalan government and external Non-Governmental Organizations (Stoll 2013). The town is also home to multiple grassroots community organizations that have advocated for exhumations of massacre victims buried in clandestine graves to be interred in the local cemetery, as well as actively pursuing charges of genocide in the trial of former leader General Efraín Ríos Montt for genocide committed between 1982 and 1983 in the Ixil region (García 2014, forthcoming).

1 This work was generously supported by a pre-dissertation fieldwork grant from the Tinker Foundation and the Center for Latin American Studies at the University of Chicago, NSF Doctoral Dissertation Research Improvement Grant #1627540 and NSF BCS 1227908 to Diane Brentari.

2 In Guatemala, the 22 primary administrative subdivisions (Departments) are further divided into municipios, most similar to counties in the United States (Stoll 1993; Tax 1963). Nebaj is one of 21 municipios in the Quiche Department.

3 Population estimates vary, but this one is taken from a projection of the 2002 census (INE 2002).

https://doi.org/10.1515/9781501504884-010

Indigenous Ixil people remain the majority of Nebaj's population today (the indigenous population was estimated to be 88.6%, INE 2011). Inhabitants continue to work 'milpas,' or family-owned plots of land, where they grow corn and other crops. Many men, but also entire families, migrate to the coast of Guatemala for weeks or months each year for wage labor on plantations or *fincas*. This pattern of seasonal migration extends back to the earliest days of the Spanish conquest, when indigenous Mayas were forced to provide free labor under the encomienda system enforced by the conquistadors (Colby and van den Berghe 1969). In the late 1960s, Colby and van den Berghe (1969) estimated that 4,000–5,000 Ixiles continued to migrate to coastal plantations for wage labor each month. The migration routes from Nebaj now extend even farther, to Guatemala City and the United States (Stoll 2013; Ibáñez-Holtermann 2011). Many of the families I know have two to four adult relatives who currently live in the US or are in the process of trying to reach the US. These women and men work and send back a percentage of their wages, known as remittances, to family still in Nebaj.

On the streets in Nebaj, it is typical to encounter an eclectic amalgam of traditional and contemporary influences. While most younger women maintain the traditional red woven skirt, or *corte*, they often pair it with a t-shirt from local stores that sell American castoff clothing, and they can be seen, seated "sidesaddle" on motorcycles and scooters, driving through the center of town. In the local market, vendors sell traditional hand-woven huipils alongside stalls filled with neon-colored plastic bowls, chairs and trashcans and mass-produced backpacks that feature American cartoon characters. The language spoken on the streets and in the market is typically Ixil, a Mayan language in the Mamean branch of the language family, spoken natively by approximately 69,000 people living in the municipios of Nebaj, Chajul and Cotzal[4] (Lewis et al. 2014; Romero 2017). Nebajeños under age 30 are typically bilingual Ixil-Spanish speakers – a consequence of loosely-enforced compulsory school attendance.

4 Residents from the towns of Nebaj, Chajul and Cotzal speak three distinct dialects of Ixil that are estimated to be 70–75% mutually intelligible (Lewis et al. 2014). In a detailed study of the three dialects, Lengyel (1991) notes significant variation both inter- and intra-dialect.

Informal survey of deaf people living in Nebaj

During my fieldwork,[5] I have met seven adults and twelve children who are deaf. I have been told about an additional 9 deaf individuals who live in the urban center of Nebaj or in nearby *aldeas*. To protect their identities, all participants are identified by pseudonyms in the this chapter. Some of the children I have worked with tell me that they had hearing aids when they were younger, and one participant showed me his hearing aid, which was missing the battery. It was not clear to me who provided the students with their hearing aids. Some students indicated that they did not like the sound of the hearing aids and stopped wearing them soon after they received them. I have not observed any of the child participants in this study to currently wear a hearing aid regularly. All participants, children and adults, lack enough residual hearing to learn spoken Ixil or Spanish.

Fourteen of the deaf participants in my study have at least one deaf relative (a parent, sibling or cousin). Of the children who are deaf, three (Sara, Rosa and Andres) have an adult relative who is deaf, either a parent (Lucia) or grandparent (Andres). Six of the child participants have a deaf sibling (Jose, Juana, Rosa, Andres) or cousin (Sara, Jose, Juana, Tomas, Diego) who is approximately the same age. Two of the deaf adult participants (Lucia and Andres) are reported to have a deaf sibling as well.[6] Demographic information from an informal survey of the community, compiled between 2013 and 2017, is presented in Table 1. The local school for special education, Escuela Oficial para Educación Especial de Nebaj, is identified by the acronym EOEE. The school is described in greater detail in the following section.

Table 1: Deaf Individuals in Nebaj and Their Relationships.

Child	Deaf Relatives	Age (first interview)	School Attendance (first year of attendance)
Sara*	*mother*, Lucia; *aunt*; *cousins,* Juana, Jose	8 (2013)	local school
Rosa*	*grandfather*, Andres; *brother*, Andres	7 (2013)	EOEE (2017)
Andres*	*sister*, Rosa; *grandfather*, Andres	1 (2013)	na

5 I began working in Nebaj in the summer of 2013 and have returned each summer since for a period of 2–6 weeks. For more detail on fieldwork methods, see Horton, this volume.

6 I was told by Lucia's husband and Andres' daughter that they each have a sibling who is also deaf, but I have not met either of the siblings in person.

Table 1: (continued)

Child	Deaf Relatives	Age (first interview)	School Attendance (first year of attendance)
Tomás*	*cousin*, Diego	10 (2013)	EOEE
Diego*	*cousin*, Tomás	13 (2013)	EOEE
Jose*	*sister*, Juana; *cousin*, Sara; *aunt*, Lucia	10 (2016)	EOEE
Juana*	*brother*, Jose, *cousin*, Sara; *aunt*, Lucia	14 (2016)	EOEE
Antonio*		6 (2015)	local school (2017)
Jacinto*		8 (2015)	local school (2016)
Alejandro*		10 (2014)	EOEE (2015) local school (2016)
Eduardo▲	unknown	na	attended EOEE, 2013
Sergio▲	unknown	na	attended EOEE, 2013
Alicia	unknown	na	unknown

Adult	Deaf Relative or Spouse	Age (first interview)	Employed	Married
Lucia*	*daughter*, Sara; *niece*, Juana, *nephew,* Jose	38 (2013)	yes	yes
Marco	*brother*, Andres	na	unknown	unknown
Andres*	*brother*, Marco; *grandchildren*, Rosa, Andres	78 (2013)	yes	yes
Jairo*		29 (2013)	yes†	no
Julio*		26 (2015)	no	no
Francesca▲	*husband*, Ramon	na	unknown	yes
Ramon▲	*wife*, Francesca	na	unknown	yes
Ana▲		na	no	no
Sergio	*wife*, Maria	na	unknown	yes
Maria	*husband*, Sergio	na	unknown	yes
Miguel	*father*, Jose	na	yes†	unknown
Jose	*son*, Miguel	na	yes†	yes
Emilio	unknown	na	yes†	unknown
David	*sister*, Paz	na	yes	no
Paz	*brother*, David	na	yes	divorced

**Participant in ongoing study of homesign systems in Nebaj*

▲I have met with this person, but they did not ultimately become a participant in the ongoing study

† A group of deaf adult men who work together to transport goods between from vendors' homes and the market

Table 1 includes demographic data about child and adult homesigners from Nebaj. The children who are deaf range from 18 months to 18 years of age. Most of the child homesigners I have worked with for the past five years were between the ages of 9 and 12 years old. I have worked with some of these children and their families since 2013 and I began working with others as recently as 2016. All of the school-aged children attend a school. Most children in Nebaj begin attending school between ages seven and nine. One child participant (Andres) is too young to attend school. Several of the child homesigners (Juana, Eduardo and Sergio) no longer go to school regularly, either because they are too old or do not want to attend. Four of the homesigners (Sara, Antonio, Jacinto and Alejandro) go to local elementary schools near their homes (typically within walking distance). As far as I have been able to tell through informal conversations with their parents, they do not receive any special services at school and attend classes with other hearing students.

Four of the homesigners attend the same school together, the local school for special education (EOEE), described below. Currently the four regular attendees are: Rosa, Jose, Diego and Tomás. Rosa just began attending EOEE in 2017, after sporadically going to her local school for two years. Juana, Jose's sister, used to attend EOEE regularly from 2013 through 2017, but she stopped wanting to go to school in 2017, preferring to stay home and help her mother. Diego and Tomás are now almost too old to continue going to school at EOEE. Tomás, who used to attend daily now only goes to school 3–4 days each week and sometimes stays home or works in his father's sewing shop.

There are at least fifteen deaf adult homesigners in Nebaj. I have met eight of the adult homesigners, and have been told about seven additional adult homesigners. In Table 1, I present additional demographic information about each of the adult homesigners, including their marital status and whether they are employed. Most of the adult homesigners I have worked with did not attend school, but approximately half are employed and half are married, in some cases to other deaf people. I discuss the integration of deaf adults into the larger community further in a later section of this chapter.

Formal education and literacy in Nebaj

School attendance is widespread across Guatemala, however, a recent survey estimates that 29–35% of people in the municipio of Nebaj are illiterate (INE 2014), and until recently many teachers at the 477 local schools were monolingual

Spanish-speaking ladinos.[7,8] As such, all classes in the schools in town were taught almost exclusively in Spanish, although the majority of students enter as monolingual Ixil speakers.[9] Today there are more teachers who are Maya, bilingual speakers, and Ixil is offered as a course in later elementary years.

As noted in the previous section, the deaf children I work with who attend regular schools do not receive interpreting services and they do not attend the same schools, so they are the only deaf student in their class and sometimes in their school. Even at the EOEE school, where several deaf students are enrolled, interpreting services are not provided, though some teachers are aware of LENSEGUA[10] and supplement their verbal instructions with signs. The deaf adults I have worked with have very low literacy skills, although some can write their names. Few of the deaf adults in Nebaj attended school, and some family members reported that this was because of their hearing loss.

The Escuela Oficial para Educacion Especial de Nebaj (EOEE)

The deaf students at EOEE sign with each other and also with other hearing students at the school, which enrolls any student with a disability. The number of students at the school varies substantially from year to year; in 2013, there were nine deaf students, seven of them male. In 2014, this number dropped to five deaf students, four of them male, and in 2015 and 2016, there were four deaf students, three of them male.

7 Ladino is the term used in Guatemala to refer to people who do not identify as indigenous. Ladinos typically speak Spanish and adopt Western styles of dress. They may or may not speak Ixil, but communicate predominately in Spanish. Historically, they are "mestizo," of mixed European and indigenous descent (Stoll 1993; Colby and van den Berghe 1969).

8 Based on a report published in 2008, Nebaj had 477 schools of various levels including pre-primary, primary and basic. There were 1,307 teachers and 43,879 students at the time of the report (de la Cruz et al. 2008).

9 Stoll (1993) suggests that immediately prior to the US-backed coup in Guatemala in 1954, revolutionary movements were leading to more indigenous school teachers. I do not know whether teachers at schools in the more rural aldeas surrounding Nebaj are more likely to be indigenous and speak Ixil, the experience of a Spanish-only classroom is based on a personal communication with a resident of Nebaj (Informal Interview, September 2017).

10 In the only published survey of Guatemalan Sign Language, Parks and Parks (2008) report that in Guatemala City, the association for the deaf, ASORGUA, uses the acronym LENSEGUA (Lengua de Señas de Guatemala). The International Organization for Standardization (ISO) uses GSM (ISO 639–3) as the official acronym.

Deaf students who attend EOEE are in the same class, and have been together in this class for at least three years. Prior to this, older deaf students were in a class together and one or two deaf students who were younger were in a different class with other hearing students. This was partly in an effort to address disciplinary issues between two deaf students who were siblings and partly based on the ages of the students. As mentioned above, there are illustrated dictionaries of LENSEGUA at the school, but none of the teachers surveyed at the school indicate that they know LENSEGUA and they report that they do not use the language when communicating with deaf students. While the deaf children who attend the school are familiar with the manual alphabet of LENSEGUA, I have only observed them using the alphabet sporadically in the classroom, primarily during interactions with teachers. The teachers report that they do not know all of the letters in the manual alphabet.

To provide instruction, teachers use the white boards at the front of the classroom, where they write sentences for students to copy into workbooks. Teachers frequently supplement instructions with manual signs and deictic gestures towards the board or other visual aids in the classroom (Figure 1c). These visual strategies to support the deaf students (who comprise approximately half of the class) are provided somewhat inconsistently, but the teachers frequently approach the deaf students separately to provide additional spoken instruction in Spanish or Ixil, supported by pantomiming an example of what the students need to do to complete the activity.

Deaf students rely on their peers as well, imitating what they are doing or copying their work directly, after they see that the teacher has stopped providing instructions. However, it is not always the case that deaf students are the ones copying hearing students. Since some of the deaf students have been attending the school long enough that they are intimately familiar with the routines of the classroom work and know what to do with very little prompting from the teacher, they often begin working on a writing activity before the teacher has finished giving instructions. This prompts hearing students to copy the work of deaf students once the teacher finishes her lesson.

Although the deaf students primarily interact with each other, they also actively engage with the other students in their class and at the school during recess and snack times. The hearing students use some of the same manual signs they observe deaf students using with each other, but the interactions between deaf and hearing students are abbreviated and punctuated by frequent misunderstandings and clarifications. The male deaf students play marbles and card games together during recess periods, leading to lengthy signed conversations and arguments.

Figure 1: Photos from the EOEE school. (a) LENSEGUA manual alphabet, posted above the door to the school kitchen (upper left), (b) a teacher indicating to students that they should look at their notebooks and copy down words from the board (upper right), (c) a classroom (lower left) and (d) the courtyard where students spend recess (lower right).

Guatemalan Sign Language and Deaf people in Nebaj

Based on informal conversations with all of the deaf people I have met and their hearing relatives, deaf people in Nebaj have minimal or no exposure to Guatemalan Sign Language, abbreviated as GSM or LENSEGUA. The first school for the deaf in Guatemala was founded in 1946. Based on a survey from 2008, there are ten schools for the deaf across the country. Three of these schools use an oral teaching philosophy, focused on teaching their students spoken Spanish. The remaining schools use a philosophy termed "total communication", including oral training and teaching in sign. I have not been able to visit any of these schools, they are located in Guatemala City, Huehuetenango, Quetzaltenango and other towns at least a half day from Nebaj by bus (Parks and Parks 2008: 8).

The Asociación de Sordos Guatemaltecos (ASORGUA, the national association for the Deaf) has published two illustrated dictionaries of LENSEGUA (De Leon 2001; Bámaca et al. 2008), and there are copies of these volumes at the EOEE school. Teachers at EOEE refer to these dictionaries sporadically, and some years the manual alphabet of LENSEGUA has been posted at the school (see Figure 1a). In the classrooms, teachers use some signs that are illustrated in the LENSEGUA dictionary, but also use signs that are local, and familiar to the students at the

school. These signs do not appear in the dictionaries of LENSEGUA, but are familiar to all of the hearing teachers at the school. When I asked acquaintances in Nebaj who do not have regular interactions with deaf people, they also recognized these gestures and could explain their meaning. For example, a sign that involves pointing to one's eye to indicate that the student should pay attention to or look at something (see Figure 1b).

Deaf-hearing interactions in Nebaj

In terms of communicative interactions between deaf and hearing people, the microcosm of the EOEE school appears to generalize to the larger community of Nebaj. In the school, deaf students freely interact with other hearing students but also engage in longer exchanges with each other where possible. Deaf people in Nebaj do not generally appear to seek the company of other deaf people over family and neighbors who are hearing.[11] One exception to this is a group of deaf men who work together in the local market to transport vendors' goods from their homes to market stalls. When working in the market, the deaf men have abbreviated signed conversations with hearing customers and vendors and are able to negotiate their responsibilities and errands with relative ease. I have observed the group of deaf men to have lengthy conversations with each other, involving teasing and what appears to be rapid, fluent signing.

Gestural exchanges between deaf and hearing Nebajeños is not limited to people who interact regularly, or to adults. I have observed interactions between deaf and hearing people, both adults and children in public and private spaces. Roberto, one of the deaf students at the EOEE school, used to work as a *lustrador*, or shoe shiner, in the central park in town. One day, while shining a customer's shoes, Roberto had an extended conversation with the man. Although he was hearing, the customer did not hesitate to engage with Roberto using improvised signs and also by acting out parts of his story.

11 This situation is similar to Maya communities described by Johnson 1991 (in Yucatan) and Fox Tree 2009 (in Nahualá, Guatemala) where they observe a general lack of Deaf solidarity. This is partly attributable to the social structure of the Nebaj community, in which the family is typically the most central unit of social interaction, similar to other Maya communities (Gaskins 1999). See Friedner (2014) and Kusters (2014), however, for alternative constructions of deaf communities in Bangalore, India (Friedner) and the Adamorobe village in South-Ghana (Kusters).

Deaf employment and social integration in Nebaj

Some deaf adult men in Nebaj are employed, with many working in the local market to transport goods from vendors' homes to their market stands. Many of the deaf men also have families with children (see Table 1). The deaf adult women primarily stay at home, although one works outside of Nebaj doing seasonal farm labor and one occasionally works outside her home making tortillas and doing laundry. Three of the deaf women have children, although one is unmarried and one is divorced.

Attitudes towards deafness and signing

Hearing parents are reluctant to speculate about the possible source of their children's deafness when asked directly. Even in families with multiple generations of deafness, some adults I spoke with did not assume that a grandchild's deafness would be related to his grandfather's deafness. In other ethnographic accounts of Maya communities in Guatemala, researchers have commented on the taboo against discussing childhood illness and disability (Fox Tree 2009: 329).

In conversations with local hearing people in Nebaj, some suggested to me that children are born deaf because something bad happened during the pregnancy or when the child was young. Parents of deaf children express concern that their children will not be able to find a job when they grow up, or could be injured, for example, if they are near a road and are not able to hear an oncoming car. Additionally, some of the people I talked with in Nebaj did not refer to deafness as a lack of hearing, but a disinclination or inability to speak, using the phrase "no tiene boca" (they have no mouth). They often insist that a person can hear, but chooses not to speak and instead communicates with their hands.

Deaf Nebajeños are thus integrated into the larger social fabric of the community, although this varies significantly by age and gender, as well as whether the family lives in town or in a more rural *aldea*. The number of related deaf individuals in Nebaj would indicate a genetic trait for deafness in some of these families, though this has not been confirmed. In ongoing work Horton (forthcoming) is examining the role of multiple generations of signers in contact within a family versus children who sign together at a local institution, like the EOEE school, on the emergence of sublexical/morphophonological structure and lexical richness in these shared homesign systems. The chapter in this volume on shared homesign systems from Nebaj presents an analysis of the lexicons of some of the child signers in this sample, with particular attention to iconic strategies used for denotation as well as the role of deictic signs and emblems from the surrounding hearing community.

References

Bámaca, Julio, Vinicio Aguilar, Ileana Estrada de Aguilar, Martha López. 2008. *Lensegua: Lengua de Señas de Guatemala*, 2nd edn. Guatemala City, Guatemala: Asociación de Sordos de Guatemala.

CEH, Comisión para el Esclaramiento Histórico. 2004/1999. *Conclusiones y Recomendaciones, Guatemala memoria del silencio.* Guatemala: F&G Editores.

Colby, Benjamin & Pierre van den Berghe. 1969. *Ixil Country: A plural society in highland Guatemala.* Berkeley: University of California Press.

De León, Rolando Ismael, Lissette Reyes de Ramos, Julio Roberto Bámaca & Elfego Mendez. 2001. *Lenguaje de señas guatemalteco (Lensegua.)* first edn. Guatemala City: Comité Pro Ciegos y Sordos de Guatemala, Asociación de Sordos de Guatemala.

De la Cruz, Tabita Juana, Diego Santiago Ceto & Lucas Mendoza Asicona. 2008. *Itilon Tatin Tenam Maya Ixil. Investigación sobre Monografía Maya Ixil*. Ciudad de Guatemala: Academia de Lenguas Maya de Guatemala.

Fox Tree, Erich. 2009. Meemul Tziij: An Indigenous sign language complex of Mesoamerica. *Sign Language Studies* 9(3). 324–366.

Friedner, Michele. 2014. The church of deaf sociality: Deaf churchgoing practices and "Sign bread and butter" in Bangalore, India. *Anthropology & Education Quarterly* 45(1). 39–53.

García, María Luz. 2014. The long count of historical memory: Ixhil Maya ceremonial speech in Guatemala. *American Ethnologist* 41(4). 664–680.

Gaskins, Suzanne. 1999. Children's daily lives in a Mayan village: A case study of culturally constructed roles and activities. In Artin Goncu (ed.), *Children's engagement in the world*, 25–81. Cambridge, England: Cambridge University Press.

Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language*. New York: Psychology Press.

Horton, Laura. 2018. *Conventionalization of shared homesign systems in Guatemala: Social, lexical, and morphophonological dimensions*. Chicago, IL: University of Chicago dissertation.

Hou, Lynn Y-S. 2016. *"Making hands": Family sign languages in the San Juan Quiahije community.* Austin, TX: University of Texas dissertation.

Ibáñez-Holtermann, Esther. 2011. *La parada: Explaining Ixil day laborers in Virginia, illegality, loss, hope and community*. Washington D.C.: American University dissertation.

INE, Instituto Nacional de Estadistica. 2014. Caracterización departamental Quiché 2013. Guatemala, Diciembre 2014.

INE, Instituto Nacional de Estadistica. 2011. Encuesta Nacional de Condiciones de Vida, ENCOVI 2011.

INE, Instituto Nacional de Estadistica. 2002. Estimaciones y Proyecciones de Población, con base en los Censos Nacionales XI de Población y VI de Habitación 2002.\

Johnson, Robert. 1991. Sign language, culture, and community in a traditional Yucatec Maya village. *Sign Language Studies* 20. 461– 474.

Kusters, Annelies. 2014. Language ideologies in the shared signing community of Adamorobe. *Language in Society* 43. 139–158.

Lengyel, Thomas. 1991. Toward a dialectology of Ixil Maya: Variation across communities and individuals. *International Journal of American Linguistics* 57(3). 330–364.

Lewis, M. Paul, Gary F. Simons & Charles D. Fennig (eds.). 2014. Ethnologue: Languages of Guatemala. In *Ethnologue: Languages of the world*, Seventeenth edition. Dallas, Texas: SIL International. http://www.ethnologue.com.

Parks, Elizabeth & Jason Parks. 2008. Sociolinguistic survey report of the Deaf community of Guatemala. SIL International, SIL Electronic Survey Report 2008-016.

Romero, Sergio. 2017. Ethnicity, history and standard Ixhil (Ixil) Mayan. *Language & Communication 61*. 102–112.

Sanford, Victoria. 2003. *Buried secrets: Truth and human rights in Guatemala*. New York: Palgrave Macmillan.

Stoll, David. 2013. *El Norte or bust!: How migration fever and microcredit produced a financial crash in a Latin American town*. Lanham, Maryland: Rowman & Littlefield.

Stoll, David. 1993. *Between two armies in the Ixil towns of Guatemala*. New York: Columbia University Press.

Tax, Sol. 1963. *Penny capitalism: A Guatemalan Indian economy*. Chicago: University of Chicago Press.

Josefina Safar and Olivier Le Guen

Yucatec Maya Sign Language(s): A sociolinguistic overview

Introduction

Yucatec Maya Sign Languages (YMSLs) are indigenous sign languages used by deaf and hearing signers in Yucatec Maya communities with a high incidence of deafness in the peninsula of Yucatán, Mexico. They are unrelated to Mexican Sign Language (*Lengua de Señas Mexicana*, LSM) and developed outside of institutional settings out of the necessity for deaf and hearing community members to communicate with each other. So far, four signing communities with multiple deaf members have been identified: Chicán, Nohkop, Trascorral and Cepeda Peraza. The communities of study are all located within the state of Yucatán but at one to several hours drive from each other.[1]

Figure 1: Location of the YMSL communities.[2]

1 See http://ymslproject.org/map_no_Kopchen.html for an interactive map of the YMSL communities.

2 Moroz, George (2017). Lingtypology: easy mapping for Linguistic Typology. Online: https://CRAN.R-project.org/package=lingtypology. Thanks to Calle Börstell for plotting this map.

https://doi.org/10.1515/9781501504884-011

In the peninsula of Yucatán, the YMSL project team[3] encountered some other villages with one or two deaf individuals, but it is not unlikely that further larger, yet unknown, signing communities exist in the region. The sign languages of Trascorral and Cepeda Peraza have only recently started to be investigated (Safar and Petatillo Chan, this volume; Safar, forthcoming), but a number of previous studies have been carried out on sign languages in the village of Chicán (Johnson 1991; Shuman 1980; MacDougall 2012; Fox Tree 2009; Le Guen 2012; Escobedo Delgado 2012) and Nohkop (Safar et al. 2018; Safar, in press). However, in-depth linguistic descriptions of YMSLs are still lacking.

Note that some previous publications alternatively refer to YMSL as Chicán Sign Language/*Lengua de Señas Chicana* (Escobedo Delgado 2012; Zeshan et al. 2013), Meemul Tziij (Fox Tree 2009) or Nohya Sign Language (Shuman 1980). The question of whether we are dealing with regional varieties of one common Yucatec Maya Sign Language or with distinct languages in each community is controversial and difficult to answer (see Le Guen et al. this volume; Safar 2017 for discussion). Members of the four communities have not been in contact in the past, their sign languages emerged within the last decades and are historically unrelated. In-depth interviews with community members, including the oldest deaf signers and their families, failed to provide any evidence for historical contact between the communities. In Nohkop, Trascorral and Cepeda Peraza, the oldest signers are still alive and in Chicán, the oldest signer passed away in early 2020. None of them remembers the presence of any other deaf people or an already existing sign language in their environment when they grew up. In rural Yucatán, people traditionally travel little, transport options are limited and contact between villages is scarce if people are not kin-related. Fox Tree (2009) postulated the existence of a prehispanic, pan-Mayan sign language complex across Mesoamerica, but there is no solid evidence – neither from historical sources nor from people's memories – to sustain his claim.

Despite the lack of a historical link, YMSLs from different communities exhibit an important degree of overlap in their lexicon and beyond (Le Guen, this volume; Le Guen 2012; Safar 2017; Safar et al. 2018; Safar, in press). This, we argue, can partly be explained by their shared sociolinguistic background and their common gestural precursors (precisely, the extensive use of multimodal communication among hearing Yucatec Maya).

As for sign language "types", YMSL is best described as a village sign language or "a constellation of family sign languages" (Hou 2016 for San Juan Quiahije Chatino Sign Language). Given that, in the case of YMSL, criteria such

3 http://ymslproject.org

as intergenerational transmission, linguistic complexity or language contact are very hard to pin down, the YMSL context challenges traditional sign language classifications such as "homesign" or "village sign language" (Safar 2017). YMSL's sociolinguistic landscape forms "a multi-layered network of different villages, families, generations and overlapping deaf and hearing spaces" (Safar 2017).

Deafness in rural Yucatán

We will shortly outline the demographic composition of four YMSL communities: Chicán, Nohkop, Trascorral and Cepeda Peraza. The villages differ from each other in their overall population size as well as the number and distribution of deaf people. Chicán is a village of 720 inhabitants, including 16 deaf people who are between 14 and 67 years old. The oldest signer was in his early eighties when he passed away in 2020. In Nohkop a family of five siblings grew up together, four of them are deaf and between 17 and 24 years old. Trascorral is home to a family of 13 siblings, six of whom are deaf and between 9 and 27 years old. In Cepeda Peraza, there are ten deaf community members from different families, who are between 28 and 47 years of age. Demographic data of the four communities is summarised in the table below (adapted from Safar 2017).

	Chicán	**Nohkop**[4]	**Trascorral**	**Cepeda Peraza**
Number of inhabitants	720 (Escobedo Delgado 2012)	No exact figure (around 30)	~300	~700
Number of deaf people	16	4	6	10
Percentage of deaf people	~2.2%	No exact figure	~2%	~1.4%
Age of deaf people in January 2020 (approximately)	16–67	17–24	9–27	28–47
Gender distribution of deaf people	8 female, 8 male	3 female, 1 male	2 female, 4 male	4 female, 6 male
Family distribution of deaf people	Multiple families	Siblings of one family (family of 5 siblings)	Siblings of one family (family of 13 siblings)	Multiple families

4 Nohkop is a pseudonym for a small neighbourhood of the town Chemax, chosen according to the family's wish to remain anonymous.

In Chicán and Cepeda Peraza, the high incidence of deafness most likely has a genetic reason and it has been investigated by geneticists. In both villages, many people are kin-related to each other and most deaf people have the same family name (Collí in Chicán, Chi or Ek' in Cepeda). In Nohkop and Trascorral, the origin of deafness is unknown, but it is likely to be different, given that deafness only occurs within one family. In Chicán, government programs and NGOs have carried out audiometry and distributed hearing aids to the deaf people, but deaf people do not use them and explain that they do not correspond to their needs (Dikyuva et al. 2012: 319; MacDougall 2012; Safar 2015). Cochlear implants have not been introduced to the communities. In Cepeda Peraza, a hard-of-hearing girl, who was around three-and-a-half years old at the time the mother was interviewed in 2017, has received hearing aids and her mother considered surgery for the girl to receive a cochlear implant.

All YMSLs are young languages, with a maximum generational depth of three generations in Chicán. The oldest signer in Chicán, who died in his early eighties and only had hearing children, was the only deaf person of his age group. Only the subsequent generation – today between 47 and 67 years old – included a critical mass of deaf signers. As it has been pointed out in the literature, defining "generations" in village sign language communities is far from straightforward and more fine-grained categorisations, which are well-informed by ethnographic research, are necessary (Kisch 2012). Le Guen (2012: 216) divides deaf signers in Chicán into seven "interactional groups", some of which include several, some no hearing members. There are two young deaf signers (16 and 20 years old in 2020) who were born to deaf parents and grew up in a house surrounded only by deaf people. It is important to keep in mind that even though the communities of study can be considered "family villages" (Le Guen 2012: 211), where most people know each other and many are kin-related, the specific dynamics of interaction of YMSL signers conform to general cultural interaction patterns. As customary among the Yucatec Mayas, people interact primarily with members of their own extended families. Deaf people do not socialise with each other based only on their shared experience of being deaf and a separate Deaf community, as in the context of national/urban sign languages, does not exist (Johnson 1991; Escobedo Delgado 2012; MacDougall 2012; Le Guen 2012; Safar 2017). This results in a situation where deaf signers from different interactional groups in Chicán have very little contact with each other and exhibit some differences in their signing (Safar et al., 2018; Safar and Petatillo Chan, this volume).

The deaf population of Nohkop and Trascorral is comprised by siblings of one family each, who constitute the first generation of users of their sign language. Over the past few years, the signing community in Nohkop has dissolved as deaf women went to live with their husbands, either in the same village but in

a different household or in the husband's village. In 2020, the oldest deaf signer has two hearing children (eight and five years old). The second deaf girl of the family has three hearing children (ten, six and one year old). The youngest deaf girl has a hearing baby of 11 months. All the children are acquiring YMSL as their first language. The deaf women are married to hearing men who learned the sign language through living with their wife.

In Cepeda Peraza, deaf people are distributed across five families: four pairs of deaf siblings and two young men who are the only deaf members of their families.

Languages

The main spoken language in the communities of study is Yucatec Maya, which is part of the Mayan language family. Yucatec Maya has the status of an official national language in Mexico and with around 800,000 speakers (INEGI 2010) it is one of the most widely-spoken indigenous languages in the country. Speaking Yucatec Maya is a primary index for identification with Yucatec Maya culture: people do not refer to themselves as being 'Maya' as an ethnic label but rather through language, as speakers of *maaya t'aan* or just *mayeero* 'speakers of the Maya language'.

Today, the influence of Spanish is growing and hearing community members are becoming increasingly bilingual in Yucatec Maya and Spanish (or trilingual in Yucatec Maya, Spanish and YMSL). Yucatec Maya remains the primary language of socialisation within the families, but Spanish is the dominant language in public domains, most crucially education, and children and teenagers can sometimes be observed speaking Spanish to each other. There are regional differences with regard to bilingualism and in Cepeda, parents use Spanish with their children much more than for instance in Chicán or Nohkop.

Yucatec Maya is primarily used in face-to-face settings, it lacks a written tradition and is characterised by a high use of multimodal communication (see Le Guen et al., this volume). Even though language conservation policies have attempted to establish a written standard form for Yucatec Maya, its use is restricted to specific contexts (e.g. universities) and the majority of the population (if literate) uses Spanish for written communication.

In all four communities, sign language is used in all private domains of village life. Deaf children are socialised in YMSL and acquire the sign language naturally in interaction with other deaf relatives or peers. Most hearing people in the community are competent signers, with varying degrees of fluency, depending on their proximity in kinship and their amount of interaction with deaf people.

As there is no formal teaching of YMSL, the only way of acquiring the language is through exposure and contact with other signers. The most skilful hearing signers are CODAs (Children Of Deaf Adults), younger siblings or peers. But even community members who only sporadically interact with deaf people are able to communicate with deaf people using sign language. Visitors from outside (e.g. people from other village who come to do trade), rely heavily on their gestural repertoire and often consult hearing relatives as interpreters. However, these "interpreting" situations are rather spontaneous and informal, continuous and planned interpreting does not exist (Pacheco, forthcoming).

The sociolinguistic situation of YMSLs – just like other village sign languages – is radically different from urban, national sign languages: The majority of language users are hearing L2 signers, who co-created a sign language together with a minority of deaf signers. This can occur even when the total number of deaf signers is very small. For instance, in the case of Nohkop, there are only four deaf signers who grew up with their grandmother after their mother had passed away. The grandmother has only very limited signing skills and the sign language developed between the siblings and their peers. In addition to the four deaf siblings, there are around 30 hearing signers in the extended family and neighbourhood (cousins, peers, neighbours, spouses and children of deaf women).

Spoken Yucatec Maya and YMSLs are in intense contact and specifically the conventional gestures used by Yucatec Maya speakers have an important impact on the emergence of YMSLs.

Cultural characteristics

YMSLs emerged spontaneously in settings where several deaf people were born into Yucatec Maya communities. This means that deaf signers of YMSLs share a cultural background with hearing Yucatec Maya. It also implies that the four communities of study exhibit similar sociolinguistic and cultural traits, which contributes to linguistic similarities between YMSLs from different locations (Safar 2017; Le Guen et al., this volume). In rural Yucatán, the extended family typically lives together on one family compound. Traditionally, it is a patrilocal society: after a couple gets married, they settle at the compound of the man's family. Today, we can notice a tendency towards neolocalisation, i.e. the founding of a new, independent household after marriage, which leads to changes in traditional family structure and patterns of socialisation. In Nohkop, because the first three deaf children were girls, the community dissolved in the last years,

leaving only the male deaf member and his hearing brother living with their grandmother.

As all over Mexico, both Catholic and Protestant religion have been adopted in Yucatec Maya communities. In Chicán, the population is divided into a Catholic and a Protestant part (see Escobedo Delgado 2012: 378). Cepeda is a predominantly Protestant community. The annual cycle in Yucatec Maya communities is structured by the harvest and a sequence of religious rituals and ceremonies – both traditional Maya and Christian ones.

Yucatec Maya men traditionally engage in a particular form of slash-and-burn agriculture, corn farming and the cultivation of crops (e.g. pumpkin, beans) on their *milpa* (corn field), hunting and apiculture. The women take care of the house, grind maize at the mill and prepare food, look after the children and the domestic animals (pigs, chickens, turkeys). Additionally, men and women also produce artefacts such as hammocks and embroidery. Today, new forms of income have emerged and many people commute or permanently move to nearby cities (commonly to Merida from Chicán and to Tekax from Cepeda) to seek employment. Men usually work in the construction business and women as housekeepers and babysitters. In Cepeda, several hearing men have migrated to the US over the last decades to make a living there and regularly send back money to their families (up to now, no deaf community member has left for the US). Within traditional Yucatec Maya community structures, deaf and hearing had equal professional opportunities and deaf people were not disadvantaged in terms of work. Nowadays, under the pressure of radical economic and demographic changes and the impact of globalisation, deaf community members face a new situation. Even though several deaf Yucatec Maya took on jobs outside their home villages, a change in location imposes new challenges and barriers in terms of communication and equal access (see the section on education).

Attitudes towards deafness and sign language

In their spoken language, the Yucatec Maya refer to deaf people as *kóok* (deaf), *toot* "mute" or, more commonly, using the Spanish loan *(sordo-)muudo* – the latter term is considered pejorative by Deaf communities in Spanish-speaking countries, but in the Yucatec Mayan context it does not carry any negative connotations. A common paraphrase in Yucatec Maya for 'deaf' is *mina'an ut'aan* '(those who) do not have words/voice'. Interestingly, when talking about the signed communication of deaf people, Yucatec Maya speakers use the verb *e'es* 'to show, to demonstrate' instead of *a'al* 'to say' (Le Guen 2012: 212). To say 'sign language', hearing people usually employ the Spanish loan *seenyas* 'signs'. In

YMSL, deaf people refer to themselves as HEAR-NEG/(SPEAK-NEG) 'does not hear/(does not speak)'. In Chicán, when translating an utterance from a deaf person from sign to spoken Yucatec Maya, speakers use the reportative evidential *bin* "so they say" instead of the quotative *k-* used to cite direct speech. This seems to reflect the idea that a process of translation is involved when quoting an utterance from another modality.

One crucial characteristic of the sociolinguistic environment of YMSLs are the positive attitudes of the Yucatec Maya towards deafness. As several authors have observed (Le Guen 2012; Johnson 1991; Escobedo Delgado 2012; MacDougall 2012; Safar 2017), deafness is not considered problematic in the Yucatec Maya context and deaf people are not discriminated against. This ideology is not restricted to deafness but forms part of a broader cultural understanding of difference and diversity. The Yucatec Maya consider that children are born just the way God created them and they should be accepted as they are. As a consequence, people do not view deafness as a disability but rather a trait of a person (Le Guen 2012: 212) and "a normal phenomenon" (Escobedo Delgado 2012: 378). In Cepeda, where Protestantism is prevalent, we encountered similar positive attitudes but slightly different explanations, which are more influenced by Christian values of benevolence and tolerance. In the communities of study, deaf people are included into society and fulfil similar social roles as hearing people do: they marry deaf or hearing partners, have children, pursue jobs and are assigned tasks within the community. They are viewed as competent members of society and are appreciated for their individual skills. A young deaf man in Cepeda, for instance, is regularly contacted by the municipality of Tekax to take visitors to some nearby caves because locals agree that he can guide the way better than anyone else in the village.

It is noticeable that deaf people are described as "strong-minded" by hearing people, as they often express their thoughts and emotions very directly (whereas Yucatec Mayas usually tend to favour indirectness, see Le Guen 2018). Such a behaviour might not be a character trait but more likely the result of a restriction in language socialisation practices that did not apply equally to deaf people as to hearing people, especially considering that hearing parents are usually not very proficient signers.

In Chicán and Cepeda, deaf people's marriage rate is somewhat lower than among the general population, but people are reluctant to provide an explanation for this situation. In Cepeda, only one deaf man is currently married, but several others have boy- or girlfriends.

Positive evaluations of deafness are strongly interlaced with the perception of sign language as an effective, pleasant and effortless means of communication. As Le Guen et al. (this volume) demonstrate, the Yucatec Maya make extensive

use of multimodality and are not reluctant to employ their hands, bodies and faces to express themselves. Community members acknowledge that deaf people are intelligent and can understand everything as long as it is communicated in an accessible modality, i.e. in sign language (Safar 2017). YMSL, in turn, is perceived as a fully-fledged means of communication, in which even complex topics can be discussed (Safar 2017). In Chicán and Cepeda, Jehovah's witnesses have attempted to teach villagers LSM, but people rejected these interventions, explaining that they did not feel the need to learn another sign language (Safar 2017; MacDougall 2012; Escobedo Delgado 2012: 378).

Education

What crucially distinguishes deaf from hearing Yucatec Maya are their opportunities in terms of education. Education taught in sign language is not available and deaf people attend regular hearing classes, sometimes relying on hearing peers as tutors, but in fact, sitting through their school career without being able to actively participate.[5] Apart from two young deaf people in Chicán and two in Cepeda, who finished secondary school, deaf YMSL signers received only basic schooling. In Nohkop, none of the deaf siblings attended school. While formal education and literacy is generally low among the older generation (45 and older) in rural Yucatán, the imbalance in professional opportunities is growing among deaf and hearing Yucatec Maya of the younger generation (see also Nonaka 2012 for Ban Khor Sign Language). Due to these barriers in access to education deaf community members are monolingual in YMSL and cannot read Spanish, which becomes an increasingly important requirement in the labour market. In the education system, deaf Yucatec Maya face double discrimination as deaf and as indigenous people (Poy Solano 2011).

YMSLs and language endangerment

As other village sign languages (and as many spoken minority languages) YMSLs are vulnerable to extinction (Safar and Webster 2014; Webster and Safar 2019). The sign languages of Chicán and Nohkop were classified as *severely endangered*

5 Two deaf teenagers attended a special education centre in Tekax once a week, but this school caters for students with all types of disabilities and the teacher knows only some basic LSM signs and the manual alphabet.

by UNESCO's Atlas of the World's Languages in Danger.[6] The main reason for this precarious situation lies in the decrease in birth of deaf children and in the ongoing dispersion of deaf signers (who migrate for work or move to another village with their husbands). So far, we observed only superficial language contact with LSM: some younger signers know the manual alphabet or occasionally use signs for particular lexical domains that are only partly lexically encoded in YMSL, such as colours or week days. One deaf young woman from Chicán took LSM classes (which were paid for by the family she works for in Merida), got in contact with the Mexican Deaf community and is now married to a Deaf man from Merida. She is bilingual and code-switches between LSM and YMSL. Recently, her deaf brother also moved to Merida and started working in the same business as his brother-in-law. When the siblings return to Chicán, they use YMSL with their family. So far, LSM has not had any strong impact on the structures of YMSL, but with signers' increased mobility and access to communication technology and social media, social networks and contact with the Mexican Deaf community are facilitated and we cannot predict how this will affect YMSLs in the near future. YMSLs are not officially recognised by law, but the National Institute for Indigenous Languages (Instituto Nacional de Lenguas Indígenas: INALI) supported the activities of the Yucatec Maya Sign Language Documentation Project. As an effort of language documentation and preservation, two dictionaries were compiled: one print version for YMSL of Chicán (Escobedo Delgado, in prep.) and one online dictionary including signs from Chicán and Nohkop (http://ymslproject.org/index.html#voc).

6 http://www.uclan.ac.uk/research/explore/projects/sign_languages_in_unesco_atlas_of_world_languages_in_danger.php (22/11/2018)

References

Dikyuva, Hasan, Cesar Ernesto Escobedo Delgado, Sibaji Panda & Ulrike Zeshan. 2012. Working with village sign language communities: Deaf fieldwork researchers in professional dialogue. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 313–344. Berlin: Mouton de Gruyter.

Escobedo Delgado, Cesar Ernesto. 2012. Chican Sign Language: A sociolinguistic sketch. In Ulrike Zeshan & Connie De Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 377–380. Berlin: Mouton De Gruyter.

Escobedo Delgado, Cesar Ernesto. In prep. Diccionario de la Lengua de Señas de Chicán.

Fox Tree, Erich. 2009. Meemul Tziij: An Indigenous sign language complex of Mesoamerica. *Sign Language Studies 9*(3). 324–366.

Hou, Lynn Y-S. 2016. *"Making hands": Family sign languages in the San Juan Quiahije community*. Austin: University of Texas dissertation.

INEGI. 2010. *Censo de población y vivienda 2010*. Mexico: Instituto Nacional de Estadística y Geografía.

Johnson, Robert E. 1991. Sign language, culture, and community in a traditional Yucatec Maya village. *Sign Language Studies 73*. 461–474.

Kisch, Shifra. 2012. Demarcating generations of signers in the dynamic sociolinguistic landscape of a shared sign language: The case of the Al-Sayyid Bedouin. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 87–125. Berlin: Mouton De Gruyter.

Le Guen, Olivier. 2012. An exploration in the domain of time: from Yucatec Maya time gestures to Yucatec Maya Sign Language time signs. In Ulrike Zeshan & Connie De Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 209–250. Berlin: Mouton De Gruyter.

Le Guen, Olivier. 2018. Managing epistemicity among the Yucatec Mayas (Mexico). In Joëlle Proust & Martin Fortier (eds.), *Metacognitive diversity: An interdisciplinary approach*, 193–222. Oxford: Oxford University Press.

MacDougall, Jennifer Paige. 2012. *Being Deaf in a Yucatec Maya Community: Communication and Identity Negotiation*. Montreal: McGill University dissertation.

Nonaka, Angela. 2012. Language ecological change in Ban Khor, Thailand: An ethnographic case study of village sign language endangerment. In Ulrike Zeshan & Connie De Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights*, 277–312. Berlin: Mouton De Gruyter.

Pacheco Cahuich, Maribel. (forthcoming). *Trayectorias de vida de los sordos de Chicán, usuarios de la lengua de señas maya yucateca. La sordera indígena frente a los retos actuales en un contexto intercultural*. Mexico City: UNAM B.A. thesis.

Poy Solano, Laura. 2011. Margina el sistema educativo a niños con problemas de lenguaje. *La Jornada*, 05/07/2011.

Safar, Josefina. 2015. Eine analyse von diskursen über Chicán Sign Language (Mexiko). *Das Zeichen 101*(1). 434–446.

Safar, Josefina. 2017. Translanguaging in Yucatec Maya signing communities. *Applied Linguistics Review*. Online: doi:https://doi.org/10.1515/applirev-2017–0082.

Safar, Josefina. in press. "When you were that little…" – From Yucatec Maya height-specifier gestures to Yucatec Maya Sign Language person-classifier signs. *Gesture*.

Safar, Josefina & Jennifer Webster. 2014. Cataloguing endangered sign languages at iSLanDS. Online: https://islandscentre.files.wordpress.com/2014/08/report-endangered-sls_070814.pdf.

Safar, Josefina, Olivier Le Guen, Geli Collí Collí & Merli Collí Hau. 2018. Numeral variation in Yucatec Maya Sign Languages. *Sign Language Studies 18*(4), 488–516.

Shuman, Malcolm K. 1980. The sound of silence in Nohya: A preliminary account of sign language use by the deaf in a Maya community in Yucatan, Mexico. *Language Sciences 2*(1). 144–173.

Webster, Jennifer & Josefina Safar. 2019. Scoring sign language vitality: Adapting a spoken language survey to target the endangerment factors affecting sign languages. *Language Documentation & Conservation 13*. 346–383.

Zeshan, Ulrike, Cesar Ernesto Escobedo Delgado, Hasan Dikyuva, Sibaji Panda & Connie De Vos. 2013. Cardinal numerals in rural sign languages: Approaching cross-modal typology. *Linguistic Typology 17*(3). 357–396.

Emmanuella Martinod, Brigitte Garcia and Ivani Fusellier

Sign languages on Marajó Island (Brazil)

About Marajó Island

Marajó Island (in the state of Pará in Northeast Brazil) is the world's biggest river island (see Figures 1 and 2 below). Its capital city, Soure (24 488 inhabitants), is located within a rural area where people earn their living from fishing, agriculture or farming. For instance, the buffalo is a culturally important animal as it produces quality meat and milk. Marajó buffalo cheese is a well-known specialty in the North of Brazil. As for the demography, inhabitants are descendants of mixed ancestry of indigenous people living in the Northeast of Brazil and white Europeans (known as *caboclos*).[1] Most of the population only work sporadically. Work is perceived as a way of satisfying family needs, but most people do not appreciate being bound to a profession because freedom is seen as a significant value in this traditional way of life (Ayres 1992: 143; Serre 2002).

Figures 1 and 2: Map of the Marajó Island.[2]

1 See Moran (1974) or Parker (1982) for a basic background of this notion and Ayres (1992) or Tiphagne (2005) for more detail.

2 Images from Google Map (https://maps.google.com/). Date of download : 18th November 2017.

https://doi.org/10.1515/9781501504884-012

History of the deaf community and local sign languages

Martinod (PhD in progress) conducted two periods of fieldwork (August 2015 and March 2017). During this time, she collected data from the local sign languages (SLs) and conducted interviews with ten deaf people and ten hearing people (eight adults and two children of a deaf mother).[3] The information below comes from observations made during the fieldwork, interviews and bibliographic research in the library of the Soure annex of the Federal University of the State of Pará (UFPA)[4] where previous research on deaf people's education in Marajó is archived.

Since sign languages on Marajó are not recognized by the government, they have no official names. For convenience, we use the term *Marajó SLs* although our analysis focuses on some of the signers from Soure.[5]

The deaf people on Marajó had, until the last decade, lived relatively isolated lives among their hearing families, using homesign systems exclusively within the family circle. Since 2007 a deaf community is gradually emerging, and individual homesign systems come into contact with each other due to an initiative by the UFPA annex. The first study of deaf people of this area and their SLs was conducted in 2006 by Thianny Brito from UFPA. Brito lists fifty deaf individuals in the area. A more recent subsequent survey lists thirty deaf individuals living in Soure.[6] Following Brito's work, social gatherings had been arranged for these deaf individuals by two local disability associations,[7] leading to the formation of a deaf community in Soure. The consolidation of this emergent community was aided by the creation of communal spaces hosting various activities (e.g. games, embroidery courses), thanks to a collaboration between the UFPA and the two mentioned associations.

Some of the deaf people (six out of ten) went to school until the equivalent of the last year of middle school (about 13 years old). This year should be completed with a special exam, but none of them could pass it so they left school. They spent these schooling years in classes they could barely comprehend. Indeed,

3 Metadata has been provided in our chapter (Martinod et al., this volume).

4 *Universidade Federal do Pará.*

5 We suppose there is a lot of individual and regional variation on the island since the existence of deaf communities in other cities has been reported.

6 2010, Brazilian Institute for Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística)*.

7 *Associação de Pais e Amigos e Deficientes de Soure* (APADS) and *Amis Marajó*.

teachers were not trained to teach deaf children and did not use any SL.[8] Several deaf adults explained that at the time they went to school they stayed in the back of the classroom and simply wrote what was written on the board without understanding anything. In a study of the literacy skills of five Sourense deaf students during the Brazilian equivalent of Grammar school and Middle school (aged 7–12), Ramires (2012) showed that none of the participants was able to master the alphabetic system through reading or writing. Another study (Do Socorro 2012) emphasized the urgent need for schools of the city to adapt to deaf students in terms of teacher training.

The associations organizing activities for the deaf stopped in 2012 due to lack of resources. To our knowledge, at least four deaf women who formed the strongest connections and could socialize freely, continued to meet regularly outside the association framework, thereby reinforcing the contacts between their individual SLs. The others seemed to return to the isolated conditions they lived in before 2007 living with their hearing family and communicating with them through familiolects that remain poorly studied for the moment.

We observed that the frequent population movements and the tendency of hearing families to protect their deaf members keeps preventing the community from strengthening through frequent meetings. This has also been confirmed by a teacher working in one of the associations for the deaf (APADS). Hearing families indeed often go on extended family visits to other areas of the island. This is a part of the Brazilian culture where family remains an important kernel in people's life, whatever their age or their social status. If a member of the family happens to be disabled, the family is expected to take care of him (Marques 2010).

The Marajó context does involve adult deaf signers who are not a part of a stable signing community. SLs produced in such sociolinguistic conditions are rarely studied, therefore requiring specific categorisation. Given the conditions on Marajó, we now consider these SLs as *partially integrated adult homesigns*. This term comes, in part, from the distinction made by Nyst et al. (2012: 268) between child homesign and adult homesign in a rural context.

Influence of an institutional SL: LIBRAS

Until recently, the national Brazilian Sign Language (LIBRAS) had little presence in the area of Marajó. The UFPA initiated weekly LIBRAS courses in 2016 for deaf

8 A Brazilian Portuguese-LIBRAS interpreter began to work in Dom Alonso school (Soure) in 2017. At this time she is the only interpreter for three deaf students who attend different classes.

and hearing people. These courses can also have a positive impact on literacy as they use a handbook where images of signs are presented next to their equivalent word in Brazilian Portuguese. We observed the case of a deaf woman who used this book to improve her Brazilian Portuguese reading and writing skills.

LIBRAS also started to be used in one of Soure's schools (see footnote 8). This led some deaf adults to be willing to come back to school in order to increase their level of education. Unfortunately, we observed that some of them do not completely understand the SL the interpreter uses because their LIBRAS proficiency is low.

Attitudes towards the deaf and local SLs

Martinod's observations and interviews with hearing and deaf individuals show that attitudes towards the local SLs are quite negative. Hearing people consider the institutional LIBRAS the only *real* SL. The simple fact that nine of the ten hearing people interviewed refused to use the local SLs in front of the researcher tends to confirm this. This is why hearing people encourage the deaf to learn LIBRAS when possible. The deaf assimilated this view and often have a poor self-esteem unless they learn LIBRAS. The LIBRAS courses initiated in 2016 are provided by a hearing interpreter whose assistant is deaf. Considering that most of the students are hearing people, usually teachers, this situation might discourage deaf people to attend the course and increase their sense of inferiority.

However, judging from our observations deaf people seem to progressively become a part of the current Marajóara life. They often briefly interact with hearing people, mostly for work purposes: some occasionally work as baby-sitters or housekeepers. In addition, the Dom Alonso school in Soure hired in 2012 a deaf dance teacher. This contributed to change people's perception on deafness. That being said, career opportunities for deaf people remain very limited because of their low level of education. This remains true even if we take into account the overall economic and cultural context of the island.

In 2015 and 2016 an awareness-building activity for the preservation and promotion of Marajó SLs was initiated, following post-doctoral research conducted by the director of the Soure annex of the UFPA, Maria Luizete Carliez, in France at the University Paris 8. Workshops and courses were proposed to UFPA teachers and students by SL linguists, sociologists and philosophers. The aim of these activities was to encourage the use of local SLs and consider them in the education of the deaf. Nevertheless, the survey conducted in 2017 by Martinod allows us to think that the local SLs could continue to develop in the most remote areas of Soure while LIBRAS will increase its influence downtown.

References

Ayres, Deborah de Magalhães Lima. 1992. *The social category caboclo: History, social organization, identity and outsider's social classification of the rural population of an Amazonian region (the middle Solimões)*. Cambridge: University of Cambridge dissertation.

Brito, Thianny. 2006. *O ensino da língua portuguesa para surdos*. [The teaching of the Portuguese language for the deaf]. Trabalho de Conclusão de Curso directed by Waldemar dos Santos Cardoso. Campus universitário do Marajó — Soure: Universidade Federal do Pará. Unpublished graduation work.

Marques, Suely. 2010. Au Brésil, le handicap en ombres et lumières. In Gardou Charles (ed.), *Le handicap au risque des cultures*, 11–132. Toulouse: Éditions ERES.

Moran, Emilio. 1974. The adaptive system of the caboclo. *Man in the Amazon*, 136–159. Gainesville: University of Florida Press.

Nyst, Victoria, Sylla, Kara, Magassouba, Moustapha. 2012. Deaf signers in Douentza, a rural area in Mali. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: Anthropological and linguistic insights* [Sign Language Typology, Vol. 4], 251–276. Berlin: Mouton de Gruyter.

Parker, Eugene Philip. 1982. *Cultural Ecology and Change: A Caboclo Varzea Community in the Brazilian Amazon*. Boulder: University of Colorado Boulder dissertation.

Ramires, Marileide Cristina Lima. 2012. *Habilidades de leitura e escrita de alunos surdos alfabetizados de Soure.* [Reading and writing skills of some deaf students in Soure]. Trabalho de Conclusão de Curso directed by Waldemar dos Santos Cardoso. Curso de especialização em estudos da linguagem aplicados à Educação de surdos. Campus universitário do Marajó — Soure: Universidade Federal do Pará. Unpublished graduation work.

Serre, Agnès. 2002. Construction d'une identité urbaine par l'utilisation d'imagerie. Le cas de Benguí, favela d'Amazonie brésilienne. *Autrepart*, (4), 69–87. Presses de Sciences Po (P.F.N.S.P.). Paris.

Socorro de Oliveira Almeida, Luana do. 2012. *Avaliação da aprendizagem do aluno surdo na rede publica de ensino no municipio de Soure na Ilha de Marajó*. [Evaluation of the learning of a deaf student in the public network of education in the municipality of Soure on the Island of Marajó]. Trabalho de Conclusão de Curso. Curso de especialização em estudos da linguagem aplicados à Educação de surdos. Campus universitário do Marajó — Soure: Universidade Federal do Pará. Unpublished graduation work.

Tiphagne, Nicolas. 2005. *Entre Nature et culture, les enchantements et les métamorphoses dans le monde caboclo de l'Est de l'île de Marajó: invention et discours sur l'autre, prémisses d'une identité*. PhD dissertation. Paris: University Paris 7 Diderot.

Ben Braithwaite

Sociolinguistic sketch of Providence Island Sign Language

Providence Island is located in the Western Caribbean, around 200km off the coast of Nicaragua. Part of Colombia's Archipelago of San Andres, Providence and Santa Catalina, it has much in common historically, socially and linguistically with the English Creole speaking Caribbean. An indigenous sign language has been used by deaf and hearing people in Providence since at least the second half of the nineteenth century.

Figure 1: Map of Providence and San Andres.

One of the first rural sign languages to receive substantial attention from linguists, Providence Island Sign Language (PSL) was first described by Washabaugh, Woodward, and DeSantis (1978), and then in a series of publications by

https://doi.org/10.1515/9781501504884-013

Washabaugh (Washabaugh 1979, 1980a, 1980b, 1981, 1985, 1986a, 1986b) and Woodward (Woodward 1978b, 1979, 1982, 1987).

Unusually for such a small community, two distinct genetic causes of deafness have been identified in Providence, one associated with Waardenburg Syndrome, the other autosomal recessive and non-syndromatic (Lattig et al. 2007). Non-syndromatic deafness may well have been brought to Providence by settlers from the Cayman Islands, where genetic deafness is known to have been extremely common (Doran 1952). Lattig et al. (2007) also identify some cases of deafness which appear to be idiopathic or isolated.

The total number of deaf people in Providence seems to have remained fairly steady over the last few decades. Washabaugh (1986a: 9) reported 20 deaf people in a total population of around 3,000. Thirty years later, Lattig et al. (2007) report seventeen deaf people, though the total population has increased significantly over the same period, to around 5,000. This increase has largely been a result of migration from mainland Colombia. Currently, there are deaf people of all generations, including at least one child under the age of 10, living in villages around the island.

The total number of hearing signers is not known. Woodward (1978b) carried out a survey of 28 hearing people living in two villages. He found that 16 of the 28 reported fair to excellent signing ability. 11 people reported their signing ability as 'poor' signing ability and one reported "none." Recent fieldwork suggests that while there are still hearing signers, there may be fewer than before, and that this may be connected to the introduction of Lengua de Señas Colombiana (LSC) and special education.

The spoken languages of Providence are English Creole and Spanish. Spanish is the official language of education, including in the special school established in 1999 and attended by several younger deaf people. Hooker O'Neill De Carreño, (2016) found that Creole-speaking family members in San Andres and Providence would often switch to Spanish when addressing deaf relatives. Most deaf people in Providence have some literacy in Spanish and English, and several younger people make fairly regular use of both languages on social media.

The first special education programme for deaf children was established in 1999. The special education teacher at the school used LSC, not PSL. Even those who went through this programme, seem to have a preference for PSL. During fieldwork, the author observed that many of the family members of younger deaf people seem to have quite limited signing abilities, and some family members had negative attitudes towards signing. These attitudes may have been influenced by the introduction of special education, speech therapy, and the availability of audiological services. Some younger deaf people have hearing aids, and at least

one has had hopes of getting a cochlear implant. Some younger deaf people have also received some speech training, from speech therapists based in San Andres.

Deaf people in San Andres use LSC, and it seems that none know PSL, though several know of its existence. Improved transport infrastructure has meant that there is much more contact between Providence and San Andres than when Washabaugh and Woodward were writing. Deaf people from both islands move between them, though there remains very limited contact between them. One younger deaf man has spent a considerable amount of time away from Providence, in mainland Colombia, and, as a result, has had some sustained contact with the LSC-using members of the Colombian deaf community.

Washabaugh argued that PSL was not a "mature" sign language, that it lacked "the conventionality and rule governedness we have come to expect of complete, mature human languages" (Washabaugh, 1986a: 74). It is possible that, with the significant advances that have taken place in the field of sign language linguistics since Washabaugh was writing, it might be possible to find evidence of grammatical patterning which were not previously apparent, and to reassess such claims. For instance, Washabaugh was unable to find consistent word order patterns, but a better understanding of the ways in which non-manual markers interact with word order may reveal patterns which he missed.

There is no official recognition of PSL, and prospects for the future are very uncertain. With such a small deaf population, the language is bound to be extremely vulnerable. The influx of people from mainland Colombia, and the prospect of genetic counseling following recent research into the etiology of deafness make the disappearance of deafness within the foreseeable future quite likely. The influence of LSC through the education system, and contact with the wider Colombian deaf community, including on the neighbouring island of San Andres, present additional threats to the continued use of PSL.

The resumption of research on PSL provides the prospect at least of language documentation, and a small grant was recently approved to support a documentation project. There is enthusiasm for this work from within Providence, among deaf and hearing people. The loss of cultural and linguistic heritage is already an issue of considerable concern to the Creole-speaking population of Providence, where Spanish has made considerable inroads, and PSL is clearly another important aspect of that heritage.

References

Doran, Edwin. 1952. Inbreeding in an isolated island community. *Journal of Heredity* 43. 263–266.

Hooker O'Neill De Carreño, Maureen. 2016. El bilingüismo de los sordos: un estudio exploratorio sobre la situación lingüística del sordo en la comunidad multilingüe del archipiélago de San Andrés, Providencia y Santa Catalina. Universidad Nacional de Colombia, Sede Caribe.

Lattig, Maria Claudia, Nancy Gelvez, Silvia L. Plaza, Gustavo Tamayo, Jorge Uribe, Igor Salvatierra & Martha L. Tamayo. 2007. Deafness on the island of Providencia-Colombia: different etiology, different genetic counseling. *Genetic Counseling* 19(4). 403–412.

Washabaugh, William. 1979. Hearing and deaf signers on Providence Island. *Sign Language Studies* 24. 191–214.

Washabaugh, William. 1980a. The manu-facturing of a language. *Sign Language Studies* 29. 291–330.

Washabaugh, William. 1980b. The organization and use of Providence Island Sign Language. *Sign Language Studies* 26. 65–92.

Washabaugh, William. 1981. Sign language in its social context. *Annual Review of Anthropology* 10. 237–252.

Washabaugh, William. 1985. Language and self-consciousness among the deaf of Providence Island. In William. C. Stokoe & Virginia Volterra (Eds.), *Proceedings of the 3rd International Symposium on Sign Language Research*, 324–333. Rome/Silver Spring: CNR/Linstock Press.

Washabaugh, William. 1986a. *Five fingers for survival*. Ann Arbor: Karoma.

Washabaugh, William. 1986b. The acquisition of communicative skills by the deaf of Providence Island. *Semiotica* 62(1–2). 179–190.

Washabaugh, William, James Woodward & Susan DeSantis. 1978. Providence Island Sign: A context-dependent language. *Anthropological Linguistics* 20. 95–109.

Woodward, James. 1978b. Attitudes toward deaf people on Providence Island: A preliminary survey. *Sign Language Studies* 1018(1). 49–68.

Woodward, James. 1979. The selflessness of Providence Island Sign Language: Personal pronoun morphology. *Sign Language Studies* 23. 167–174.

Woodward, James. 1982. Beliefs about and attitudes towards deaf people and sign language on Providence Island: On depathologizing deafness. In James Woodward (ed.), *How you gonna get to heaven if you can't talk with Jesus*, 51–74. Silver Spring, MD: T. J. Publishers.

Woodward, James. 1987a. Providence Island Sign Language. In *Gallaudet Encyclopedia of Deaf People and Deafness*, Vol. 3, 103–104. New York: McGraw-Hill.

Kristian Ali and Ben Braithwaite

Bay Islands Sign Language: A sociolinguistic sketch

The Bay Islands is a group of islands belonging to Honduras in the Caribbean Sea. Located between Utila and Guanaja, Roatan is the largest of the islands. With a population of just over 62,000 – though reports suggests 100,000 (2014), it lies 40 miles off the Honduran coast. Roatan is ethnically very diverse, with black islanders, white islanders, Mestizos,[1] Garifuna,[2] and several other groups. Within the towns of French Harbour and Jonesville on the southern coast of Roatan, a sign language has been used in the visual and tactile modalities by hearing, deaf, and deafblind villagers for at least three generations.

Figure 1: Location of the main islands of the Bay Islands.

We refer to this previously unresearched language as Bay Islands Sign Language, henceforth BISL, since the language appears to be indigenous to the Bay Islands,

1 By far the largest ethnic group in Honduras, the Mestizo people have European and Amerindian heritage.

2 The Garifuna people, also known as Garinagu and Black Carib, have West African and Amerindian heritage.

https://doi.org/10.1515/9781501504884-014

and is in use in both Roatan and Guanaja. Other sign languages are used in the Bay Islands, including ASL and Lengua de Señas Hondureña (LESHO) as well as a number of homesigning situations, and some BISL signers are also familiar with some of these other codes.

BISL emerged due to a high incidence of deafblindness in the communities of French Harbour and Jonesville, a result of Usher Syndrome, which causes a person to be born profoundly deaf and then to gradually lose their vision later in life. Deafblindness has been present in these communities for at least 100 years. The oldest deafblind person we currently know of was born in 1895 and died in 1988 in Jonesville. She had two younger siblings who also had Usher Syndrome and a son with Usher Syndrome who married a woman with Usher Syndrome from French Harbour. That woman had three sisters also with Usher Syndrome. They had two children who both have Usher Syndrome and are still alive today. One was adopted as a baby and brought to the USA, where he still lives. The other grew up in Jonesville but lives in French Harbour. The simplified family tree in Figure 2 shows the distribution of Usher Syndrome across the related communities in French Harbour and Jonesville. From the family tree we can see that deafblindness is not limited to close family. Two grandchildren of the uncle of the deafblind sisters from French Harbour also have Usher Syndrome and are still alive today in French Harbour. Another of the four deafblind sisters married a deaf man and moved to Guanaja where they both still live. In all, there have been at least 11 signers with Usher Syndrome across three generations (not counting 13 in the diagram below, who never learned BISL), as well as many more hearing signers, and deaf signers without Usher Syndrome. Only four deafblind signers are still alive, aged between 51 and 73.

There is evidence that the language was transmitted intergenerationally. The deafblind man who grew up in Jonesville (12) was adopted by hearing and sighted relatives but often signed with his deafblind parents (4,5) as well as his deafblind grandmother (1) and great aunt (3) who lived nearby. His father was exposed to signing by his deafblind mother and her deafblind siblings. The other two deafblind people in French Harbour (10,11) grew up in contact with the four deafblind sisters (5, 6, 7, 8) and a deaf neighbour (without Usher Syndrome).

It is important to note that the family tree shows the distribution of Usher Syndrome and not the extent of the signing community. The boundaries of the signing community extend far beyond the deafblind signers. The hearing members of these tightknit communities signed with the deaf and deafblind members to varying degrees of competency, though the language seems to have been largely restricted to the white islander populations. Many older hearing people from both villages recall signing regularly in the past, though some no

longer use the language much, as a result of deafblind friends, neighbours and relatives dying or moving away.

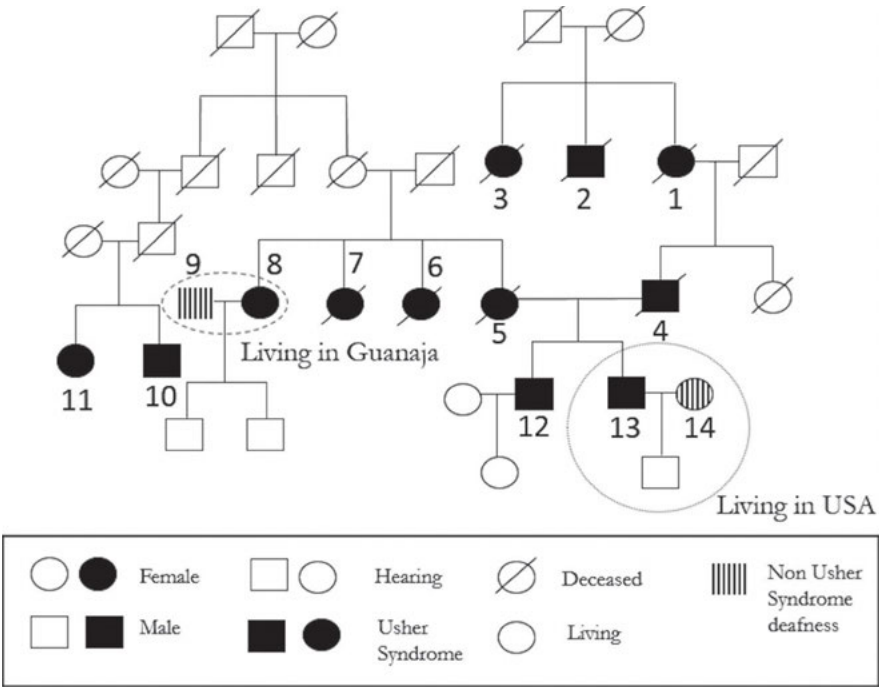


Figure 2: Family tree showing Usher Syndrome in the communities of French Harbour and Jonesville.

The language is signed in both the visual and tactile modalities, depending on the sightedness of the interlocutors. When addressing a blind interlocutor, one or both hands are usually in contact. Because some of the deafblind signers have some vision, they may be able to perceive language visually, depending on lighting conditions, and similar factors. It is normal to touch the addressee's face and body, or to bring the addressee's hand into contact with one's own face and body. Further research is required to determine the extent to which consistent conventions have been established in the same ways that have been reported for other tactile sign languages (Checchetto et al. 2018; Edwards 2014; Mesch 2001). When addressing a sighted interlocutor, signing may be purely visual, though we have noticed that tactile signing is quite often used, even when the addressee can see.

The one deafblind BISL signer who received some formal training in English reading and writing when he was young (12 on the family tree) often traces words

on the interlocutor's arm, particularly when addressing someone with limited signing competence. The same signer also makes some use of written Spanish. There is now a school for children with special needs in French Harbour but there are not yet any institutional measures in place to educate deaf children.

The language is not likely to remain in use much longer. The youngest deafblind signer is 51 years old. There are no younger people who have Usher Syndrome as far as we know. There are younger deaf people living nearby, but the language is not being passed on to them. Some have learned LESHO or ASL through missionary organisations, others have only homesigns. There are hearing signers as young as 20 years old, who have used it since they were very young, but they are unlikely to continue to sign once the last deafblind signer has died or once they have fallen out of physical contact with them. Since the last deafblind signer who grew up in Jonesville (12) now lives in French Harbour, many of the older hearing signers there have fallen out of contact with him and have not used the language much for many years. A huge increase in immigration from the mainland has greatly changed the demographics of Roatan. At the same time, many white Islanders have moved away to North America. These demographic changes make it quite unlikely that there will be any future cases of Usher Syndrome. A small documentation project is underway by the authors with the aim of creating a corpus of natural and elicited data and a lexical database. The oral history of this unique language is also being documented.

References

Checchetto, Alessandra, Carlo Geraci, Carlo Cecchetto & Sandro Zucchi. 2018. The language instinct in extreme circumstances: The transition to tactile Italian Sign Language (LISt) by Deafblind signers. *Glossa: a journal of general linguistics* 3(1). 1–28. doi:https://doi.org/10.5334/gjgl.357.

Edwards, Terra. 2014. From compensation to integration: Effects of the pro-tactile movement on the sublexical structure of Tactile American Sign Language. *Journal of Pragmatics* 69. 22–41. http://dx.doi.org/10.1016/j.pragma.2014.05.005.

Mesch, Johanna. 2001. *Tactile sign language: turn taking and question in signed conversations of deaf-blind people*. International Studies on Sign Language and Communication of the Deaf, Vol. 38. Signum.

2014. Roatan Population Tops 100,000. *Bay Islands Voice*. http://www.bayislandsvoice.com/roatan-population-tops-100000-up-four-fold-since-last-official-census-in-2001–201405079774.

Marie Coppola

Sociolinguistic sketch: Nicaraguan Sign Language and homesign systems in Nicaragua

Nicaraguan Sign Language (NSL) emerged from the newly formed Deaf community in the late 1970s. The Deaf community formed as a result of the expansion of two centers for special education and vocational training in the capital city of Managua (Polich, 2005; Senghas, Senghas and Pyers, 2005). The national deaf association, ANSNIC (Asociación Nacional de Sordos de Nicaragua) was formally organized in Managua in 1986 and, with the support of the Royal Swedish Association of the Deaf, purchased a house (Polich, 2005). In Nicaragua, the language is referred to as "Lenguaje de Señas Nicaragüense"; forms of the language have also been referred to in the literature as "Lengua de Señas Nicaragüense" and "Idioma de Señas Nicaragüense" (Kegl and Iwata 1994, Kegl, Senghas and Coppola, 1994).

This sketch will also provide information about the nature and context of individual homesign systems used by deaf children and adults in Nicaragua. Homesigners are deaf individuals who have not acquired a spoken language (due to their deafness), nor had sufficient contact with a Deaf community in order to acquire an existing sign language. They nevertheless develop gesture systems, called "homesign" or "señas caseras", that they use as their primary means of communication (Coppola, 2002).

Demographics and deafness

Nicaragua has a population of 6 million, and a total area of 130,000 km^2 (about the same size as Greece). The overwhelming majority of the population resides in the western half of the country, with much of the urban growth centered in the capital city of Managua (World Factbook, 2019). Reliable figures regarding the number of deaf people in Nicaragua are difficult to come by; estimates of the occurrence of significant hearing loss (greater than 30 dB) among children enrolled in public, non-special education schools are between 18 and 20% in some areas (Saunders et al., 2007). The authors note that the etiologies of deafness in Nicaragua differ from those in wealthy, industrialized nations; these include poor perinatal health care, infectious causes, gentamicin (antibiotic) exposure, and hereditary hearing loss. Local explanations commonly given for an individual's deafness include

https://doi.org/10.1515/9781501504884-015

prenatal accidents (e.g., falls, scorpion bites), accidents related to the major earthquake that occurred in Managua in 1972, and child or maternal illness.

According to a census conducted in 2009 in which 179,138 households were visited, people with hearing loss constituted 10.1% of the disabled population in Nicaragua (12,783 people) (JICA, 2014). This figure likely includes many non-signing deaf people. The census also reports that 41% of people with disabilities have no formal schooling (JICA, 2014) and 49% are unemployed (JICA, 2014). However, figures on education and employment are unavailable for deaf people as a subgroup.

It is quite rare for deaf adults to have deaf children; thus, a very small number of deaf children in Nicaragua experience regular contact with a deaf signing relative (parent, sibling, or extended family member). Most deaf individuals begin learning NSL when they enter school. The Nicaraguan Ministry of Education lists 25 cities with centers for (general) special education, and there are a handful of private schools serving deaf children (see later section for more details and a map). However, the deaf individuals who are among the 41% of the population living in rural areas (World Factbook, 2019) do not have access to special education. Indeed, even deaf individuals living in urban areas often do not attend school or have access to a signing community.

As mentioned in the introduction, the deaf community began to form in the late 1970s in the context of two educational vocational programs aimed at deaf children and young adults (Polich, 2005; Senghas, Senghas and Pyers, 2005). There was no previously existing deaf community or sign language in Nicaragua; thus, the first group of deaf people to form this community did not learn a sign language from older signers. Rather, the deaf individuals who participated in these programs brought with them the gestures they used to communicate with their families, also known as homesigns. The homesigns themselves were idiosyncratic and likely varied considerably across individuals in terms of their structure and complexity. However, within a relatively short time, the deaf signers converged on a rudimentary sign language, which served as the language input for deaf children who subsequently entered these programs.

Thus, researchers characterize the transmission of the language in terms of "cohorts," or waves, of children and adults who enter the community via an established program or through contact with the Deaf association. Signers who entered the signing community before 1983 are considered Cohort 1; those who entered between 1984 and 1993 are Cohort 2, those who entered 1994–2003 are Cohort 3, and so on. These designations are purely for purposes of analysis, and do not correspond to signers' identities or actual patterns of interactions in the community (i.e., signers interact freely across these groups, especially after they have completed school). Deaf adults often marry each other, and usually have

hearing children, who are bimodal bilinguals (users of both NSL and spoken Spanish); such individuals are also known as codas (children of deaf adults). Gagne (2017) reports on codas' acquisition and use of NSL.

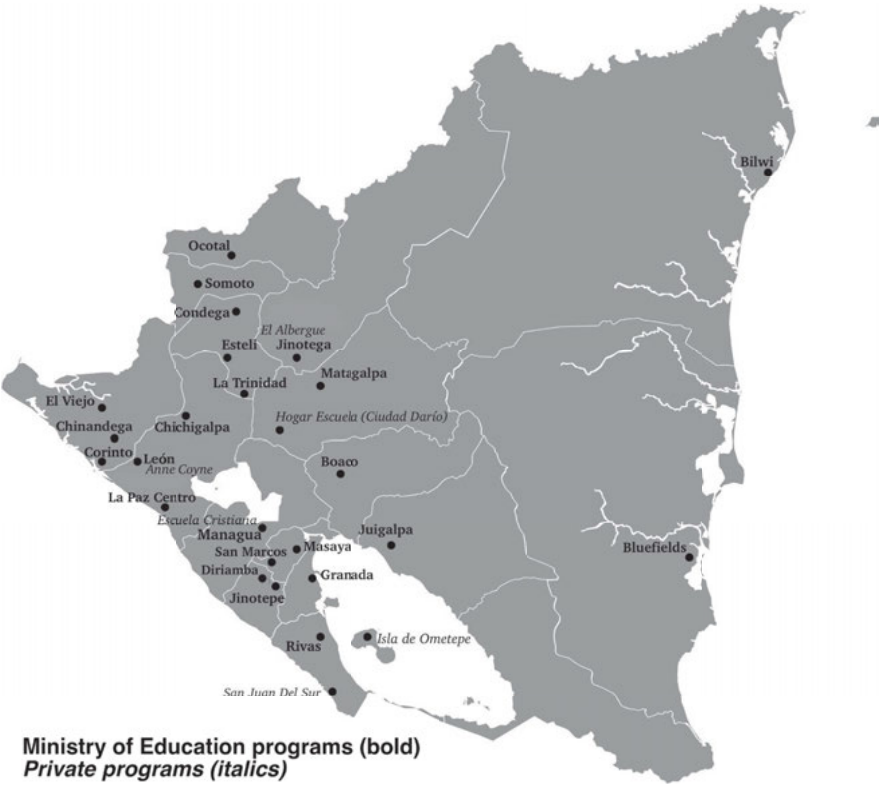


Figure 1: The locations of schools for special education in Nicaragua; cities with public schools are labeled in **bold** and private programs serving deaf children are labeled in *italics*.

Language use

The sign language began to coalesce around 1978, making it approximately 40 years old. As noted earlier, the original centers of language transmission were the center for special education in Managua, the vocational school (now closed), and the Deaf association in Managua, as well as the other affiliated Deaf associations that began to spread out from Managua. Managua, the capital and largest city, has the largest Deaf community. Other deaf population centers include Estelí,

León, Matagalpa, Masaya, San Marcos, Jinotega, Granada, Chinandega, Somoto, Ocotal, and Bluefields. NSL has since spread to other cities, generally through the establishment of classrooms for deaf children, as well as the movement of deaf adults from Managua to outlying areas. NSL signers in the earliest stages of the language's emergence had very little contact with signers of other sign languages. The international support from Sweden resulted in limited contact with Swedish Sign Language; much later in the development of the language (after around 2010), the internet and social media facilitated contact with American Sign Language videos. Nicaraguans, both deaf and hearing, tend not to travel much outside of the country, thus limiting in-person contact with users of other sign languages.

The dominant spoken language in Nicaragua is Spanish; however, many indigenous languages are also spoken (including Miskitu and Sumu), and the majority of these speakers live on the Atlantic Coast (Eberhard et al., 2019). Many deaf individuals know some Spanish; this knowledge, as well as the general increase in literacy[1] in NSL, has been facilitated by the increase in deaf teachers and teacher assistants in elementary classrooms (Gagne and Coppola, 2020). Hearing Nicaraguans are generally quite open to using their hands to communicate with deaf people regardless of their knowledge of NSL or their previous experience communicating with deaf signers and homesigners. Indeed, Coppola's chapter (this volume) characterizes some of the conventional gesture resources available to hearing non-signers.

Culture

Nicaragua is one of the poorest countries in the western hemisphere (The World Factbook, 2019). Underemployment is high; among those employed in the formal economy, 31% work in agriculture, 18% in industry, and about 50% in service occupations. The country is predominantly Christian (50% Catholic, 33% Evangelical), and 59% of the population lives in urban settings (The World Factbook, CIA, 2019). Multiple generations of families tend to live together, or close to each other, and family relationships are highly valued and relied upon. Deaf people, like their hearing counterparts, often struggle to find adequate employment, even when they have completed their primary (required) or

1 The notion of literacy in a sign language that does not have a written form encompasses conceptual knowledge about language, as well as metalinguistic skills, including the ability to use the language effectively in different contexts and registers (Cummins, 2006).

secondary education. The relatively recent emergence of the Deaf community and sign language, as well as access to education, mean that skilled jobs are only available to deaf people under the age of about 45; indeed, the vast majority of deaf people are unemployed, or work informally (e.g., selling food or goods on the street, or as domestic workers). As noted in the next section, however, opportunities for higher education and better job prospects for deaf people have been increasing in recent years.

Education

NSL is recognized by the government as the natural language of deaf children, and is being increasingly used in deaf classrooms. However, there is simultaneously an increase in the application of the policy of "inclusive education", whose intended goal is to educate deaf children alongside their hearing peers, with appropriate supports (e.g., interpreters, signing teachers, specialized teaching assistants). Unfortunately, a lack of awareness of best practices in educating deaf children, as well as a lack of financial resources and pedagogical expertise, often compromise effective implementation of this policy in Nicaragua (Donovan, 2015) and elsewhere (e.g., Goico, 2019). In many inclusive education scenarios, deaf children may be physically present in the classroom, but their lack of access to the communication of their teachers and classmates severely restricts their learning.

Outside of Managua, the availability and size of deaf classrooms in public elementary schools varies, as does the availability of Deaf signing teachers (Figure 1). There are 25 public schools of Special Education located in the municipalities of Managua, San Marcos, Jinotepe, Diriamba, Nuevo Amanecer Community (Diriamba), Masaya, Granada, Rivas, León, La Paz Centro, Chinandega, Chichigalpa, El Viejo, Corinto, Boaco, Juigalpa, Matagalpa, Jinotega, Estelí, La Trinidad, Condega, Ocotal, Somoto, Bluefields and Bilwi. As is the case in many schools serving typically hearing children, the school day lasts approximately 3.5 hours. In recent years, Deaf signing teachers have increasingly been offered paid teaching positions; however, many teachers are hearing and have only rudimentary signing skills. Javier López Gómez, the president of the National Association of the Deaf, notes that some of these programs only offer education through third grade (La Prensa, 2010).

There are also currently at least five private schools/programs that serve deaf children in Nicaragua: the Escuela Cristiana de Sordos Isaías 29:18 (the Christian Deaf School) in Managua, El Albergue in Jinotega, run by Mayflower Medical Outreach (mayflowermedical.org), the Hogar Escuela in Ciudad Darío, operated

by Catholic nuns (Hermanas de la Caridad de Santa Ana), the Ann Coyne School for the Deaf in León, and Los Pipitos in San Juan del Sur, funded by the Nicaragua Children's Foundation. A deaf education program in Ometepe is run by a sister-city project partnership with a US city (Bainbridge, WA), and there are likely other small programs. There is no centralization of information about educational or vocational programs for deaf people.

Until relatively recently, deaf education was limited to elementary school (i.e., 6th grade level). Many students would repeat grades until they were about 16 and then they would "graduate" from elementary school. Two high school programs now operate in Managua (one called Bello Horizonte). Estelí has had a secondary school program for the last few years, serving approximately 4 students per year. Another secondary program in Ciudad Darío has served approximately 25 students a year since 2012; these students come from many communities across the northern region of Nicaragua. It is common for deaf and hearing students to complete high school by attending classes all day on Saturdays for several years. The number of deaf people studying at the university level, or having completed a post-secondary degree, is now around 25. The number of deaf people pursuing post-secondary education has increased dramatically recently (mostly in Managua and Estelí); however, these students represent a very small proportion of the deaf population. (For comparison, the rate of university attendance among the hearing population is approximately 3% of the total population (Olivares, 2011).) Above the elementary school level, all classes are taught by hearing teachers in spoken Spanish, with interpretation into NSL. Access to interpreting services at the university level is difficult to achieve, and some groups of deaf students decide to pursue the same degree programs in order to minimize interpreting costs, which in many cases are paid by the students and their families. In 2010, ANSNIC had registered 20 trained interpreters nationwide (La Prensa, 2010).

The percentage of deaf people who enter programs for special education appears to be the highest in the capital city of Managua, where the school for the deaf is relatively well known. Managua's overall population is approximately 970,000, with a school-age population (ages 5–14 years) of 190,718 (World Factbook, 2019). The World Health Organization estimates that 1.6% of children between the ages of 0 and 15 years in Latin America and the Caribbean have disabling hearing loss (WHO, 2018). This rate would translate to 3,051 deaf students of school age living just in Managua. Given that an absolute maximum of 300 deaf students attend educational programs in Managua, these estimates suggest a rate of school attendance for deaf children in an urban environment of approximately 3%. Looking at the numbers on a national level, an estimated total of 1,040 deaf children attend school in Managua and across the country. Based on a total of 1,179,703 children between the ages of 5 and 14 years across Nicaragua,

the estimated total deaf school-age population would be 18,875. These figures suggest that approximately 5% of deaf children in Nicaragua attend school. These are far smaller percentages than suggested by the census data reported for disabled people more generally (59%, according to Table 10 in JICA, 2014). Note that the lack of access to education is particularly problematic for deaf children, whose access to a sign language often depends on an educational setting in which sign language is used.

Technology and oralism

There is no national screening program aimed at identifying children with hearing loss, nor early intervention services targeting deaf children. Hearing aids, cochlear implants, and speech training are relatively infrequent due to poverty and a general lack of medical, technological, and clinical expertise (Madriz, 2009). A very small number of families have traveled to the US to receive assistive technology. International non-profit organizations often donate hearing aids to deaf individuals, but these are rarely used on a consistent basis: batteries die quickly and are expensive to replace; the high humidity damages delicate electronics; and speech therapy with trained professionals is scarce.

Such resources are available in a small number of locations. For example, Mayflower Medical Outreach (MMO, www.mayflowermedical.org), a US-based non-profit organization, operates modern Ear, Nose, and Throat (ENT) clinics in Jinotega and Estelí (both about 2.5 hours from Managua). This organization also operates the Albergue, a facility that provides lodging, meals, health care, and access to education in both sign and spoken language to about 25 deaf children and young adults (previously described in the Education section). They also support a permanent ENT doctor in Jinotega and an audiology technician in Jinotega and Estelí and provide continuing education for ENT doctors in Managua, Jinotega, Estelí, and surrounding areas. MMO recently began a hearing screening program for all first graders in Jinotega, and also launched an Audiometry Training and Certification Program – both of these programs are the first of their kind in the country.

Linguistic status and language activities

Nicaraguan Sign Language *(Lenguaje de Señas Nicaragüense)* is considered a "Deaf community SL" (see the introduction, this volume) because of its origins in a small number of educational and vocational institutions that served as a focal

point for interactions among deaf individuals in the mid-to-late 1970s. NSL is one of the official languages of Nicaragua. Table 1 summarizes the laws related to the rights and well-being of people with disabilities in Nicaragua (JICA, 2014). The language does not appear to be endangered, given that the number of users continues to increase, and the geographic areas in which it is used continue to expand. However, transmission of the language does depend on the institutional context of education, because of the low incidence of inherited deafness and consequently rare transmission of the language within families.

Table 1: Nicaraguan laws related to people with disabilities (especially deaf people).

Law	Year passed	Summary
Law 202	1995	Rehabilitation of people with disabilities; obligates employment equality and accessibility of media (television). However, both provisions were extremely vague and not enforced.
Law 675, *Nicaraguan Sign Language*	2009	Nicaraguan Sign Language is the official language of Deaf people in Nicaragua.
Law 763, *Rights of disabled people*	2011 (updates/ replaces Law 202)	Sign language should be the language of instruction for deaf children.

A number of institutions are concerned with the rights and well-being of the Nicaraguan Deaf community. The National Association of the Deaf, (Asociación Nacional de Sordos de Nicaragua, or ANSNIC), maintains a physical headquarters in Managua and offers NSL classes, academic support, vocational training, and interpreter training. The national disability association (Federación de Asociaciones de Personas con Discapacidad, or FECONORI http://www.feconori.org/) also advocates for disability rights more generally. Since 2010, a number of new interpreter associations have appeared in Managua; some are church-based. Manos Unidas (now known as Signs and Smiles (signsandsmiles.org)), a non-profit organization founded by the author, promotes equal access to language and education for deaf people. Current projects include development of a smartphone app, *Señas y Sonrisas* ("Signs and Smiles," Manos Unidas (2019)), to encourage literacy in NSL and Spanish among deaf individuals in Nicaragua and their families, particularly those who live in rural areas where no special education is available.

Prior research on Nicaraguan Sign Language

Judy Kegl, a linguist then based at the Massachusetts Institute of Technology (MIT), began investigating the language in 1986, made the first videorecordings in 1987, and published the first scientific report of NSL (Kegl and Iwata, 1989). Ann Senghas began to research NSL in 1989, completing her dissertation in 1995. Since then, a number of deaf and hearing researchers from many countries have led and contributed to research on NSL and related topics.

Laura Polich's book "*The Emergence of the Deaf Community in Nicaragua*" (2005) offers a historical perspective on deaf education in Nicaragua, and work by Richard Senghas and colleagues (Senghas, 1997; Senghas and Monaghan 2002) offers an anthropological view of this new deaf community. R. Senghas, A. Senghas, and Pyers (2005) characterize the earliest stages of the emergence of the community and language, and include summaries of detailed empirical work showing that the youngest signers in the community propel the language's most dramatic grammatical innovations, including introducing systematicity in the use of space in verbs (Senghas, 1995; Senghas and Coppola, 2001; Senghas, 2003).

Previous work characterizing the emergence and change in the structure of Nicaraguan Sign Language includes referential shift (Kocab et al., 2015) and the emergence of temporal language (Kocab et al., 2016). Prior work that carefully evaluates the relationship between the gestures produced by the hearing, non-signing individuals who surround the deaf community includes Senghas et al., 2004 (segmentation of manner and path) and Brentari et al., 2012 (use of handshape for grammatical contrasts). Other work has focused on the relationship between language and other cognitive abilities, for example Pyers and Senghas (2009) on mental verbs and theory of mind; Pyers et al. (2010) on spatial language and spatial reorientation; and Martin et al. (2013) on the relationship between language experience and mental rotation.

Prior research with Homesigners in Nicaragua

Examples of the linguistic structure present in Nicaraguan homesign systems include the grammatical relation of subject (Coppola and Newport 2005) and plural marking in child and adult homesigners and their hearing communication partners (Coppola et al., 2013). Coppola and Brentari (2014) offers a rare longitudinal case study of a child homesigner's use of handshape to mark grammatical distinctions. A relatively surprising finding is that even after interacting regularly over decades, homesigners and their hearing family members do not significantly share the gesture system. Carrigan and Coppola

(2017) found that signers of American Sign Language who had had no previous exposure to homesign systems in Nicaragua nevertheless scored higher than the homesigners' everyday communication partners on a task in which they had to match a homesign sentence presented in a video with an event (e.g., "a man pushes a chair").

A number of articles have both characterized aspects of the linguistic structure of adult homesign systems and further compared homesigners with successive cohorts of NSL signers in order to understand the impact of having a linguistic community on one's language development. These phenomena include: the conventionalization of lexical items (Coppola, this volume); the development of points into locatives and nominals (Coppola and Senghas, 2010); using handshape to express morphophonological and morphosyntactic contrasts (Brentari et al., 2012); contrasting arguments and predicates (Goldin-Meadow et al 2015); marking agentivity and number (Horton et al., 2015); and the noun-verb contrast (Abner et al., 2019).

References

Abner, Natasha, Molly Flaherty, Katelyn Stangl, Marie Coppola, Diane Brentari & Susan Goldin-Meadow. 2019. The noun-verb distinction in established and emergent sign systems. *Language* 95(2). 230–267.

Brentari, Diane, Marie Coppola, Laura Mazzoni & Susan Goldin-Meadow. 2012. When does a system become phonological? Handshape production in gesturers, signers, and homesigners. *Natural Language & Linguistic Theory* 30(1). 1–31.

Carrigan, Emily & Marie Coppola. 2017. Successful communication does not drive language development: Evidence from adult homesign. *Cognition* 158. 10–27.

Coppola, Marie & Elissa L. Newport. 2005. Grammatical subjects in home sign: Abstract linguistic structure in adult primary gesture systems without linguistic input. *Proceedings of the National Academy of Sciences* 102(52). 19249.

Coppola, Marie, Elizabet Spaepen & Susan Goldin-Meadow. 2013. Communicating about number without a language model: Number devices in homesign grammar. *Cognitive Psychology* 67. 1–25.

Coppola, Marie & Diane Brentari. 2014. From iconic handshapes to grammatical contrasts: Longitudinal evidence from a child homesigner. *Frontiers in Psychology* 5. 830.

Coppola, Marie. 2020. Gestures, homesign, sign language: Cultural and social factors driving lexical conventionalization. In Olivier LeGuen, Marie Coppola & Josefina Safar (eds.), *Emerging Sign Languages of the Americas* (Sign Language Typology 9). Berlin: DeGruyter.

Coppola, Marie & Ann Senghas. 2010. Deixis in an emerging sign language. In Diane Brentari (ed.), *Sign Languages: A Cambridge language survey,* 543–569. Cambridge, UK: Cambridge University Press.

Cummins, Jim. 2006. The relationship between American Sign Language proficiency and English academic development: A review of the research. Paper presented at the conference Challenges, Opportunities, and Choices in Educating Minority Group Students, Norway. October.

Donovan, Mona. 2015. Los Pipitos: A stepping stone to inclusive education in Nicaragua. *Childhood Education* 91(1). 54–56.

Eberhard, David M., Gary F. Simons & Charles D. Fennig (eds.). 2019. *Ethnologue: Languages of the World.* Twenty-second edition. Dallas, Texas: SIL International. http://www.ethnologue.com (accessed December 1, 2019).

Gagne, Deanna L. 2017. With a little help from my friends: The contribution of a peer language network on the conventionalization of space in an emerging language. Storrs, CT: University of Connecticut dissertation.

Gagne, Deanna L. & Marie Coppola. 2020. Sign language literacy in emerging language communities: The impact of social, political and educational resources. In Susan Easterbrooks & Hannah Dostal (eds.), *The Oxford Handbook of Deaf Studies in Literacy.* Oxford: Oxford University Press.

Goico, Sara Alida. 2019. The impact of "inclusive" education on the language of deaf youth in Iquitos, Peru. *Sign Language Studies* 19(3). 348–374.

Goldin-Meadow, Susan, Diane Brentari, Marie Coppola, Laura Horton & Ann Senghas. 2015. Watching language grow in the manual modality: Nominals, predicates, and handshapes. *Cognition* 136. 381–395.

Horton, Laura, Susan Goldin-Meadow, Marie Coppola, Ann Senghas & Diane Brentari. 2015. Forging a morphological system out of two dimensions: Agentivity and number. *Open Linguistics* 1(1). 596–613.

Japan International Cooperation Agency (JICA). 2014, January 21. *Estudio de diagnóstico del sector de las personas con discapacidad en la república de Nicaragua* [Diagnostic study of the sector of people with disabilities in the Republic of Nicaragua]. https://www.jica.go.jp/nicaragua/espanol/office/others/c8h0vm000001q4bc-att/ESTUDIO_DISCAPACIDAD.pdf (accessed December 1, 2016).

Kegl, Judy & Gayle A. Iwata. 1989. Lenguaje de Signos Nicaragüense: A pidgin sheds light on the "creole?" ASL. In Robert Carlson, Scott DeLancey, Spike Gildea, Doris Payne & Anju Saxena (eds.), *Proceedings of the Fourth Annual Meeting of the Pacific Linguistics Conference,* 266–294. Eugene: University of Oregon, Department of Linguistics.

Kegl, Judy, Ann Senghas, Marie Coppola. 1999. Creation through contact: Sign language emergence and sign language change in Nicaragua. In Michel DeGraff, (ed.), *Language creation and language change: Creolization, diachrony, and development*, 179–237. Cambridge: MIT Press.

Kocab, Annemarie, Jennie Pyers & Ann Senghas. 2015. Referential shift in Nicaraguan Sign Language: A transition from lexical to spatial devices. *Frontiers in Psychology* 5. 1540.

Kocab, Annemarie, Ann Senghas & Jesse Snedeker. 2016. The emergence of temporal language in Nicaraguan Sign Language. *Cognition* 156. 147–163.

La Prensa. 2010. http://www.laprensa.com.ni/2010/10/10/suplemento/la-prensa-domingo/1112681–2988 (accessed May 2019).

Madriz, Juan J. 2000. Hearing impairment in Latin America: An inventory of limited options and resources. *Audiology* 39(4). 212–220.

Manos Unidas. 2019. Señas y Sonrisas [Signs and Smiles] (1.0.0) [Mobile application software]. https://play.google.com/store/apps/details?id=com.manosunidas.senasdesentido&hl=en_US (accessed December, 2019).

Martin, Amber, Ann Senghas & Jennie Pyers. 2013. Age of acquisition effects on mental rotation: evidence from Nicaraguan Sign Language. In Sarah Baiz, Nora Goldman & Rachel Hawkes (eds.), *BUCLD 37: Proceedings of the 37th Boston University Conference on Language Development,* 241–250. Somerville, MA: Cascadilla Press.

Nicaragua Population. 2019-08-28. http://worldpopulationreview.com/countries/nicaragua/ (accessed October 12, 2019).

Olivares, Carlos. 2011. La educación superior en Nicaragua [Higher education in Nicaragua]. *Revista Innovación Educativa [Journal of Educational Innovation],* 11(57). 91–97.

Polich, Laura. 2005. *The emergence of the Deaf community in Nicaragua: With sign language you can learn so much*. Washington, DC: Gallaudet University Press.

Pyers, Jennie E. & Ann Senghas. 2009. Language promotes false-belief understanding: Evidence from learners of a new sign language. *Psychological Science* 20(7). 805–812.

Pyers, Jennie E., Anna Shusterman, Ann Senghas, Elizabeth Spelke & Karen Emmorey. 2010. Evidence from an emerging sign language reveals that language supports spatial cognition. *Proceedings of the National Academy of Sciences* 107(27). 12116–12120.

Saunders, James E., Sharon Vaz, John H. Greinwald, James Lai, Leonor Morin & Karen Mojica. 2007. Prevalence and etiology of hearing loss in rural Nicaraguan children. *The Laryngoscope* 117(3). 387–398.

Senghas, Ann. 1995. Children's contribution to the birth of Nicaraguan Sign Language. Cambridge, MA: Massachusetts Institute of Technology dissertation.

Senghas, Ann. 2003. Intergenerational influence and ontogenetic development in the emergence of spatial grammar in Nicaraguan Sign Language. *Cognitive Development* 18. 511–531.

Senghas, Ann & Marie Coppola. 2001. Children creating language: How Nicaraguan Sign Language acquired a spatial grammar. *Psychological Science* 12(4). 323–328.

Senghas, Ann, Sotaro Kita & Aslı Özyürek. 2004. Children creating core properties of language: Evidence from an emerging sign language in Nicaragua. *Science* 305(5691).1779–1782.

Senghas, Richard J. 1997. An "unspeakable, unwriteable" language: Deaf identity, language & personhood among the first cohorts of Nicaraguan signers. Rochester, NY: University of Rochester dissertation.

Senghas, Richard J. & Leila Monaghan. 2002. Signs of their times: Deaf communities and the culture of language. *Annual Review of Anthropology* 31. 69–97.

Senghas, Richard J., Ann Senghas & Jennie E. Pyers. 2005. The emergence of Nicaraguan Sign Language: Questions of development, acquisition, and evolution. In Sue Taylor Parker, Jonas Langer & Constance Milbrath (eds.), *Biology and knowledge revisited: From neurogenesis to psychogenesis,* 287–306. New York: Routledge.

The World Factbook. 2019. Washington, DC: Central Intelligence Agency. https://www.cia.gov/library/publications/the-world-factbook/index.html (accessed October 1, 2019).

World Health Organization. 2018. WHO global estimates on prevalence of hearing loss. https://www.who.int/deafness/estimates/en/ (accessed December 1, 2018).

Language Index

https://doi.org/10.1515/9781501504884-016

Subject Index

https://doi.org/10.1515/9781501504884-017