Research Article

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BSL signers combine different semiotic strategies to negate clauses

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Abstract: Signers of Deaf community signed languages negate clauses via manual negating signs and/or non-manual movements such as headshakes. Several claims about the dominance of manual versus non-manual negation across signed languages have been made, mostly based on survey responses and elicited data. Here, we describe how clause negation was signalled in 420 clauses identified in dyadic conversations between 40 deaf signers of British Sign Language (BSL) documented in the BSL Corpus. Signers tended to use between two and three strategies to negate clauses, typically including one or more manual negating signs. Clause negation signalled via headshakes most often co-occurred with manual negating signs, mouthings of English negating forms, and/or conventionalised mouth gestures. Headshake-only clause negation was rare. Overall, corpus data suggests that BSL signers prefer to combine manual and non-manual strategies, especially headshakes and mouthings of English negating forms, when signalling clause negation. The exact manifestation depends on both discourse-pragmatic factors and socio-demographic factors such as region, age group, and BSL teaching experience. This investigation demonstrates how signed language corpus studies can further our understanding of signed language variation and linguistic diversity, while also supporting applied linguistic contexts such as language teaching.

Keywords: corpus, gesture, multimodal, negation, sign language, variation

1 Introduction

Why do languages differ? What factors constrain the conventionalisation of form and meaning between signers and speakers of different languages? There are many possible grammatical and social factors, all of which are central to our understanding of language variation and linguistic diversity (LaPolla 2003). Many linguistic studies, especially typological studies, depend on reference grammars of spoken languages based on elicited data from small numbers of speakers. Comparably fewer studies have focussed on Deaf community signed languages, and even fewer using corpus data that is both representative of large numbers or groups of signed language users, and reflect everyday language variation and use (see McEnery and Hardie 2012, Meyerhoff and Klaere 2017, Fenlon and Hochgesang 2022). There is an increasing consideration of corpus-based investigations of minority spoken languages (e.g. Schnell and Barth 2018, Barth 2019, Calude et al. 2019) and variationist approaches to linguistic typology (Heller et al. 2017, Seifart et al. 2018, Cacoullos and Travis 2019, Palfreyman 2019). However, to our

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knowledge, there is only one typological study to date that includes both spoken and signed language corpus data and accounts for both individual and language variation within minority language contexts (Barth et al. 2021).

The study of deaf community signed languages has much to offer for the question of why languages differ: signed languages are minority languages, and signers make extensive use of visible and/or tactile communicative resources instead of speech. The inclusion of signed languages in language description and comparison thus encourages the application of comparative concepts that are 'modality-agnostic' and not constrained to specific forms such as those in spoken language (Dingemanse 2019; see also Haspelmath 2010, Croft 2016). This forces us to consider how different people combine multimodal strategies during all kinds of face-to-face interactions (Clark 1996, Kendon 2004, Ferrara and Hodge 2018, see also Vigliocco et al. 2014). Multimodal strategies are often coordinated into composite utterances that 'signal' various acts of meaning (Clark 1996, Enfield 2009). For example, a parent asking a negative question might use conventionalised speech or manual forms while also gesturing with their hands and shaking their head: "You don't wanna play peek-a-boo?" with rising intonation and headshake (Fusaro et al. 2014, 243). Signals are simply "the acts by which one person means something for another" (Clark 1996, 155). This terminology is useful because it avoids making assumptions about which acts of meaning are 'linguistic' or not, which is an ongoing debate in the signed language linguistics literature (e.g. Lillo-Martin and Meier 2011, Schembri et al. 2018). Instead, any and all meaningful actions can be analysed in terms of their composite signalling properties (Ferrara and Hodge 2018).

In addition to seeing language as inherently multimodal, we also take a broadly usage-based approach, seeing grammar and usage as inextricably intertwined in the study of British Sign Language (BSL) negation. We are using conversational corpus data to explore language as a "dynamic system of emergent categories and flexible constraints" (Diessel 2019, 51). As such, we do not seek to make generalisations about whether particular features are obligatory or not (Section 2). Instead, we are interested in how manual and non-manual signals are combined as part of a dynamic network of lexical, grammatical, and pragmatic elements. In such a network, interpretation of various signals may be compositional (each signal contributing in an additive way to the overall meaning) and/or Gestalt-like (where the whole is more than the sum of its parts) (Pleyer et al. 2024, Trujillo and Holler 2024). As do a growing number of other usage-based linguists (Geeraerts and Kristiansen 2019), we draw on approaches from variationist sociolinguistics to ensure that sociolinguistic factors are included in our understanding of language as a dynamic system.

This article deals with the functional domain of clause negation: how BSL signers negate clauses using manual signs and/or non-manual forms such as headshakes and English mouthings, and what these patterns of clause negation say about variation in BSL and other signed languages. We adopt the definition of clause negation proposed by Payne (1985), who defines it as the type of negation that is used in main clauses, minimally consisting of a single predicate with as few noun phrases and adverbial modifiers as possible. We describe how clause negation is signalled during dyadic conversations between forty deaf BSL signers from four regions in England.

The first objective is to use BSL corpus data to describe how a specific cohort of deaf signers – deaf people who learned BSL from birth or before age seven – negate clauses within naturalistic conversations. As BSL signers frequently use English mouthings when they sign, either with or without manual BSL signs (Proctor and Cormier 2022), this study also analyses the role that English mouthings play in clause negation. This enables us to explore signed language negation as an example of the multimodality and semiotic diversity of face-to-face communication, while also describing what these signers do (Kendon 2004, Enfield 2009, Hodge et al. 2019). The second objective is to compare similarities and/or differences between clause negation in BSL and Auslan, a closely related signed language of Australia, both of which are characterised by extensive individual and sociolinguistic variation (e.g. Schembri et al. 2010, Stamp et al. 2014).

Overall, we find that BSL signers most commonly combine different manual and non-manual strategies for negating clauses, creating 'composite utterances' of different semiotic resources (Enfield 2009). These are primarily manual signs, headshakes, and English mouthings. We also find that these BSL signers signal clause negation in very similar ways to a comparable cohort of deaf Auslan signers, in that headshake-only negation is rare (Johnston 2018). When headshake-only negation does occur, this generally mirrors what hearing speakers of the ambient spoken language English also do, such as pointing to a visible referent while shaking one's head. Together, these corpus studies indicate that the semiotic coordination of clause negation in BSL and Auslan is best explained by discourse-pragmatic and socio-ecological factors. These findings advance our

understanding of how these two closely related signed languages differ beyond documented lexical differences (e.g. McKee and Kennedy 2000). They also offer some important implications for understanding language variation and linguistic diversity more generally.

2 Clause negation in signed and spoken language use

2.1 How clause negation is signalled in Deaf community signed languages

Zeshan (2004) was the first to investigate the typology of negation in signed languages on a large scale. She investigated clause negation in 38 different signed languages, drawing mostly on traditional typological survey methods (see also Zeshan 2006). On the basis of this data, Zeshan (2006) proposed a binary typology of clause negation (Table 1). This typology categorised languages as having either 'manual dominant' or 'non-manual dominant' negation. This categorisation depends on the obligatoriness of manual versus non-manual negating forms, the choice of particular manual versus non-manual negating forms, and the scope of non-manual negation. Under this typology, 'manual dominant' signed languages primarily signal negation via manual conventional signs, while 'non-manual dominant' signed languages primarily signal negation via non-manual actions (usually head movements) during the production of the negated constituent. Zeshan (2006) also recognised that many signed languages use both manual and non-manual strategies for signalling negation, and that some signed languages may be 'mixed systems' with no dominance either way. However, most of the signed languages in her typology were classified in a categorical fashion as 'non-manual dominant,' including BSL and Auslan.

Zeshan's (2004, 2006) pioneering work has been hugely influential. Investigations of clause negation in signed languages have continued to centre on the obligatoriness of manual and/or non-manual forms, particularly headshakes, including proposed revisions of Zeshan's typology (e.g. Makaroğlu 2021). For example, investigations of NGT (Nederlandse Gebarentaal, Dutch Sign Language) found that headshaking has grammaticalised into a marker of negation in NGT (e.g. Pfau 2015, Oomen and Pfau 2017). These claims are based on formal and syntactic factors: (1) the obligatoriness of headshakes, in that headshakes must occur and thus can be the only element that marks negation in a clause; and (2) syntactic patterns relating to the spreading of headshakes across a sentence, such as the temporal alignment of negating headshakes with a manual negation sign, and syntactic constraints on how and where negating headshake movements spread across manually negated clauses. Due to the primacy of headshakes in 120 negated clauses identified from 1.5 h of dialogues from 22 signers documented in the Corpus NGT (Crasborn et al. 2008), Oomen and Pfau (2017) stated that clause negation in NGT is 'non manual-dominant'. However, they also observed considerable variation in their dataset, such as when and where negating headshakes are used within the clause.

Johnston (2018) also explored the application of Zeshan's (2004, 2006) typology to Auslan, also using a corpus-based methodology, but with a much larger dataset. Johnston analysed 1,672 clauses from ~25 h of data

Table 1: Characteristics of non-manual dominant versus manual-dominant negation (Zeshan 2006)

Non-manual dominant systems of negation	Manual dominant systems of negation
Non-manual negation is obligatory	Non-manual negation is not obligatory
Clause can be negated non-manually only; a manual basic clause negator is optional	Clause cannot be negated non-manually only, manual negator is required
Choice of non-manual marking does not depend on manual signs	Choice of non-manual marking depends on the choice of manual clause negator (if there is more than one manual configuration)
Non-manual negation spreads freely over the phrase or clause	Scope of the non-manual negation is over the manual negator only or is closely tied to the manual negator
Zeshan (2006) claims BSL, Auslan, ASL (American Sign Language), DGS (German Sign Language), and LSC (Catalan Sign Language) are examples of signed languages with non-manual dominant systems for signalling negation	Zeshan (2006) claims TİD (Turkish Sign Language), LIS (Italian Sign Language), HKSL (Hong Kong Sign Language) are examples of signed languages with manual dominant systems for signalling negation

from a range of text types in the Auslan Corpus (Johnston 2008). He found that Auslan signers most frequently use conventionalised manual signs to signal negation, often also with non-manual movements such as headshakes, and occasionally some negating mouth gestures that are co-extensive with specific manual signs. Examples include the sign HAVE-NOT that often co-occurs with a 'boo' /bu/ mouth gesture in naturalistic contexts, or negative facial expressions that communicate rejection or displeasure (Johnston 2008, 211).[1] Even though the Auslan dataset highlighted the important role of headshakes for signalling clause negation in Auslan, Johnston found it is extremely rare for Auslan signers to rely on headshaking alone to negate clauses: only three tokens out of a dataset of 600 negated clauses were unequivocally headshake-only negated clauses (Johnston 2018, 211). Most headshakes occurred with conventionalised manual negating signs and/or mouth gestures.

On the basis of this rich corpus data, Johnston concluded that Auslan cannot be described as 'non-manual dominant' using Zeshan's criteria, even though headshakes are present in the overwhelming majority of negated clauses (cf. Table 1 and the characteristic of a form being 'obligatory'). While it might appear that Auslan is instead primarily manual dominant for negation, Johnston also cautioned that there is still not enough naturalistic data on multiple different signed languages to make a strong typological claim either way. For this reason, we will not be revisiting Zeshan's manual/non-manual dominant typology in the remainder of this article, but will instead focus on how clause negation is signalled in BSL and how it compares to clause negation in other signed languages.

Palfreyman (2019) investigated clause negation in BISINDO (Bahasa Isyarat Indonesia, Indonesian Sign Language) using 804 examples identified in 180 min of spontaneous data from 37 participants. He found that BISINDO is manual dominant, with headshake serving a primarily reinforcing function. However, as with the NGT studies, Palfreyman also noted considerable variation in signers' use of manual and non-manual negation that was not recognised in earlier typological studies based on elicited and judgement data. He went much further in observing how BISINDO signers use mouthings borrowed from the ambient spoken languages, sometimes also instead of a signed negation predicate (Palfreyman 2019, 204). Furthermore, BISINDO showed evidence of variation due to signer's region, with some use of different manual negators in the Solo versus Makassar varieties, and age, with older signers favouring negative particles and younger signers favouring negative suppletives. This data enabled Palfreyman to consider specific sociolinguistic reasons for variation in signers' choices of specific negating signs and/or mouthings, especially related to the use of enactment in BISINDO.

In addition to the presence or absence of manual and non-manual negating forms, the position of negating signs and the spread of non-manual headshakes is important for teasing apart the grammatical factors influencing clause negation in these signed languages. Oomen and Pfau (2017) found that more than half of the manually negated clauses in NGT included manual negating signs at the end of the clause, which is consistent with clause negation in spoken Dutch. Johnston (2018) found that in more than half of the negated clauses in his dataset, the manual negating sign occurred before the predicate. As English speakers also often use negating forms before predicates, he noted this could be due to influence from the ambient spoken language English, and preverbal negation is also likely the most common typological pattern (Van der Auwera and Krasnoukhova 2020). Yet, unlike English, some of the Auslan manual negating signs were used after the predicate. Palfreyman (2019) also identified a preference for post-predicate manual negation marking in BISINDO, which distinguishes it from the ambient spoken languages in each case.

Regarding the spread of headshakes within clauses, Oomen and Pfau (2017) identified that a frequent pattern in NGT was for headshakes to begin with a manual negating sign or verb (whichever comes first) and then continue to the end of the clause (see also Klomp et al. In press). Johnston (2018) also found that in clauses with manual negating signs, over half of these contained headshakes throughout the entire clause. Yet he attributed this to the fact that most of the clauses in the corpus data were very short. In the remaining negated

1 https://auslan.org.au/dictionary/words/have%20(not%20have)-1.html Specific manual signs are referenced here using an ID gloss in small capital letters. An ID gloss is an English gloss that is used to uniquely identify a sign in its citation form or its morphological and/or phonological variants (Johnston 2010). Each ID gloss links to a citation form documented in the Auslan Signbank or BSL Signbank along with English keywords. ID glosses are used to assist machine-readability of manual forms annotated in signed language corpora.

clauses, a range of different headshake spreads were observed: (a) starting from manual negating sign and spreading to the end of the clause; (b) co-occurring with manual negating sign only; (c) co-occurring with predicate only; (d) starting from manual negating sign and spreading onto object; (e) starting from manual negating sign and spreading onto subject; and (f) starting from manual negating sign and spreading onto repeated manual negating signs later in the clause. In contrast, Palfreyman (2019) and Chizhikova and Kimmelman (2022) found it was relatively rare for headshakes to spread beyond the negative particle or predicate in BISINDO and Russian Sign Language, respectively.

Lutzenberger (2017) used corpus data to study clause negation in Kata Kolok, a shared community signed language used in Bali, Indonesia. She also observed much variability in the spreading behaviour of headshake used for clause negation. A later study of Kata Kolok identified a considerable increase in the use of spreading by younger signers, which led the researchers to suggest possible grammaticalisation pathways for negation-related headshakes (Lutzenberger et al. 2022). Thus, recent studies of several unrelated signed languages have found that manual negating signs are used in a range of pre- and post-predicate positions within negated clauses. They have also identified a range of different headshake patterns, many of which may be due to factors other than language contact.

Previous studies considered the role of these manual and headshake negation markers in terms of grammar and pragmatics. Palfreyman (2019) identified variation in the use of headshake in BISINDO conditioned by grammatical function: basic clause negation or the use of a negative modal tended to co-occur with headshakes more often in this data than with negative imperatives or existentials. He also found that irregular negative marking (irregular negators have no morphological relationship to their positive counterpart) was less likely to occur with headshake than regular marking. Johnston (2018) observed that pragmatic factors are also important for understanding signers' use of headshake in Auslan. Headshakes often have functions in addition to signalling negation. Examples include signalling pragmatic negative appraisal for the co-occurring clause, or negating an unstated or implied proposition or assumption, or occurring as part of a question/response frame where the response is negative. The scope or spreading of headshakes in negated clauses in Auslan also appeared to be related to pragmatic and/or semantic factors, rather than syntactic constraints. These observations were also reflected in studies by Kuder et al. (2018) on clause negation in PJM (Polish Sign Language), and Puupponen (2019) on head movements in Finnish Sign Language (FinSL). However, the fact that headshaking can be plurifunctional was not considered in most earlier studies related to clause negation typology.

In Greek Sign Language and Turkish Sign Language (Türk İşaret Dili or TİD), headshake is used to mark negation alongside the backwards head tilt (e.g. Antzakas 2006, Makaroğlu 2021). In a study of TİD corpus data, Makaroğlu (2021) found that the most frequent strategies involved a combination of a manual negator with a backwards head tilt (sometimes with additional non-manual features). This accounted for just over 50% of the TİD 1,249 negated sentences in the dataset, while combinations of manual negators with headshake represented under 5% of all tokens. Overall, Makaroğlu (2021) found that the use of strategies involving only manual negation (at 3.5% of all tokens) or non-manual marking only (at 13.9%) was relatively infrequent, and that composite strategies predominated in the TİD data. In relation to the infrequent nonmanual negation marking in the TİD data, both Gökgöz (2011) and Makaroğlu (2021) suggest that brow raise can also work as an independent non-manual negator in TİD.

While head movements very often signal negation in signed languages, mouth actions are also frequently observed in negating clauses. There are two main types of mouth actions: (1) mouthings of ambient spoken language forms, e.g. English, German, Dutch, Polish; and (2) mouth gestures not based on any spoken language forms (Johnston et al. 2016). For example, as in Auslan, one common mouth gesture in BSL is a downturned mouth action with pursed lips. Sutton-Spence and Woll (1999) observed that this 'downturned mouth' gesture may signal clause negation in BSL, as well as more conventionalised mouth gestures such as 'boo' that often accompany the manual negating sign NOT-HAVE.[2]

A downturned mouth gesture is also used to signal clause negation in other signed languages. For example, this mouth gesture may be produced with a headshake and/or with a manual negating sign in Jordanian Sign Language (Hendriks 2007). Arrotéia (2005, writing in Portuguese and cited in Quer 2012) argued that a downturned mouth or rounded 'O-like mouth gesture' is an obligatory marker of clause negation in Libras (Brazilian Sign Language). In contrast, headshakes are reported to be optional for negation in Libras. Another negating mouth gesture that has been described is 'puffed cheeks' used by signers of TİD as the sole

2 https://bslsignbank.ucl.ac.uk/dictionary/words/not%20have-1.html.

signal of clause negation, occurring with no other manual or non-manual forms (Zeshan 2003). However, Zeshan notes that this construction is marginal within TİD.

These studies illustrate that signers of many different signed languages draw on mouth gestures and ambient spoken language mouthings to signal clause negation. Yet the use of spoken language mouthings to negate clauses has only occasionally been acknowledged or analysed in the literature (Bisnath 2024). One notable exception is Palfreyman (2019), who demonstrated how mouthings play an integral role in the system of negation in BISINDO. Some linguists have also noted instances where these mouthings are used to signal negation without any manual negating form. For example, Meir (2004) noticed that signers of Israeli Sign Language may mouth the Hebrew word *lo*, meaning 'no' or 'not' while also producing negating headshakes. Johnston (2018) also identified a very small number of negated clauses where Auslan signers used English mouthing to signal negation without any corresponding manual form, while also producing negating headshakes. He did not identify any examples of clauses negated with only English mouthing and without headshake in this dataset, although this may be due to the methods used (Section 4.3). While it is certainly possible for this cohort of Auslan signers to rely only on English mouthings to negate clauses, it is perhaps more likely to be seen in other signers, such as those who have learned Auslan as an additional language after acquiring English.

2.2 How clause negation is signalled in face-to-face spoken language use

Clause negation may also be constrained by the signalling methods and semiotic resources available within specific interactions (Clark 1996, 186). For example, when two people are speaking over the telephone, they are also not visible to each other, which means any visible actions that are produced are not seen by the other person. Conversely, when two deaf people are signing face-to-face, there are many more possibilities available to use – and potentially conventionalise – any and all visible and/or tactile actions (Johnston 1996). Some strategies for grammatical pathways to clause negation may be specific to signed languages and/or shared by speakers engaging in co-present, multimodal interaction. It is an empirical question whether various patterns of clause negation are the same or different across co-present signed and spoken language contexts, as is determining the broader explanations for this variation and what these might say about human language and communication overall.

Spoken language typology research suggests that multiple marking of negation is well-attested across the world's spoken languages, although relatively uncommon (Bond 2012, Dryer 2013), but few typological studies have investigated speech as a multimodal phenomenon. We know that hearing non-signers also use both manual gestures and headshakes when expressing negation (Kendon 2004, Bressem and Müller 2014, Antas and Gembalczyk 2017, Inbar and Shor 2019). Harrison (2010, 2014) showed that headshakes and manual negation gestures (e.g. Open Hand Prone) often co-occur with negation in English, and the production of headshakes and manual negation gestures often corresponds to the scope of negation in the spoken utterance. Other kinds of manual negating gestures used by hearing non-signing speakers have also been observed, such as the emblematic gesture REFUSE that appears in many West African countries (in which the elbows move towards the body, hitting the sides), and used by speakers to reject or refuse what is contextually available (Martins et al. 2019). This same gesture has been reported as used by signers of Adamorobe Sign Language in Ghana, which suggests its genesis may have been in the ambient spoken language ecology (Nyst 2007, 183).

Similar observations have been made about links between negating forms in non-signers' gestures and deaf people's signing practices in Indonesia (Palfreyman 2019). In addition, Andrén (2014) showed that the development of headshake in hearing Swedish children progresses in a coordinated way with the acquisition of negation in spoken Swedish. However, direct comparison of manual and non-manual negation signalling used by signers and non-signing speakers is only just beginning (see e.g. Harrison 2019 on a comparison of French speakers and LSF signers). We do not yet know much about what similarities or differences there might be to help answer questions about the grammaticalisation of headshake and how syntactic and pragmatic functions might influence signers and speakers' choices.

3 Research questions

In this article, we focus on negation in BSL, which is closely related to Auslan, New Zealand Sign Language and more distantly to other signed languages used in some former British colonies and thus shaped by British colonialism (Johnston and Schembri 2007). BSL and Auslan are mutually intelligible and overlap considerably lexically, but less is known about how they compare grammatically (McKee and Kennedy 2000). Our main research question is to ask how deaf signers who have learned BSL from birth or during early childhood (i.e. before age seven) signal clause negation using manual and non-manual strategies. Manual negating forms include conventionalised manual BSL signs such as regular negator NOT or irregular forms CANNOT and HAVE-NOT.[3] Non-manual negating forms include headshakes and mouthings of English forms such as *no*, *nothing*, and *cannot*, or mouth gestures such as 'downturned mouth' and 'boo'. We also investigate the position of manual negating forms within negated clauses and the scope of headshakes used to signal clause negation. Finally, we consider whether any social factors influence individual signers' expression of clause negation in BSL, such as their age, gender, region, family background (i.e. whether their parents were deaf or hearing), their age of BSL acquisition, and BSL teaching experience.

4 Method

4.1 BSL Corpus data and study participants

Our analysis is based on approximately 5.5 h of dyadic pre-arranged free conversation between 40 deaf signers documented in the BSL Corpus (Schembri et al. 2013).[4] All dyads recruited in the BSL Corpus were friends or acquainted with each other. Participants were balanced for gender (20 women, 20 men) and four regions in England (10 for each of the four cities Birmingham, Bristol, London, Manchester). Participants were on average 47.8 years old at the time of recording (SD = 17.8 years, 17–77 years). Most participants are right-hand-dominant signers (n = 37). Only three signers are left-hand dominant. There are 24 participants (60%) who come from hearing families, while 16 come from families with at least one deaf parent (40%). Those from deaf families learned BSL from birth, while most of those from hearing families reported learning BSL before age seven. Two signers reported learning BSL between the ages of 8 and 12 (LN25 and BL22). The majority of participants identified as White (n = 36, 90%), with three participants identifying as Black and one participant identifying as South Asian. We also considered if participants had experience teaching BSL at the time of filming: 10 out of the 40 signers had experience teaching BSL (25%), as opposed to 12 who had no experience teaching BSL (30%). We have no information about whether any of the remaining 18 signers did or did not teach BSL (45%). A total of 504 tokens of negation, including both clause negation and constituent negation, were annotated in this dataset. As we are using conversation data, tokens of clause negation are unequally distributed across participants, ranging from a minimum of 2 tokens per participant to a maximum of 26 tokens per participant (M = 12.6).

4.2 Representation in the BSL Corpus and current study

Before proceeding further, we want to acknowledge some issues with the representation of deaf signers in the BSL Corpus as a whole, and the current study in particular. It is important to note that a corpus can rarely, if

3 https://bslsignbank.ucl.ac.uk/dictionary/words/no-1.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/nothing-3.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/nothing-2.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/cannot-1.html.

4 Conversation topics were spontaneous and not pre-planned, but the filming sessions were pre-arranged, which means that the interactions documented in the BSL Corpus were not as fully spontaneous as they might be in everyday life.

ever, claim to be entirely balanced and representative: it can only be described in terms of how it is balanced and representative (Gries 2009). The BSL Corpus was initially designed to document eight major urban varieties of BSL as used by deaf people who learned the language from their parents and/or peers as young children growing up in the United Kingdom, i.e. cohorts of deaf signers traditionally described as 'native and near-native' signers (Schembri et al. 2014). Thus, regional representation was limited in each country, and data from only four regions in England form the focus of this study. The 10% figure mentioned above, representing Black, South Asian, and other ethnic minorities within this cohort, was based on 2001 Census of England and Wales data used to plan participant demographics for the BSL Corpus in 2008 (Office for National Statistics 2006). The main focus was on varieties of BSL used by deaf signers who experienced relatively uninterrupted signed language acquisition during early childhood, and who therefore represent language conventions transmitted across multiple generations of signing peoples (Johnston 2004). In addition, the categories provided for participants to choose on the background questionnaire for gender were only male and female.

This obviously does not capture the full range of signing peoples who use BSL in the United Kingdom, including communities outside the eight urban cities studied, those who are non-binary or genderqueer, hearing people who acquired BSL from birth or in early childhood, deafblind signers who use tactile BSL, and deaf or hearing people who learned BSL during or after transition to adulthood, sometimes referred to as 'new signers' (De Meulder 2018). Ethnic minority representation among signers in the BSL Corpus is also lower than intended, mainly because deaf signers from Black or South Asian backgrounds could not be recruited in some locations. This at least partly reflects the fact that no deaf fieldworkers from ethnic minority backgrounds were employed during the data collection phase of the BSL Corpus project. It is clear that the 10% figure itself was too low in 2008 and should have been closer to the 20% identified in the 2011 Census (Oxford Policy Management 2015). Of course, it is also misguided to rely on percentage representation figures in the context of corpus data sampling. It is not possible, for example, that data from one deaf South Asian signer can be representative of all deaf people from South Asian backgrounds who grew up using BSL in the United Kingdom.

4.3 Annotation of BSL Corpus data

Data consist of one ELAN file for each signer in the dyadic conversation. The ELAN software enables precise time alignment of annotations with the corresponding video sources on multiple user-specifiable tiers (Crasborn and Sloetjes 2008; ELAN 2017). Approximately 500 manual signs in each file had previously been tokenised and assigned ID-glosses, along with free translations into English (Fenlon et al. 2015; see Johnston 2010 for more information about ID-glossing). The same files (n = 40) were enriched with annotations for the current study.

In the first instance, we created a clause and other relevant annotations for approximately 500 manual signs in each file. Clauses, more actually described as 'clause-like units' (CLUs) were created based on the guidelines outlined in Johnston 2024 (p. 57–8). That is, "the basic articulatory chunks of propositional meaning in the corpus are called clause-like units (CLUs) rather than clauses in recognition of the dual 'tell' or 'show' strategy exploited by Auslan signers" (p. 57–8). By labelling these units as 'clause-like', we draw attention to the provisional nature of the unit, as any CLU could be an instance of 'telling', or 'showing', or both (see also Ferrara and Johnston 2014, Hodge and Johnston 2014). CLUs are delineated by both form and function: form includes both manual and non-manual delivery, including non-manual prosody, speed, body shifts, and pauses, whereas function includes the overall conceptual meaning of both individually and as composite utterances. Each file, therefore, contains n clause annotations necessary to parse the initial 500 tokens of manual signs.

The shortest clip is 03:03 minutes long; the longest clip is 20:31 minutes long. The mean duration across video clips is 08:09 minutes. These durations vary due to the conversational nature of the discourse. Signers were encouraged to discuss whatever topic they wanted to discuss, for however long they wanted, up to around 30 min. Signers covered a broad range of topics in their conversations, including their experiences

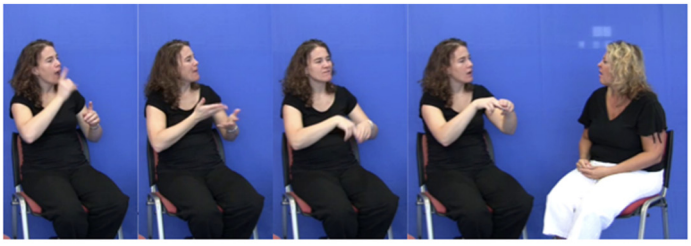
growing up deaf, their relationships with parents and teachers, their working life, Deaf clubs and other organisations, Deaf sports, childhood and travel memories, and other events that were current during 2008–2010, when the BSL Corpus was documented. For example, attending the 2005 Melbourne Deaflympics (a major event in modern deaf history), the social effects of the 2007–2008 global financial crisis (referred to as 'credit crunch' in the United Kingdom), and the 2008 BBC drama *House of Saddam* (then available with closed captions on BBC iPlayer).

Annotation of the BSL Corpus data for negation was based on guidelines developed for the Auslan Corpus (Johnston 2010) and documented in the Auslan Corpus Annotation Guidelines (Johnston 2024). It was first necessary to identify all tokens of clause negation in the BSL conversations selected for this study. Each ELAN file was viewed multiple times by at least two annotators, including the first author and the research assistant, Maxwell Barber, a Deaf lifelong signer of BSL. The author of the 2018 Auslan study, Trevor Johnston, also checked and re-analysed a proportion of these tokens (Section 4.4). All instances of negation were identified.

This process resulted in identification of three general categories of negation data: (1) tokens of clause negation (e.g. 'he can't play in the finals', Example 1); (2) tokens of clauses with a negated constituent, i.e. non-clausal constituent negation (e.g. 'I will pay them no interest', see Example 2 where English mouthing 'no' along with manual negator NO suggests constituent negation is the most appropriate analysis); and (3) tokens of clauses that were analysed as 'indefinite', where it was not possible to definitively analyse a token as either clause negation or constituent negation (e.g. 'there is no work for them' versus 'they don't work anymore', see Example 3).[5]

With the third category, the token in question could be either clause or constituent negation, and there was not enough signalling or contextual information to decide either way. As Johnston (2018, 75) explains, "Some [clauses] can be analysed in two ways, with each appearing equally plausible. When it appears impossible to make a decision one way or another…the label Indefinite is applied to the core constituents or to the [clause]." Example 3 illustrates one instance of this indefiniteness: (1) there are no morphological modifications to clarify whether WORK is functioning as a noun or verb here; and (2) the previous clauses do not clarify this situation.

(1) BM22 talking to BM21 about her brother not being able to play in the football finals at the Melbourne Deaflympics in 2005.



Head	headshake———————————		
Hand	CANNOT	PLAY	FINALS
Mouth	*he can't*	*play*	*finals*
Translation	*He can't play in the finals.*		

BM22F36WDC: 02:30.269-02:31.454

5 Each example from the BSL Corpus is shown as a series of stills from the video along with a simplified version of four main ELAN tiers: Head (for head movements), Hand (for contextual English glosses for manual signs), Mouth (for any mouth actions including English mouthings and mouth gestures), and Translation (an English translation). Under this is the participant code followed by the start and end time code. Data are available at http://bslcorpusproject.org/cava.

(2) LN23 joking with LN24 about paying no interest on a hypothetical loan.

	headshake———			
PT:PRO1SG	PAY	NO	INTEREST	PT:PRO1SG
	pay	*no*	*interest*	

I will pay them no interest.

LN23M33WDC: 05:08.449-05:10.359

(3) BL03 talking to BL04 about either (a) the lack of work or (b) that people do not work.

Head			headshake———
Hand	PT:PRO3POSS	WORK	PALM-UP
Mouth		work	
Translation	*There is no work for them. / They don't work anymore.*		

BL03F70WHC: 04:56.945-04:58.255

Tokens from each category where the annotator was not confident about the identification of token negation were tagged with a question mark symbol. This annotation process ensured that all instances of clause negation evidenced within the conversations in the study dataset were identified and included, and none were cherry-picked or arbitrarily excluded, in keeping with the variationist principle of accountability (e.g. Tagliamonte 2006). It also means that in our statistical analysis, we could focus on those tokens that are confidently identified, all of which have been revised by more than one annotator, and some of which have also been checked and/or compared with another annotator. As all tokens of both clause and constituent negation were produced freely during open conversation discourse, the total number of tokens of negation identified provides a fairly accurate indication of the proportion of clause negation within the conversations documented in the BSL Corpus.

It is important to note that the Auslan negation study used more targeted corpus methods to identify tokens of clause negation, which involved searching for specific manual negating forms and also English translations of the Auslan, among other methods (Johnston 2018, 199–204). This is different from the approach taken for our BSL Corpus negation study, whereby any and all tokens of negation identified within the first 500 signs of an ELAN file were annotated (Fenlon et al. 2015). The BSL Corpus study numbers are also skewed in other ways, such as by using only dyadic conversations and not, e.g. narrative retellings or other genres in the BSL Corpus. Table 2 describes the function of the ELAN tiers used to enrich tokens of clause negation with information relating to our research questions. The main unit of analysis is the CLU composite (i.e. clause-like unit composite, cf. clause matrix), annotated on the CLU composite tier. These annotations identify utterances as either independently stand-alone or linked to neighbouring utterances via hypotactic relations of

Table 2: Tiers annotated to describe clause negation in BSL

Tier	Tier function
CLU composite	Identifies the full duration of clause-like composite utterances, and whether a CLU is stand-alone or hypotactically linked to other CLUs as part of a clause matrix of embeddedness and/or dependency (see also Johnston 2024, 100 and Table 4 for more details)
CLU	Identifies a stretch of signing as a clause-like composite utterance (CLU) and contains metadata information to facilitate unique identification of CLUs (refer to Johnston 2024, 57–8 for more details)
Negation	Identifies a CLU as containing some form of negation, either: (i) clause negation, (ii) constituent negation, or (iii) indefinite analysis. Uncertainly identified tokens of (i), (ii), or (iii) are suffixed with a question-mark symbol
N-manual	Identifies the negation signalling as done by single, multiple, or no manual signs
N-position	Identifies the position of a manual negating sign within a negated clause, e.g. pre-predicate, post-predicate (non-reprise), reprise (clause final)
N-function	Identifies the discourse function of a negated clause, e.g. neg/declarative (negates a CLU), neg/response (negative response to an assertion or assumption within a CLU), neg/reprise (repetition of manual negating sign after the verb or other core constituent), neg/imperative (negated imperative CLU), neg/alternative (negated clause presents a contrast or alternative proposition)
N-non-manual	Identifies the negation signalling as done with or without non-manual expression, e.g. head movements, English mouthing
N-head movements	Identifies all head movements (i.e. head shaking and nodding) relating to the expression of negation. Head tilts were not observed or annotated
Grammatical class	Identifies the grammatical class of manual negating signs
Mouthing	Identifies any negating English mouthings within the negated clause
Mouth gesture	Identifies any negating mouth gestures used within the negated clause, e.g. actions such as downturned mouth, and more conventionalised gestures such as ‘boo’, ‘shh’, etc.

dependency (but not parataxis). Eyebrow movements were not annotated for this study as they were observed to not be relevant to clause negation during the initial annotation stages.

4.4 Comparability of annotations in the BSL Corpus

It is important to check if other annotators agree or disagree with the annotations created to investigate clause negation, more as an assessment of how annotations stabilise over time to represent a broad consensus, rather than as a form of ‘validation’ (Johnston 2018, Hodge and Crasborn 2022). Early on in the project, ~100 BSL clause negation annotations were checked by the author of the Auslan study, Trevor Johnston. This was done to ensure the BSL Corpus data could be directly compared with the Auslan Corpus data. Of these, 14% were re-analysed as tokens of constituent negation or merely a negating response to a signer’s question, and hence not tokens of true clause negation. All tokens of BSL clause negation were then revised accordingly during several more annotation passes. Any tokens where annotators disagreed or were uncertain about the analysis were annotated as uncertain. Much later in the project, a remaining subset of ~10 indefinite tokens were checked by the third author, who agreed that at least more than one analysis was possible for each token. One outcome of this process was greater confidence in our overall analysis of clause negation, and fewer uncertain cases in the final results presented here. Henceforth, when counts of uncertain cases are very low for particular categories in the sections below, they are omitted from the data visualisations for ease of presentation.

4.5 Statistical analysis

All analyses were conducted with R version 3.6.1 (R Core Group 2020). The ‘tidyverse’ package version 1.3.0 (Wickham et al. 2019) was used for data carpentry and plotting. The ‘gridExtra’ package version 2.3 (Baptiste

2017) was used for creating multi-plot arrays. The 'lsr' package version 0.5 was used to compute Cramer's *V* effect size statistic (Navarro 2015). Scripts, data, tables, and figures are available in the following Open Science Framework repository: https://osf.io/snvdh/.

5 Results

Here, we describe how 40 deaf BSL signers documented in the BSL Corpus signal clause negation using manual and non-manual forms of expression. Section 2.1 framed the main issues at stake, which these empirical data can shed light on. As this study is primarily exploratory and descriptive of the factors we think may be relevant to variation in clause negation in BSL, rather than confirmatory hypothesis testing, we do not offer any predictions. In this section, we first present the aggregate results for single clauses collapsed across signers. This is followed by a brief discussion of complex clause utterances (cf. clause matrix, clause dependency, and hypotaxis), to confirm that the findings for single clauses are replicated in more complex clause structures, and are therefore generalisable across the BSL dataset, regardless of clause type. We then discuss individual variation, including the impact of various sociolinguistic factors. As we establish that clause type is not a factor influencing signers' signalling of clause negation, all clause tokens are lumped together in the following discussion, to ensure maximum tokens for data analysis.

5.1 Types of negations in the BSL Corpus dataset

As explained in Section 4.3, we distinguished between three overall types of negations in the corpus data: (1) negated clauses, (2) constituent negation, and (3) indefinite negation. Table 3 summarises the overall distribution of negation tokens identified in the BSL conversations analysed here. Out of the 504 tokens, only 25 tokens (5%) were uncertainly identified as some kind of negation. In other words, the annotators thought there was some negating quality, but they were unsure about it, usually due to structural and/or semantic ambiguity within the BSL signing (refer to Neukom-Hermann 2016 for examples of how structural ambiguity with negation is treated in English and German). The overwhelming majority of tokens that were coded with confidence were negated clauses (n = 420, 87%), with many fewer tokens of constituent negation (n = 56, 11%), and even fewer indefinite negations (n = 8, 2%).

5.2 Types of negated clauses in the BSL Corpus dataset

Table 4 summarises the overall distribution of confidently annotated tokens of clause negation in the BSL Corpus dataset (n = 420). In this dataset, clause negation was primarily signalled via single, stand-alone clause

Table 3: Types of negations in the BSL Corpus dataset and whether they have been confidently or uncertainly identified during the annotation process

Negation type	Confident	Uncertain	Total (*n*)	Total (%)
Clause negation	420	20	440	87.3
Constituent negation	51	5	56	11.1
Indefinite	8	0	8	1.6
Total (*n*)	479	25	504	100.0
Total (%)	95.0	5.0	100.0	

Table 4: Types of negated clauses certainly identified in the BSL Corpus dataset (excluding all uncertain analyses)

Clause type	Definition	Total (*n*)	%
Single	Stand-alone clause utterance, e.g. 'He can't play in the finals' (Example 1)	322	77
Depend	Clause-like utterances linked via dependency, e.g. 'If there's no money, they can't finish it and will lose everything' (Example 4)	30	7
Embed	Clause-like utterances linked via embedding, e.g. 'I didn't know she was standing behind me speaking for me' (Example 5)	22	5
Shared Echo	Clause-like utterances that reprise all or part of an utterance signed by another person, e.g. 'Not at all' (see third composite utterance in Example 6)	11	3
Combination	Clause-like utterances linked via both embedding and dependency, e.g. 'She said, It's up to you, but you won't catch anything' (Example 8)	11	3
Total		420	100

utterances, i.e. tokens of single clauses that were identified with confidence (n = 322). There were many fewer cases of certainly identified complex or shared clauses (n = 74). Analysis of complex clause tokens, such as Examples 4 to 8, also revealed that the patterns of negation realisation for single clauses are more or less the same (see Section 5.9). In the following sections, we focus on single negated clauses that were identified with confidence (n = 322), such as Example 1.

(4) BL08 explaining to BL07 what will happen if the construction industry goes bust.

Head		headshake———		———————	
Hand	FS:IF	NOTHING	CANNOT	PALM-UP	GONE
Mouth	*if*	THH	*well*	DOWNTURNED	
Translation	*If there is no money, they can't finish it and will lose everything.*				
	BL08M26WDC: 07:23.058-07:25.168				

(5) LN04 telling LN03 about a hearing friend who was learning to sign.

Head	headshake———————			
Hand	PT:PRO1SG	KNOW-NOT	PT:PRO1SG	SPEAK PT:PRO3SG
Mouth	*I*	*didn't know*	*she*	*speaking-behind-me*
Translation	*I didn't know she was behind me speaking for me.*			
	LN04F41WHC: 07:58.834-07:59.424			

(6) LN24 asking LN23 about the possibility of transferring annual leave days into the next year.

Head	headshake———		
Hand	CAN-NOT	TRANSFER	CANNOT
Mouth	*can't*	*transfer*	*can't*
Translation	*They can't transfer it to the next year?*		

LN24M31BHC: 01:49.920-01:51.6

	headshake———	
	NO-WAY	NO-WAY
	no	
	No, they are not allowed.	*Not at all!*
	LN23M33WDC: 01:52.444-01:52.994	LN24M31BHC: 01:51.610-1:52.510

(7) BM05 narrating to BM06 how Saddam Hussein coerced Aḥmad Ḥasan al-Bakr into stepping down from the Iraq presidency prior to the 1979 Ba'ath Party Purge.

Head	headshake———	
Hand	STOP	PT:PRO2SG
Mouth		*if*
Translation	*"If you don't do that…"*	

	nod———		
PT:PRO1SG	THING	GO-AROUND	HAVE
me	*something*	*concealed*	*have*

"…I've got something on you."

BM05M52WHC: 02:52.215-02:52.525

(8) LN03 narrating to LN04 advice from her boss on not needing to use plastic gloves.

Head	no headshake		
Hand	SAY	UP	PT:PRO2SG
Mouth	DOWNTURNED	*up to*	*you*
Translation	*She said, "it's up to you…"*		

headshake			
PALM-UP	SHRUG	NOTHING	CATCH
but	DOWNTURNED	*nothing*	

"…but you know, you won't catch anything."

LN03F47WDC: 05:16.758-05:17.193

5.3 Discourse contexts of single negated clauses

A range of discourse contexts of negated clause tokens were annotated, which enabled us to quantify the discourse environments (i.e. syntactic and pragmatic contexts) in which these tokens were observed (Table 2). Most of the 322 tokens of single negated clauses were used for declaratives, with a total of 170 tokens (53%). The second most frequent function was response, with a total of 115 cases (36%). There were many fewer tokens of interrogatives (n = 15, 5%), reprises (n = 12, 4%), imperatives (n = 7, 2%), or alternatives (n = 3, 1%). Figure 1 shows the proportion of functions for single negated clauses.

5.4 Manual and non-manual signalling of clause negation

In this section, we look at the manual and non-manual forms of expression used to signal clause negation in these clauses. Due to the small number of interrogatives and imperatives in our dataset, we have not analysed them separately from declaratives here. Figure 2 shows the proportions of the manual and non-manual negating forms identified in single negated clauses. Looking at Figure 2a, among those clauses with negation, most tokens involved signalling negation with one manual form (n = 196, 61%), while approximately one-third of all tokens involved no manual negating form at all (n = 89, 28%). A smaller number of tokens (n = 37, 11%) included multiple manual forms, either repetitions of preceding forms or multiple different forms. In total, 72% of all single negated clauses with manual negation involved either one or two manual negating forms (n = 233). As shown in Figure 2b, almost all tokens of clause negation involved one or more instances of non-manual signalling of negation (n = 314, 98%), with only 8 cases (2%) not using any non-manual signalling. Forms of non-manual negation include head movements, English mouthing, and mouth gestures.

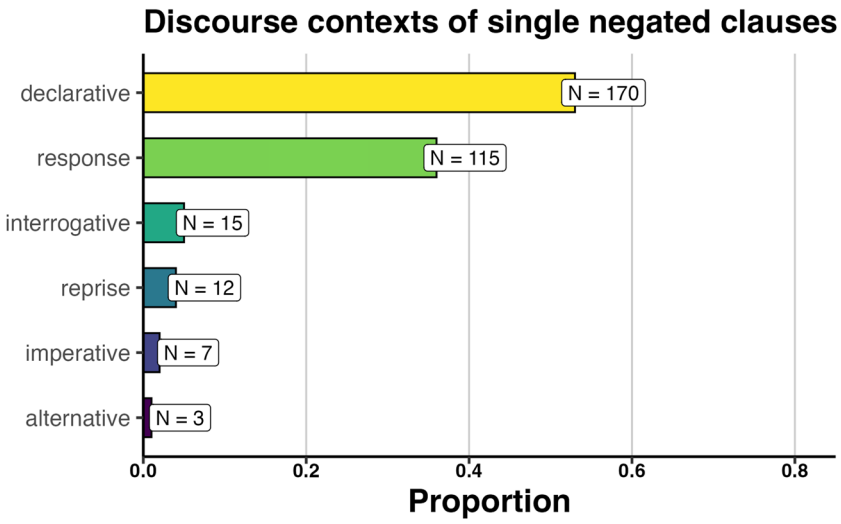


Figure 1: Proportion of discourse contexts for single negated clauses (*n* = 322).

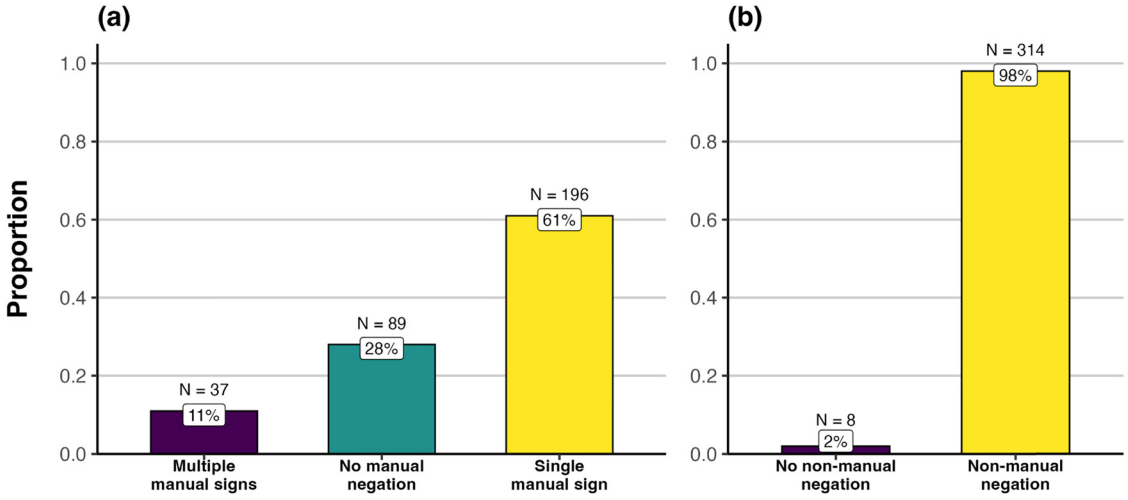


Figure 2: Proportions: (a) manual negation (with or without co-occurring non-manual negation) and (b) non-manual negation (with or without co-occurring manual negation) used in single negated clauses.

The manual negation forms include both regular negative particles such as NOT, NOTHING, and irregular lexical signs which incorporate negation, such as KNOW-NOT, CAN-NOT, and NOT-YET.[6] Slightly over 57% (*n* = 132) of all single negated clauses involved regular manual negation marking, while 35% (*n* = 82) were irregular manual negation (the remaining 19% mostly represent tokens with multiple negators that were a mix of regular and irregular forms). As has been found for BISINDO (Palfreyman 2019), the 82 cases of irregular negation had proportionally less use of headshakes (*n* = 62, 76%) than the 119 cases of regular negation (*n* = 119, 90%).

6 https://bslsignbank.ucl.ac.uk/dictionary/words/not-2.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/nothing-3.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/don't%20know-1.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/cannot-1.html.
https://bslsignbank.ucl.ac.uk/dictionary/words/not%20yet-1.html.

Table 5: Position of manual signs used in single negated clauses

Position	Total (*n*)	Percentage
Other (Example 9)	126	54
Pre-predicate (Example 1)	43	18
Post-predicate (non-reprise and clause-final; Example 10)	33	14
Reprise (clause-final; first utterance of Example 6)	21	9
Reprise (non-clause-final; Example 11)	6	3
Post-predicate (non-reprise; Example 12)	4	2
Total	233	100

We did not carry out further detailed analysis of the different sub-classes of modals (e.g. CAN-NOT versus WILL-NOT) or regular negation particles and irregular lexical signs that incorporate negation. The aim of this study was to use corpus data to describe how clause negation is signalled manually and non-manually in BSL. We therefore grouped manual negators together, because we are interested in overall patterns of combination. The main issue with splitting the data further into smaller categories, such as different types of modals, is that the data becomes increasingly sparse, and conclusions would end up being much more speculative, and hard to generalise, especially if certain subcategories occur only a few times with a few signers, or in a few contexts. Such work would require a substantially larger dataset, and this study is just a first broad brush look at negation in BSL, which can set the stage for future work.

Regarding the position of manual signs used in these negated clauses, Table 5 shows that 18% (*n* = 43) included clauses where the negating sign occurred before the predicate (i.e. 'pre-predicate' position). These seem to follow the pattern of English negative modal contractions (e.g. *can't*, *won't*) and also co-occur with corresponding English mouthing. Other negating manual signs occurred after the main predicate: 16% (*n* = 37) occurred once or the first time after the predicate and sometimes also in clause-final position (i.e. 'post-predicate non-reprise' and 'post-predicate non-reprise and clause-final' positions), and 12% (*n* = 27) occurred after the predicate as reprise/repeat of a previous manual negator (i.e. 'reprise clause-final' and 'reprise non-clause-final' positions). Over half (*n* = 126) included single-predicate utterances where the predicate itself incorporated negation, and utterances with multiple negation signs in an order that did not fit one of the other categories. This possibly reflects the naturalistic genre of these dyadic conversations, during which short clause utterances are frequently used.

(9) BL09 telling BL10 she does not know why her school had no interpreters.

Head	headshake————————————	
Hand	KNOW-NOT	WHY
Mouth	*don't know*	*why*
Translation	*I don't know why.*	

BL09F45WHC: 08:48.669-08:49.537

(10) LN06 tells LN05 that when she first arrived at school, she did not know how to sign.

Head	no headshake———		———headshake———	
Hand	PT:PRO1SG	ARRIVE	SIGN	NOTHING
Mouth		*arrive*	*sign*	*nothing*
Translation	*I started school not knowing how to sign.*			
	LN06F44WHC: 07:45.496-07:48.101			

(11) MC24 telling MC23 they could not find an interpreter for their travel guide in Egypt.

Head	headshake———				
Hand	PALM-UP	CAN-NOT	FS:GET	ONE	INTERPRETER
Mouth	DOWNTURNED	*can't*	*get*	*one*	*interpreter*
Translation	*Well no, we couldn't get one interpreter,*				

headshake———			
CAN-NOT	FS:GET	ONE	PALM-UP
can't	*get*	*one*	DOWNTURNED
we couldn't get one so…			
MC24F64WHC: 01:21.423-01:24.374			

(12) BL09 tells BL10 how she teaches hearing parents to communicate with their deaf child.

Head		headshake——
Hand	TAP	NO-WAY
Mouth		*no*
Translation	*Don't tap deaf children on the head to get their attention.*	
	BL09F45WHC: 02:33.512-02:34.380	

5.5 Use of English mouthing and/or mouth gestures to signal negation

Figure 3 shows the proportion of English mouthing and mouth gestures used to signal negation in single clauses. Overall, it was very common for signers to mouth English negating forms, with a high number of tokens (n = 167, 52%) involving English mouthings of single words. There were also a few tokens (n = 28, 9%) involving multiple English mouthings, e.g. multi-word phrases. There were, however, also 127 tokens that did not involve any English mouthing expressing negation at all (n = 127, 39%). Many different English mouthings related to negation were used. Looking at the tokens that involve mouthings of single words, the most frequent English mouthings are 'not' (n = 48, 29%), followed by 'don't' (n = 35, 21%), 'can't' (n = 21, 13%), 'no' (n = 19, 11%), and 'nothing' (n = 18, 11%). The other 26 tokens included 'never', 'won't, 'didn't, 'doesn't', 'couldn't', 'haven't', and 'shouldn't'.

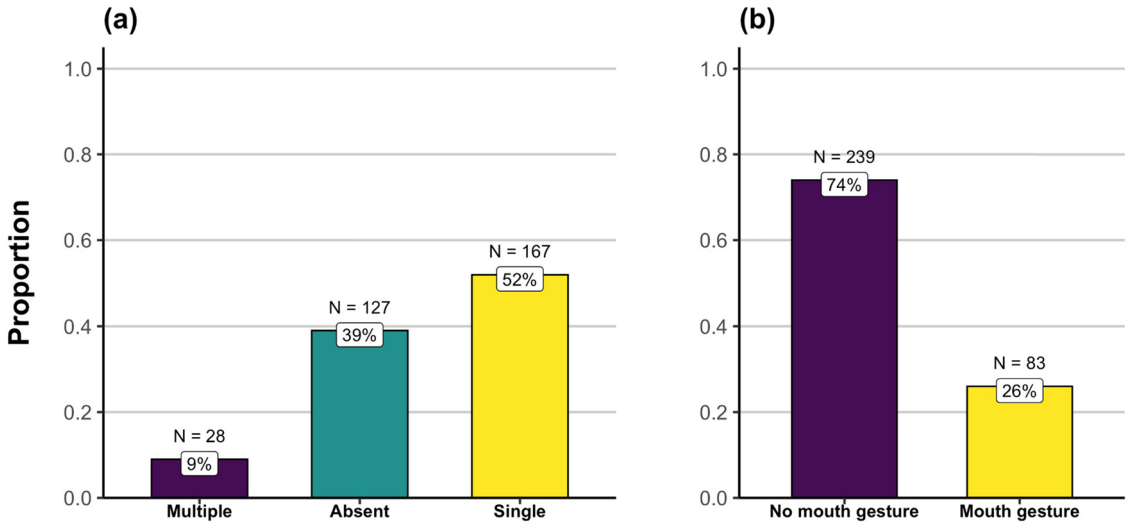


Figure 3: Proportions of (a) English mouthing expressing negation and (b) mouth gestures expressing negation used in single negated clauses.

While mouthed English negating forms were common in negated clauses, only 26% of all clause tokens included mouth gestures that signalled negation (n = 83). Most negated clauses did not contain negation-related mouth gestures (n = 239, 74%). If they did contain negating mouth gestures, the most common one was a single 'downturned mouth' (n = 53, 64%). The next frequent mouth gesture was a single 'boo' (n = 9, 11%) co-occurring with the manual sign NOT-HAVE, and a single 'shh' (n = 4, 5%) co-occurring with the manual sign NOT-YET. The mouth gestures 'boo' and 'shh' only co-occur with manual signs (single or multiple) in our data, never on their

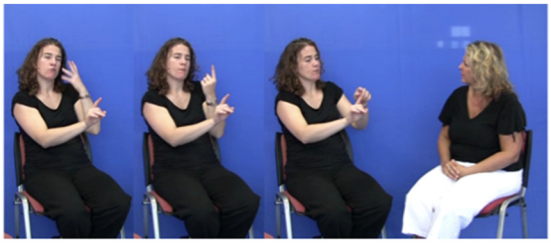
own. In contrast, the 'downturned mouth' gesture co-occurs with manual signs in 38 cases (72%) and without manual signs in 15 cases (28%). Although it is possible for both English mouthings and mouth gestures to occur sequentially within a single negated clause, they are mutually exclusive actions. There were only 11 tokens of negated clauses containing both mouthings and mouth gestures sequentially (see Example 13).

(13) BM10 explaining to BM09 that the construction industry no longer wants to hire deaf apprentices.

Head	headshake————————————————		
Hand	PT:PRO3SG	WANT-NOT	
Mouth	DOWNTURNED	*don't want*	DOWNTURNED
Translation	*No, they don't want them.*		
	BM10M67WDNC: 06:47.960-06:48.870		

Johnston (2018) observed that the Auslan signers in his dataset do not use English mouthing as the only form of negation in a clause. We also checked if this BSL dataset contains negated clauses that signal negation via English mouthing only, with no manual negator and/or co-occurring headshake. There are only five tokens of single clauses and one token of a complex clause where the signer relied solely on English mouthing to signal negation (Example 14).[7] As clause negation expressed via mouth actions was so often signalled via mouthing of English negating forms, rather than mouth gestures, it appears that English mouthing is the most frequent type of mouth action for signalling negation for these BSL signers, typically in combination with other manual/non-manual strategies for negating clauses.

(14) BM22 tells BM21 she cannot remember who the flag bearer was for Great Britain at the 2005 Deaflympics in Melbourne



Head	no head shake		
Hand	REMEMBER	WHO	PT:PRO3SG
Mouth	*can't remember who*		
Translation	*I can't remember who that person was.*		
	BM22F36WDC: 02:30.269-02:31.454		

7 It is possible the manual PALM-UP in Example 11 could be considered to have a negating function. Indeed, this gesture has been noted as having a potentially negating function for both signers and non-signers (Cooperrider et al. 2018). However, we think this is not the case in Example 11, following Arnold (2019) who found a range of functions of PALM-UP in the BSL Corpus including a modal function that indicates uncertainty. The close relationship between uncertainty/modality and negation (e.g. Byloo 2010) may be what explains the use of PALM-UP here.

5.6 Use of head movements to signal negation

Figure 4a shows the type and proportion of head movements used to signal negation in single clauses.[8] Overall, most single negated clauses also involved some type of head movement (n = 279, 87%) as opposed to negated clauses without head movements (n = 40, 13%). Different types of headshakes were used to signal negation, including continuous headshakes, a single short headshake, as well as a sequential combination of headshake with no headshake (Figure 4b).

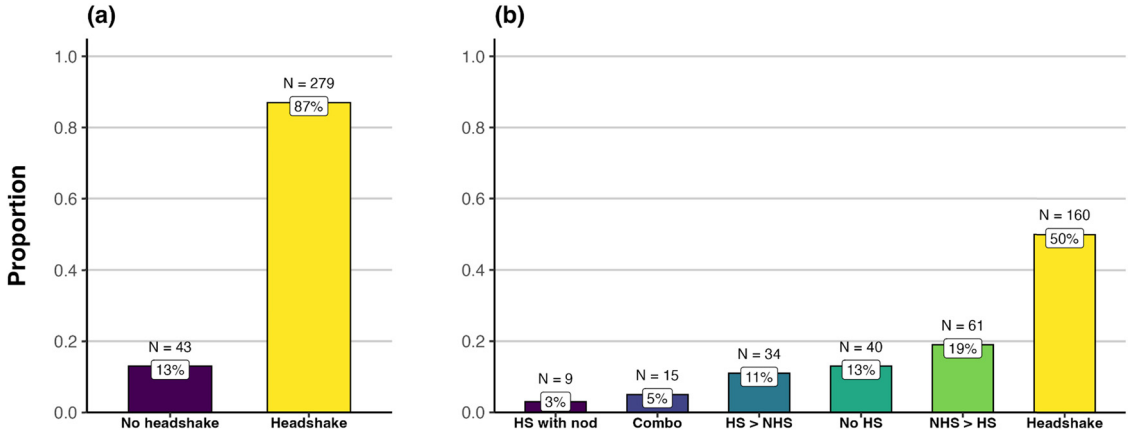


Figure 4: (a) Presence of headshake and (b) type of headshake.

5.7 Scope of headshakes in negated clauses

Figure 4b shows that most tokens of clause negation involve just one single headshake or multiple headshakes (n = 160, 50%, Example 1). The second most common type was to have no headshake followed by a headshake within a single clause (n = 61, 19%, column 'NHS > HS' in Figure 4b and Example 10). In other words, these headshakes did not occur during the entire clause, only the negated parts. The third-most common type involved no head movement whatsoever (n = 40, 13%, Example 15). There were a few cases of headshakes followed by no headshake (n = 34, 11%, column 'HS > NHS' in Figure 4b, Example 16) or more complex contours of headshakes and no headshakes within the clause (n = 15, 5%, Example 17). Very few cases involve combinations of headshakes with nods performing non-negating functions (n = 9, 3%).

The scope of headshakes observed for BSL broadly mirrors those observed for Auslan (Johnston 2018): (a) headshake on whole clause, with manual negator at the end of clause; (b) headshake only on manual negator; (c) headshake only on predicate; (d) headshake spread onto object; (e) headshake spread only subject; and (f) headshake spread onto repeated manual negator. As with Auslan, the fact that the spread of headshake during negated clauses co-occurs with a range of different syntactic constituent types suggests it is not constrained by specific syntactic constructions.

8 There were three cases that only included a head nod, e.g. Example 18. We excluded these marginal cases from our analyses of head movements, since upon further inspection, the head nods were deemed as not relevant to the non-manual signalling of negation.

(15) BL07 talks to BL08 about parenting teenage children.

Head	no head shake				
Hand	CANNOT	HAVE	PERFECT	CHILD	PALM-UP
Mouth	*can't*	*have*	*a perfect*	*child*	
Translation	*You can't have a perfect child, you know?*				
	BL07F35WDC: 04:05.455-04:08.985				

(16) LN24 tells LN23 he does not want to take too much time off work.

Head	headshake———	no headshake———	
Hand	PT:PRO1SG	DISAPPEAR	WORK
Mouth	*don't want*	*miss*	*job*
Translation	*I don't want to miss much work.*		
	LN24M31BHC: 01:08.715-01:09.680		

(17) BM14 tells BM13 she cannot remember the name of the eldest daughter of an acquaintance.

Head	headshake———	no hs———	headshake———		
Hand	PT:LBUOY	FIRST	REMEMBER	NAME	PALM-UP
Mouth		*first*	*can't remember*	*name*	*DOWNTURNED*
Translation	*I can't remember the eldest child's name.*				
	BM14F36WHC: 01:39.008-01:40.358				

(18) MC22 tells MC21 she agrees that a chairlift is not suitable for her husband due to vertigo.

Head	nod———	
Hand	NOT	AGREE
Mouth	*not*	*suitable*
Translation	*I agree it's not suitable for him.*	
	MC22F67WHNC: 13:03.157-13:04.367	

5.8 Combining multiple strategies to signal clause negation

Figure 5 shows the number of strategies used to signal negation in single clauses. Most tokens of single clause negation involved both manual and non-manual signals, such as English mouthings, mouth gestures, and headshakes. In other words, clause negation was usually expressed using more than one form of signalling. In this section, we report the use of sole versus multiple strategies that were used to signal negation within clauses. For example, a negated clause signalled with both a headshake and a manual negating sign involved two strategies, as did a negated clause signalled with a headshake and English negating forms, or a headshake and negating mouth gesture (Example 19). If there were further additional signalling of negation via mouthing of English negating forms or negating mouth gestures, the number of strategies signalling clause negation rises to three or four (see Example 13).

(19) BL09 asks BL10 if her brother was an oral deaf person (i.e. a deaf person who uses spoken rather than signed communication)

Head	no headshake———		———headshake———	
Hand	PT:POSS2SG	BROTHER	ORAL	PT:PRO3SG
Mouth		*brother*	*DOWNTURNED*	
Translation	*Your brother wasn't an oral deaf person, was he?*			
	BL09F45WHC: 05:59.401-06:01.686			

Figure 5 shows how many negations are involved in one, two, three, or four signalling strategies. Most tokens of single negated clauses involved more than one signalling strategy (n = 280, 87%), with only 42 cases (13%) involving only one signalling strategy. The most common pattern was clause negation signalled via three strategies (n = 174, 54%). Most tokens involving three strategies were a combination of manual sign, English mouthing, and headshake (n = 120, see Example 12), or a combination of manual sign, mouth gesture, and headshake (n = 50, see Example 20). These are the two most common patterns for signalling clause negation in the BSL data analysed here. There were fewer single negated clauses involving only two strategies (n = 99,

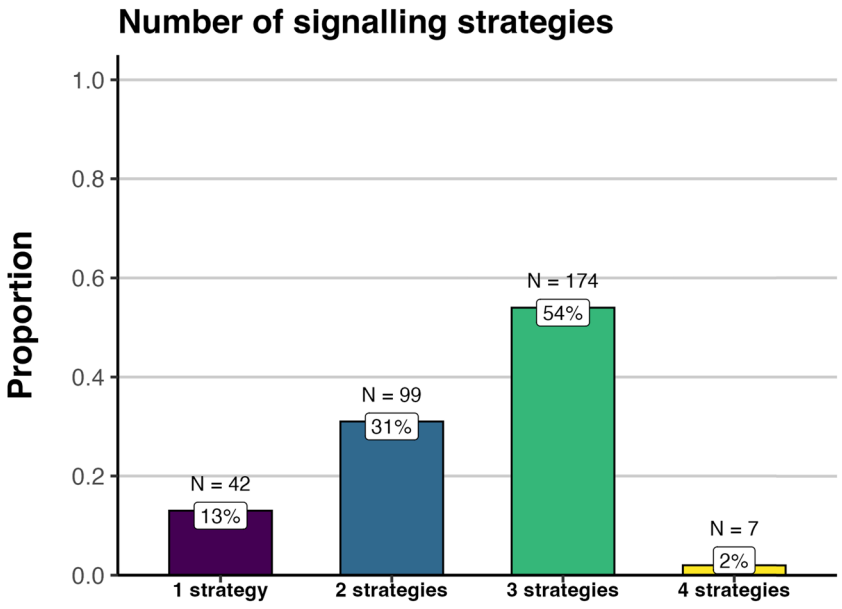


Figure 5: Number of strategies used to signal clause negation.

31%). When two strategies were used, signers often produced a combination of English mouthing and headshake, without an associated manual sign (n = 34). Alternatively, they produced a manual sign with English mouthing, but no headshake (n = 25), or a manual sign with headshake but no negating mouth action (n = 18). Fewer cases involved negating mouth gestures with a headshake (n = 15) or mouth gestures with a manual sign (n = 7). As mentioned above, cases with one strategy are quite uncommon (n = 42, 13%), such as those signalled exclusively via one manual sign (n = 5) or one English mouthing (n = 5). The least common number of strategies was tokens with four strategies (n = 7, 2%).

(20) BL21 checking with BL22 about the chronology of UK deaf theatre companies.

5.9 Signalling negation in complex clauses

In this section, we present results for complex clauses that signal negation (n = 63), i.e. clauses that are not stand-alone single clauses, nor clauses that are shared by two signers (Table 4). First, we assessed if there was an interaction between single versus complex clauses for any of the patterns reported above. This was done using Cramer's V, an effect size statistic for contingency tables. A large Cramer's V value indicates that there was an interaction between the variable in question (e.g. presence/absence of headshakes) and the distinction

between single and complex clauses. As a rough heuristic, a Cramer's *V* value of 0.10 indicates a 'small' effect size; a value of 0.30 indicates a 'medium' effect size; and a value of 0.5 indicates a 'large' effect size.[9]

We computed Cramer's *V* separately for all contingency tables, which tabulate the respective variable in question (e.g. presence/absence of headshakes) against whether the clause was single or complex. Cramer's *V* was generally below 0.10 for all form features, with the largest effect size being 0.13 for mouthing (still a relatively small difference). For mouthing, a look at Pearson standardised residuals (which measure the over- or under-representation of particular cells)[10] reveals that single mouthings are more common for complex clauses (+2.2), with an under-representation of negations without mouthing (−1.4) or multiple mouthings (−1.7). This suggests signers may rely on English mouthing to negate complex clauses slightly more than for single clauses. With the exception of mouthings, the overall negligible effect sizes indicate that all variables considered above (manual negation, non-manual negation, mouth gestures, head movements, multi-strategy count) did not show any large differences between single and complex clauses. The results reported above extend beyond clause types, and the use of specific form features is not substantially moderated by the complexity of the clause. Cramer's *V* was slightly higher for the negation function ($V = 0.18$), indicating that there were some small differences in what functions complex or single clauses participated in. A look at the standardised residuals suggests that declaratives are over-represented for complex clauses (+3.2) and under-represented for interrogatives (−1.7) and responses (−2.3).

Likewise, complex clauses signalling negation also often involved English mouthing ($n = 43$, 68%), while fewer tokens had no mouthing ($n = 19$, 30%), and only a single token containing multiple mouthings ($n = 1$, 2%). As was the case for single clauses, mouth gestures were not often used ($n = 11$, 17%). It was more common for complex clauses to contain no mouth gestures signalling negation ($n = 52$, 83%). Head movements were also a prominent feature of complex clauses signalling negation ($n = 56$, 89%), with only seven cases (11%) involving no head movements. Finally, patterns of use with respect to multiple strategies were similar, with most complex clause negations combining three strategies ($n = 38$, 60%). Fewer tokens involved two strategies ($n = 19$, 30%) or one strategy ($n = 6$, 10%). Overall, however, the results for complex clauses broadly mirror results for the single clauses, with all other patterns being similar to what was reported for single clauses above.

5.10 Exploration of individual variation in the signalling of negation

In this section, we assess the extent to which the signalling of negation shows individual variation. To assess whether the form variables are similar across signers, we looked at only those signers for whom we had at least 10 tokens, i.e. 16 signers who produced 224 negated clauses in total. This arbitrary threshold was chosen because it is hard to draw any conclusions about individual differences for participants with very few data points. Since we have shown that the pattern of results is almost indistinguishable between the single and complex clauses, we look at all clause types together here, to ensure we maximise the number of data points for each participant.

Most signers in this subset ($n = 13$) most frequently produced clause negation using a single manual sign (81%). Only 3 out of the 16 signers (19%) produced most of their clause negations without manual signs. This suggests that the pattern seen in the aggregate result described above is also consistent across signers, with only a few signers proving to be an exception to the general trend. Most signers used regular negating signs in the majority of cases ($n = 11$, 69%), with only three signers (31%) using irregular negating signs more often than regular negating signs.

9 We note that just like the aggregate percentages, Cramer's *V* does not account for the clustered nature of corpus data (e.g. multiple tokens from the same signer, or from the same region, gender, etc.) and is thus best interpreted to have heuristic value. Refer to Winter and Grice (2021) for a discussion of non-independence in corpus data.

10 We use Pearson's standardised residuals as a heuristic (Levshina 2015, 220–1). These are calculated by cross-tabulating specific form features (e.g. the presence/absence of manual signs) against specific syntactic features (in this case single versus complex clause type). Pearson's standardised residuals characterise the degree to which specific cells in a contingency table are over- or under-represented given the assumption that rows (form features) and columns (syntactic features) are independent. In using Pearson's residuals heuristically, we only report cases that are large deviations ($>|2|$), that is, deviations that exceed +2.0 ('significant' over-representations) or are below −2.0 ('significant' under-representations).

Analysis of tokens of clause negation from the 16 participants for which we have at least 10 tokens also shows that the use of non-manual signals is remarkably consistent across individuals, with all 16 signers (100%) in this subset also using non-manual strategies for signalling negation the majority of the time (on average across participants, 98%). Note that they are not using non-manual strategies exclusively: they are also using manual strategies too. There is relatively little variation across this group with respect to clause negation, i.e. this aspect of BSL grammar seems relatively consistent across this cohort of deaf BSL signers.

The use of English mouthing to signal negation showed somewhat more individual variation. Most of the 16 signers with at least 10 tokens of clause negation commonly signalled clause negation using one English mouthing (10 signers, 62%). However, there were also a few signers who usually produced clause negations without English mouthing (6 signers, 38%). These patterns are consistent with Proctor and Cormier's (2022) study on mouthing in BSL generally, which exhibited a huge range of individual variation across signers, ranging from 10 to 100% mouthing. Conversely, the absence of negation mouth gestures in the current study was remarkably consistent across individuals: for the 16 participants for whom we had at least 10 tokens, only one participant consistently produced negating mouth gestures with their clause negations (6%). The remaining 15 participants were more likely to produce clause negation without mouth gestures (94%). The presence of headshakes was consistent across individuals, with all 16 signers (100%) using a negating headshake in most cases (89% across participants).

Finally, the sequential use of multiple strategies within a clause to signal negation was also consistent across individuals: signers generally used three strategies to signal negation (n = 15, 94%), with only one using two strategies the majority of the time (6%). The fact that all of the signers with at least 10 tokens produced at least two strategies the majority of the time further shows that combining ways of communicating negation is very common in BSL.

It is important to point out that these associations must be interpreted with caution. As signers chose the specific topics they talked about, the influence of individual variation and topic can thus not be ruled out in any sociolinguistic studies with this corpus. The differences noted above could also, in part, be driven by differences in conversation topics and the personalities of different individuals and pairs, in addition to how much work signers felt they needed to do pragmatically to disambiguate the context of what they were negating.

5.11 Socio-demographic factors influencing variation

In this section, we investigate the form of negation signalled with respect to key sociodemographic variables using the same approach described above, i.e. Pearson standardised residuals as a heuristic of association between categorical variables within a contingency table. This time, the contingency tables involve associations between forms (e.g. presence of a manual sign) and sociodemographic variables (e.g. whether there was at least one deaf family member or not).[11] We do not consider ethnic background variation here due to a lack of ethnic diversity in the BSL Corpus data overall (see Section 3.2). As before, we only discuss interactions with demographic factors that exceed the heuristic threshold of $>|2|$ for the Pearson residuals. There were no patterns for gender, language background, and age of BSL acquisition that exceeded this $|2|$ threshold, so nothing on these specific variables will be reported below.

Geographic region was the most important socio-demographic factor influencing the distribution of negating forms. Signers from Manchester were much more likely to use manual signs (+3.02); signers from Bristol were much less likely to use manual signs (−2.91). This pattern was fairly consistent across individuals

11 This analysis obviously ignores individual variation, which is why we checked heuristically whether results appear to be driven by a few individuals. While one could incorporate the individual variation into a statistical model via random effects (such as in an Rbrul analysis), we opted for the simpler descriptive analysis because the dataset is massively unbalanced, with a few individuals not exhibiting much variation for a given form feature, thereby making random slopes inestimable. In this context, a linear mixed effects model without random slopes effectively nullifies the use of mixed models (Winter and Grice 2021).

from those regions. All ten Birmingham signers used manual signs most of the time; for the ten Bristol signers, the picture was more divided, with only six signers using manual negation most of the time. There were no noteworthy differences across regions with respect to the use of regular versus irregular negation (all Pearson residuals $<|2|$).

Headshakes were under-represented amongst Manchester signers (−2.60), and relatively more over-represented amongst signers from Bristol (+2.0). Across the different signers from Bristol, all had a consistently high proportion of headshakes. In contrast, Manchester signers showed much more variation in the proportion of headshakes, with only a few signers who used fewer headshakes. These results suggest that amongst the four different locations, Manchester and Bristol are most different from each other, with signers from Manchester using more manual negation signs, more English negation mouthings, and fewer headshakes, in contrast to signers from Bristol. Signers from London and Birmingham fall in between the two extremes.

Signers from Manchester were also much more likely to use English negation mouthings (+2.76). This pattern was not just driven by a few individuals, as 9 out of 10 Manchester signers used mouthing most of the time for clause negation. There were comparatively fewer signers from Birmingham (5 out of 10), Bristol (5 out of 10), and London (4 out of 10) who used mouthing most of the time. Mouth gestures showed no strong association with region (all Pearson residuals $<|2|$).

Age was the next most important socio-demographic factor influencing the choice of negating forms. For this analysis, we split age into three groups (below 30, 30–60, and 60+). This grouping is based on different educational experiences that these groups would have had, with the oldest group more likely to have experienced education in centralised schools for deaf children and spoken English as the sole language of instruction, and the youngest group more likely to have experienced signed/spoken language bilingual education or to have been mainstreamed into hearing schools. The middle group would have experienced the transition from centralised schools to mainstream settings, as well as from spoken language only approaches to more sign-inclusive policies.

The younger signers (<30) exhibited an over-representation of manual signs (+2.43), and the signers aged 30–60 exhibited an under-representation of manual signs (−2.27). There was no noteworthy age-dependent difference for the use of regular versus irregular negation (all Pearson residuals $<|2|$). The 30–60 age group also showed a dispreference for the use of English mouthing in negation (−1.98), compared with the older 60+ group, which showed a preference for the use of English mouthing (+2.37). Results for mouth gestures were less age-dependent (all Pearson residuals $<|2|$). The 30- to 60-year-old group also showed a stronger preference for headshakes (+2.80), in contrast to the 60+ group, who showed a slight dispreference (−2.24).

We also considered influence from BSL teaching experience, due to the possibility that signed language teaching ideologies may influence language practices, both in and outside the classroom (Kusters et al. 2020). For this variable, we focus only on the 22 individuals where information about their BSL teaching experience was available (10 signers had experience teaching BSL at the time of recording, while 12 did not). BSL teaching experience did not play a strong role for the use of manual negation, or the use of regular versus irregular negation (all Pearson residuals $<|2|$). However, signers who had teaching experience were more likely to avoid using English mouthing to signal negation (−3.27), compared to those signers with no teaching experience. Conversely, signers who had teaching experience were much more likely to use mouth gestures (+3.24). There was no strong difference for headshakes. A look at the distribution (average proportions of mouthings/mouth gesture per signer) shows that signers with BSL teaching experience are overall much more variable with respect to these two form features. In contrast, with a few exceptions, signers who have not taught BSL have a consistently high proportion of mouthings and a consistently low proportion of mouth gestures.

6 Discussion

The aim of this study was to use corpus data to describe how clause negation is signalled manually and non-manually in BSL. We found that negated clauses in this dataset of dyadic BSL conversations are usually simple and short declaratives. This cohort of BSL signers tends to use between two and three different semiotic strategies for negative clauses, usually with one or more manual negating signs and almost always with some

kind of non-manual strategy such as head movements, English mouthing of negating forms, and/or mouth gestures. The most common combination was for the signer to use a manual negating sign, a headshake, and an English mouthing. Where there was a manual negating sign, regular negation used proportionally more headshake than irregular negation, following similar findings for BISINDO (Palfreyman 2019).

Just one third of all negated clauses relied on non-manual strategies alone. These included combinations of headshakes with English mouthings, or headshakes with BSL mouth gestures, or headshakes with both English mouthing and mouth gestures. It was very rare for this cohort of BSL signers to use just one strategy to signal negation, i.e. only manual sign, only headshakes, only English mouthing, or only mouth gesture. Generally, more than one signal is used. An online BSL judgement task investigating clause negation also found that a wider range of signers prefer negated clauses with manual signs and headshakes more than similar clauses without headshakes, which is consistent with the corpus data reported here (Cormier et al. 2025).

BSL signers' use of English mouthing to negate clauses is very common, although it is not obligatory, since there were a large number of negated clauses with no English negation mouthing at all (cf. Mesch et al. 2021 who found few Swedish mouthings with incorporated negation signs in Swedish Sign Language). Mouth gestures were less common, with 'downturned mouth' being the most common mouth gesture, when there was one, used to signal negation. Other well-known and conventionalised mouth gesture and sign combinations occurred too, such as 'boo', 'shh', and 'th', which aligns with earlier observations in the literature (e.g. Sutton-Spence and Woll 1999).

In contrast to BISINDO, it was very rare for BSL signers to rely solely on mouthing to negate clauses, as English mouthing of negation in BSL usually also occurs with either headshake and/or manual sign or both. When mouth patterns are used to negate clauses, the BSL signers in this dataset prefer to use English mouthings rather than mouth gestures. English mouthings were slightly more prevalent in complex clauses than in single clauses, and complex clauses were more likely to function as declaratives. Mouth gestures were not really used in complex clauses, but headshaking was very common. Complex clauses also tend to have two or three strategies. Overall, patterns of negation signalling in complex clauses mirrored those identified for single clauses, albeit with slightly more use of English mouthings.

Analysis of individuals confirmed these results are relatively consistent across this cohort of BSL signers; they are not a result of only one or two people. Most signers tend to use three strategies to signal clause negation most of the time. Only one signer uses two strategies most of the time. However, analysis of a subset of the data showed there was more individual variation relating to the use of English mouthing to negate clauses: most signers use it, but there are a few signers who consistently do not use mouthing. One other signer consistently uses mouth gestures, while most signers do not use mouth gestures. Overall, the picture suggests that the results observed in the aggregate characterise the majority of signers, which suggests considerable uniformity and/or conventionalisation of these patterns. At the same time, we should not neglect the fact that there are few individuals who have usage patterns that diverge from the majority pattern, which evidences the flexibility with which negation can be signalled in BSL.

We also found that patterns of clause negation in BSL are very similar to those reported for Auslan, particularly regarding the position of manual negating signs and the use of headshakes (Johnston 2018). Varying reports of the degree of lexical variation between these two closely related languages have been published (McKee and Kennedy 2000, Johnston 2003). Yet in at least one domain of grammar (clause negation), these two varieties appear to be fairly similar. In both languages, manual negating signs were either incorporated into the predicate and/or occurred before it. It was less common for a manual negating sign to occur after a predicate, and when this did happen, it was often a repetition of manual negating signs used earlier in the clause. Headshakes usually span the whole clause or just the end of the clause, although a wide range of head movements were observed in different contours.

We agree with Johnston (2018) that the position of manual signs and the scope of head movements may also be explained by discourse-pragmatic factors relating to language contact with English and also the multimodal strategies used by non-signing English speakers during co-present interactions. However, we suggest that BSL signers' choice of using English mouthing or mouth gestures to negate clauses is more likely explained by sociolinguistic and ecological factors. This is the most striking difference between BSL and Auslan, although the Auslan study did not consider social factors.

Region was the most influential social factor influencing how clause negation was signalled. Signers from Manchester and Bristol were most different from each other. Signers from Manchester were more likely to use manual signs and less likely to use headshakes, while signers from Bristol were less likely to use manual signs and more likely to use headshakes. Signers from London and Birmingham fall in between these two extremes. In other words, the data simultaneously suggest there may be previously unidentified regional differences in negation in England, particularly northern versus southern regions in England. This may reflect other regional differences in BSL, including more use of English mouthing in the south of the United Kingdom vs the north (Proctor and Cormier 2022). Future research could include more regions within the United Kingdom, e.g. Glasgow, Belfast, Cardiff, to test these claims and investigate possible reasons for differences, particularly as existing literature suggests there are also differences in manual negators between these varieties (Sutton-Spence and Woll 1999).

The age group of signers and their BSL teaching experience seems to explain some other patterns. Younger signers were more likely to use manual signs, whereas signers in the 30–60 age group were less likely to use manual signs. The younger group also used less English mouthing compared with the older group, who used more English mouthing. The two younger age groups also used headshakes more than the older group. Older signers more frequently used English mouthing when signalling negation. Age-related variation in manual clause negation has also been observed by Palfreyman (2019), who found younger and older BISINDO signers prefer different manual variants for expressing negation (Palfreyman 2019, 234).

Mouth gestures were not age-related. This finding is consistent with Proctor and Cormier (2022), who found that older BSL signers generally use more English mouthing than younger signers. Greater use of manual signs and headshakes in younger signers, compared to greater use of mouthing in older signers, may reflect different educational experiences as well as the emergence of more positive attitudes towards signing, as educational systems have moved away from a focus on spoken language-only approaches. There was no link between deafness in the family and manual signalling, English mouthing, and headshakes.

Stamp and colleagues (2015) found there was no difference in preference for use of traditional versus non-traditional number signs in BSL when comparing teachers vs non-teachers. In our data, we found some small differences between how teachers and non-teachers used English mouthings and mouth gestures to negate clauses, although we acknowledge that future ethnographic research might reveal more about how teaching experience might be relevant here. Signers who had teaching experience were more likely to avoid using English mouthing to signal negation and were much more likely to use mouth gestures instead. Overall, signers with BSL teaching experience were much more variable than signers without teaching experience regarding their use of English mouthing and mouth gestures to negate clauses.

Conversely, signers who did not have experience teaching BSL consistently use lots of English mouthing and fewer mouth gestures to negate clauses. This suggests the possibility of differences between teachers and non-teachers in terms of grammar, compared to vocabulary (e.g. Stamp et al. 2015). As mentioned above, these trends possibly relate to language ideologies regarding BSL and Sign Supported English (SSE), as reported in a recent study, which found that signers believe English mouthings tend to index SSE signing varieties (Rowley and Cormier 2024). These patterns may reflect beliefs about who make good BSL teachers, and whose signing is respected as a teacher, so that those who avoid English mouthings self-select or are encouraged by others to take up teaching, and possibly vice versa (those who become teachers avoid English mouthings). Unlike mouth patterns, there were no strong differences for head movements between teachers and non-teachers in these data.

7 Conclusion

Analysis of BSL Corpus data makes it possible to describe the different strategies that signers use to negate clauses in BSL, and discuss the many different reasons that influence how this is done. First, as has also been reported for TİD (Makaroğlu 2021), it illustrates that the use of composite strategies in the signalling of clause negation in BSL is more common than not. This pattern is also seen in English and other spoken languages. Indeed, as observed by Bond (2012, 35), “negation strategies involving more than one negative form are widely

attested across the world's languages." This also lends support to usage-based theories, which view language as a multimodal, dynamic system in which signals combine holistically in a Gestalt-like manner, in addition to, or instead of, in a purely compositional way (Trujillo and Holler 2024).

Second, it demonstrates how sociodemographic factors and individual variation account for significant variation in the corpus data, even among people who grew up signing BSL from birth or from early childhood. This variation is less extensive than the lexical variation we see in the BSL Corpus, but it certainly sheds light on ecological factors that drive variation in BSL. In particular, BSL Corpus data reveals the importance of English mouthing and mouth gestures for signalling negation in BSL, which has not been considered in most of the other signed language corpus studies, except for BISINDO (Palfreyman 2019).

Together, these findings suggest that patterns for signalling clause negation in BSL mirror those found in other signed language corpus studies and also studies of hearing non-signing speakers, especially with respect to specific forms such as headshakes. These findings also make it possible to develop resources for teaching BSL that are based on what specific cohorts of signers actually do, not what people think they do (Cormier et al. 2015).

Abbreviations

ASL	American Sign Language
Auslan	Australian Sign Language
BISINDO	Indonesian Sign Language, *Bahasa Isyarat Indonesia*
BSL	British Sign Language
DGS	German Sign Language, *Deutsche Gebärdensprache*
FinSL	Finnish Sign Language
GSL	Greek Sign Language
HKSL	Hong Kong Sign Language
Libras	Brazilian Sign Language, *Língua Brasileira dos Sinais*
LIS	Italian Sign Language, *Lingua dei segni italiana*
LSC	Catalan Sign Language, *Llengua de signes catalana*
NGT	Dutch Sign Language, *Nederlandse Gebarentaal*
PJM	Polish Sign Language, *Polski język migowy*
TİD	Turkish Sign Language, *Türk İşaret Dili*

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Informed consent: Informed consent and ethical approval for the BSL Corpus are described in Schembri et al. (2013).

Data availability statement: Data are available on the BSL Corpus website and the Open Science Framework. The scripts, data, tables, and figures for this study are available in the following Open Science Framework repository: https://osf.io/snvdh/. BSL Corpus data are available online to registered users at: http://bslcorpusproject.org/cava.

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Appendix

The scripts, data, tables, and figures for this study are available in the following Open Science Framework repository: https://osf.io/snvdh/. BSL Corpus data are available online to registered users at: http://bslcorpusproject.org/cava.