Research Article

Agnieszka A Marciszewska*

L3 morphosyntactic processing among Polish–English bilinguals: Considering learners' level of bilingualism and language dominance

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Abstract: Investigating language practices of bilingual children and understanding how they process a novel L3 allow to contribute to epistemological debates on bilingualism. In the present study, Polish–English bilingual children were tested on their processing of subject-first (SVO) and object-first (OVS) sentences in Polish and German. The data collected in this exploratory study were analysed in light of learners' different levels of bilingualism and language dominance. The results consistently indicate that higher proficiency in Polish as well as ability to process the challenging OVS sentences supports learners in processing L3 German as well. The findings provide useful insights on morphosyntactic processing abilities among both migrant and bilingual 2L1 children and shine light on their needs, which could further be used to inform educational policy in the UK.

Keywords: 2L1, L3, morphosyntactic processing, language dominance, proficiency, language typology

1 Introduction

Third language (L3) acquisition and processing have become important areas for investigation. Recent formal linguistic literature has empirically tested a number of factors that may affect morphosyntactic processing among L3 learners, including L1 (e.g. Hermas 2010, 2014; Leung and Na Ranong 2009; Lozano 2002), L2 (e.g. Berkes and Flynn 2012a, 2012b; Flynn et al. 2004; Foote 2009; Kulundary and Gabriele 2012; Leung 2005, 2006; Rothman and Cabrelli Amaro 2010), proficiency (e.g. Hermas 2015), language dominance (e.g. Rah 2010), and linguistic typology (e.g. Foote 2009; Ionin et al. 2011; Kulundary and Gabriele 2012; Leung 2005; Montrul et al. 2011). Connecting the theoretical aspects of bilingualism to learners' processing abilities can contribute to current epistemological debates in the field.

In order to maintain scientific rigour while investigating L3 processing, we need to first acknowledge various language backgrounds of L3 learners. In one of the most significant formal accounts of L3 acquisition, Cenoz (2003) included both simultaneous and consecutive patterns under this overarching term. In fact, empirical investigations have been reported not only on early trilinguals (also known as trilingual first language learners or 2L3 learners), learning three languages from birth (e.g. Hoffmann 1985), and a monolingual acquiring two or more languages as foreign languages (e.g. Williams and Hammarberg 1998), but have also included early bilinguals (also known as bilingual first language learners or 2L1 learners)

* Corresponding author: Agnieszka A Marciszewska, CILT, SOAS, 10 Thornhaugh St, Bloomsbury, London WC1H 0XG, United Kingdom, e-mail: am156@soas.ac.uk
ORCID: Agnieszka A Marciszewska 0000-0002-9568-0824

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acquiring L3 in a classroom setting (e.g. Cenoz 2005) as well as bilingual migrant children who moved to a new linguistic environment (e.g. Brizic 2006). Literature therefore reflects the various acquisition patterns broadly, which is in line with a view that it is important to adopt a definition of an L3 learner that closely reflects the specific research aims (Skutnabb-Kangas 1984). Indeed, seeing as all those definitions can be subsumed under the overarching term L3 learner, it is essential to specify the backgrounds of particular cohorts.

Since 1 May 2004 when 10 new countries joined the EU, including eight countries from Central and Eastern Europe (A8), UK has seen an increasing number of economic migrants from the A8 countries (Office for National Statistics 2015). According to UK Border Agency (2009), 65% of all migrant workers registered in the UK from A8 countries are Polish. Furthermore, Polish is the second most common language in England and Wales (Office for National Statistics 2013). Since 2007, Polish has been the most common non-UK nationality in the UK and in the past 5 years Poland has been the most common non-UK country of birth (Office for National Statistics 2017). This has resulted in an increasing number of bilingual children born in the UK to both Polish migrants as well as to families that speak two different native languages. With an increased number of Polish–English bilingual children, educational institutions need to acknowledge their specific needs.

Polish Educational Society is a charitable organisation in the UK, established in 1953 (2019b). Their focus is supporting Polish education in the UK through a range of activities such as organising events such as assemblies, competitions and conferences, publishing textbooks and teaching aids, Polish literature, and educational magazines for Polish children and youth. They also aim to provide guidance for teachers, but their key activity is setting up Polish Supplementary Schools (also called *Polish Language Saturday Schools*). Polish Supplementary Schools are voluntary and supplementary initiatives operated by Polish teachers who prepare learners for GCSE and A-levels and follow the National Curriculum for Polish Pupils Abroad (Polish Educational Society, 2019a). In 2017, 108 schools were registered across the UK, with 20 schools in London alone (2019b). The present study was conducted in a London-based Polish Supplementary School in 2016–2017 and investigated language comprehension and production in the minority language, and further extending it to L3.

2 Factors delimiting L3 morphosyntactic processing

Recent literature has investigated a number of factors such as proficiency, recency, language dominance, literacy, and age as well as order of acquisition that can potentially affect morphosyntactic transfer in L3 (for a review see De Bot and Jaensch 2013). However, questions have also been asked with respect to the transfer of processing strategies in non-native learners (Felser 2005). This has been further clarified to include L3 context specifically (Jaensch 2013). At a theoretical level, various accounts have been proposed to consider the transfer of morphosyntactic information as well as processing strategies to L3, largely supporting the view that both L1 and L2 may be involved.

2.1 L1 and L2

The view that L2 as well as L1 could affect the syntactic processing and acquisition of L3 was first phrased in a cumulative enhancement model (CEM) (Flynn et al. 2004). It posits that the mental representation of linguistic knowledge will result in varying acquisition patterns of specific structures. "*All languages known can potentially influence the development of subsequent learning*" (Flynn et al. 2004, p. 5). Flynn and colleagues compared groups of child and adult L2 and L3 learners on the production of restrictive relative clauses. They found that formal syntactic features and functional categories may transfer to L3 from either L1 or L2. Further support for CEM was found in studies on relative clauses in English (Berkes and Flynn 2012b, 2012a) and properties of grammatical number and gender concord marking on German adjectives (Jaensch 2011).

Particularly interesting evidence for CEM was provided by Kulundary and Gabriele (2012) who, evaluating different levels of proficiency in the L2, found support for the effect of L2 syntactic development in L3. At the same time, L3 processing of the target structure was predominantly linked to the general level of proficiency in L3. The authors concluded that morphosyntactic differences between L2 Russian and L3 English in the form of case morphology which allow for a flexible word order may play an important role.

Since then there has been further support for the view that prior linguistic knowledge, specifically L2, affects L3 syntactic processing (but see Hermas 2010, 2014; Lozano 2002 for evidence of L1 transfer). Bardel and Falk (2007; see also Falk and Bardel 2012; Bardel and Sanchez 2017) propose *L2 status factor*, in which L2 is used as a default source of transfer by means of blocking L1. Crucial evidence for the model was found in Bohnacker (2006) who tested six Swedish learners of German, either with or without L2 English knowledge, on the production of verb placement, specifically the V2 feature. The learners with no English exposure never violated the V2 rule, while those who had knowledge of English were far less target like at 45% of violations. The finding was taken to mean that while syntactic V2 is transferred from L1 Swedish, knowledge of non-V2 language (L2 English) may obscure the transfer effect.

More recently, declarative/procedural model of bilingualism (Paradis 2004, 2008) has been used as a neurolinguistic rationale for the model. According to Paradis' implicit/explicit perspective, there is a higher cognitive similarity between L2 and L3 as both are represented in the same part of the brain and L2 and L3 vocabulary is sustained by declarative memory. L1, on the other hand, is sustained predominantly by procedural knowledge with procedural memory sustaining implicit linguistic structure. Evidence for L2 status mostly comes from studies on Germanic V2 structure in main and subordinate clauses (Falk and Bardel 2011).

2.2 Typology

A different perspective was taken by Rothman (2010) who suggested L3 transfer to be selective and motivated by the typological proximity of the target L3 and all prior linguistic systems. The *typological primacy model* (TPM) for multilingual transfer (Rothman 2010, 2011, 2013, 2015) posits that the specific structural similarity between the linguistic systems will influence the linguistic parser into determining the early perception of typological similarity. At the same time, TPM argues that transfer is defined by typological economy, which means that the transfer of a system which is not the most optimal is possible in the lack of apparent typological proximity in the languages learners know and the target L3. TPM posits transfer of "*linguistic properties that overlap cross-linguistically at the level of mental representation, whether at the lexical or grammatical levels*" (Rothman 2015, p. 179–180).

Evidence for the TPM systematically found that learners tend to select the target structure from the language which is typologically similar to the L3 for both Romance (e.g. Cabrelli Amaro et al. 2015; Giancaspro and Halloran 2012; Rothman 2010, 2011) and non-Romance L3 languages (e.g. Kulundary and Gabriele 2012; Özçelik 2013). The broad spectrum of TPM studies has recently also been expanded to evidence found in bilingual first language (2L1) learners who, when processing differential object marking in L3 Brazilian Portuguese, selected a language for transfer that was typologically the closest to the L3 (Giancaspro et al. 2015). Another particularly important empirical two-part study tested not only learners' syntactic knowledge of word order, but also their parsing preferences in L3 relative clause attachment (Rothman 2010). The study found that learners' reading of L3 relative clauses was linked to the reading of such sentences in the typologically closer language. Therefore, TPM was found to play a role not only in the transfer of the given morphosyntactic structure, but also in the transfer of a processing strategy guiding its reading.

2.3 Proficiency and language dominance

In discussing language dominance, it is crucial to reflect back on the definitions of L3 which are frequency or language use-based (Grosjean 2010; Mackey 1968; Weinreich 1953). Grosjean (2010) argues that language

proficiency and language use are intrinsically connected and that L2 proficiency attainment cannot be achieved without extensive use. Therefore, when defining L3, some accounts consider the perspective of proficiency. Such views are criticised as neither language use nor proficiency has a standardised measurement. In addition, De Bot and Jaensch (2013) argue that placing language proficiency or ability on a continuum prevents a clear indication of when each system becomes a separate system. Despite these challenges, literature recognises the importance of both these factors in shaping current L3 definitions (e.g. Aronin and Singleton 2012). Consequently, language dominance could be considered a potentially key factor in L3 processing and acquisition and certainly requires a closer empirical scrutiny.

While literature on language dominance as a factor in shaping L3 morphosyntactic processing is still in its conception, a good example of a study which has considered it closely is by Rah (2010) who tested German speakers on processing relative clauses in English and French (as L2 and L3). The parsing strategies guiding relative clause interpretation are different for English and both French and German. Initially, Rah compared the groups based on the order of acquisition and found reverse transfer effects from L3 English in L2 French, which was inconsistent with both the French native speaker controls and L3 French learners. To find out why the L2 French speakers parsed the structure differently, Rah divided the cohort into two new groups based on their language dominance. Comparing French- and English-dominant learners, clearer results were found. Namely, those learners who reported French to be their dominant non-native language did not transfer the preference for attachment style from English to French; in contrast, those who reported English as their dominant non-native language did transfer the English-based preference into their French. Although they demonstrated only a slight inclination in this direction (51.39% vs 48.61%), the finding presented a clearer overall picture. Rah concluded that language dominance was deterministic in establishing the source of transfer, while the length of exposure itself was not as relevant. Rah's finding emphasises the importance of learners' linguistic background.

Collectively, these results indicate that the study of L3 morphosyntactic processing is an exciting new area and that there are a number of factors that need to be considered. While there is ample evidence that L2, not only L1, impacts the processing of L3, the question of the interplay of specific factors such as typology or dominance remains open. The literature also highlights the need for more studies on parsing preferences as they are the key to understand the form-meaning connections learners make in real-time comprehension. As Benati and Schwieter (2017, p. 264) argue, new research "*that more specifically considers the possible role of cross-linguistic transfer on the acquisition of grammatical features in the L3*" is needed.

Acknowledging these views, the present study addressed the following research questions:

1. Do factors such as age, language proficiency, and the prior linguistic knowledge relate to the ability to process the morphosyntax of a naïve L3 for different levels of bilingualism?
2. Does language dominance play a role as well?

3 Methods

3.1 Target structures

The target structure selected for the present study was accusative case markings on masculine nouns and articles. The structure was selected as Polish and German demonstrate typological similarity in terms of the use of the structure to signify agency in transitive sentences. Consequently, both Polish and German native speakers tend to rely on morphological information used in a sentence to assign thematic roles (Kilborn 1989; Staroń and Kail 2004). In contrast, English does not use accusative case markings on nouns or articles. Therefore, English native speakers tend to assign thematic roles in simple sentences with transitive verbs by using word order as a strategy (Kilborn 1989).

Polish is a Slavic language which is characterised by free word order, with SVO word order being dominant. At the same time, the extensive case-marking system being part of the Polish fundamental grammar allows preverbal objects in OVS structures. Polish uses nominal morphology with accusative case markings on nouns. For example, on masculine animate nouns ending in *-a*, the marking changes to *-ę*. In example (1) below, the object, *the father*, is placed in a preverbal position and the subject, *the daughter*, follows the verb. A sentence like this may cause processing difficulty because learners must process the morphosyntactic information and cannot rely on word order as a strategy (VanPatten 2004). As a result, testing learners' processing of OVS sentences will reveal whether they have processed accusative case marking on masculine nouns.

(1) Tatę całuje córka.
father$_{ACC}$ kiss$_{3SNG}$ daughter$_{NOM}$
"The daughter kisses the father."

German is a V2 language with the verb placed in the second position in a sentence. What precedes can be a subject, an adverbial clause, or an object. While German largely uses SVO word order, OVS word order is also accepted, due to the fundamentally established case-marking system (Lenerz 1977; Zubin 1977). Nominal morphology is used in the form of accusative case markings on articles. For example, on masculine nouns, which have an article *der*, in accusative the article changes to *den*. Feminine nouns, which have article *die*, maintain the same article in accusative case. In a sentence which combines a feminine noun with a masculine noun (2), learners rely on masculine accusative article den to decode the agency. Again, OVS sentences like this may cause processing difficulty (VanPatten 2004). To check whether accusative case marker *den* has been truly processed, it needs to be presented in an OVS sentence in which it is the only means of assigning agency.

(2) Den Vater küsst die Tochter.
the$_{ACC}$ father kiss$_{3SNG}$ the$_{NOM/ACC}$ daughter
"The daughter kisses the father."

In OVS sentences, word order is not a predictor of agency and only accusative case marking which exists on objects (whether in the form of accusative ending on nouns in Polish or articles preceding nouns in German) is a reliable cue. These kinds of sentences, therefore, allow us to test whether learners have truly processed morphosyntactic information and use it to assign agency.

3.2 Sample

The data were drawn from an exploratory study conducted in a Polish Saturday School in Croydon, London. Participants included 16 bilingual Polish–English children. Language background questionnaire and language use questionnaire were used to establish participants' eligibility in the study as well as to place them into groups representing level of bilingualism and language dominance. To be accepted in the study, participants had to be aged 7–13 and have no working knowledge of languages other than Polish and English. Importantly, they had to be naïve in German, which was the L3 under investigation. Data from the language background questionnaire revealed that all participants were born in the UK or went to the nursery/preschool in the UK in cases when they were born in Poland. All participants reported English as their primary language. At the same time, Polish as a primary language was only reported by those participants whose parents were both Polish native speakers. In case of mixed parents, Polish had a clear minority language status. One participant who was a child of a heritage Polish speaker indicated Polish as an additional/foreign language. This crucial difference in family constellations and self-reports among the participants formed the basis of the initial groups. Therefore, in order to operationalise the level of bilingualism, three cohorts were created: children of parents of two different native languages born in the UK,

i.e. the *bilingual group* ($n = 8$), children of heritage Polish-speaking parent(s), i.e. the *heritage group* ($n = 1$), and children of Polish-speaking migrants, born in the UK or moved from Poland before they were 2 years old, i.e. the *L2 group* ($n = 7$).

3.3 Procedure

As the study involved collecting data from underaged children, parents of the participants first provided consent to the use of participants' data. Apart from signing the consent form, the parents also completed the language background questionnaire and the language use questionnaire. Both questionnaires were completed in the presence of the principal investigator to make sure that the questions were clear, especially considering the need for details pertaining to language status. The experiment itself was then held with participants in the course of two sessions outside of their regularly scheduled classroom activities.

On the first day of the experiment, all participants completed a proficiency test in Polish as well as a sentence interpretation and a sentence production task in Polish. The interpretation task preceded the production task. The second session, conducted a week after the first session, involved completing a sentence interpretation and a sentence production task in German. Participants received a vocabulary sheet with all nouns and verbs used in German to acquaint themselves within the week preceding the second session. The sheet did not include instances of accusative case markings or grammatical rules on how to use them. During the two sessions, the participants were guided from task to task by the principal investigator who acted as an instructor. As participants' linguistic background was key to the experiment, all instructions to the treatment materials and instruments were provided in English only.

3.4 Materials

Language background questionnaire was designed to check participants' knowledge of the languages in question and collect data on the status of Polish and family language constellation. In this way, it served the purpose of establishing participants' eligibility in the study as well as initial groupings. Language use questionnaire was designed to establish language dominance of the participants. A CEFR-aligned proficiency test for foreigners was used to test participants' overall proficiency in Polish (*No Title* 2019). The proficiency test was written and included 100 multiple-choice questions with 1 point awarded for each correctly answered question. The purpose of the test was not to measure the comprehension or production of the target structures, as the main experiment materials were developed and administered for this purpose. Due to the test-heavy nature of the experiment, English proficiency was not formally measured.

In the main part of the experiment, all participants completed four tests, measuring the processing of the two selected target structures. In line with input processing theory, the processing of each target structure was measured in a sentence interpretation and a sentence production task (VanPatten 2007). The sentence interpretation task measured learners' understanding of the structure, while the production task tested whether learners were also able to produce it in appropriate contexts.

3.4.1 Interpretation task

The interpretation data were collected through a sentence-level interpretation task. The test was counterbalanced for two conditions, i.e. word order and the position of the masculine noun, and included a total of twenty sentences: ten target sentences and ten distracters. All sentences were simple declarative constructions with a noun phrase followed by a verb followed by a noun phrase and an adverbial or a prepositional phrase (NP – V – NP – Adv/PP). Simple decontextualised sentences were used as they limited participants' processing load and allowed them to focus on establishing agency.

In the Polish test, target sentences included accusative case marker *-a* expressed on a masculine noun in OVS word order (see example in (3) below), while distracter sentences included the accusative case marker *-ę* expressed on a feminine noun in a post-verbal position in SVO word order (see example in (4) below). Similarly, in the German test, target sentences included accusative case marker *den* expressed on an article preceding a masculine noun in OVS word order (see example in (5) below), while distracter sentences included a nominative case marker *der* expressed on an article preceding a masculine noun in an SVO word order (see example in (6) below).

(3) *Ojc**a** woła córka do telefonu* (OVS)
(4) *Trener woła trenerkę do sali gimnastycznej* (SVO)
(5) ***Den** Vater stört die Tochter während des Mittagessens* (OVS)
(6) *Der Junge fragt die Oma nach dem Buch* (SVO)

The task used to assess the processing abilities of the participants was a question and answer task with comprehension questions being implemented in recent research involving interpretation of accusative case marking in German (Henry 2015). Participants listened to individual sentences on the headphones and were asked to determine who performed the action in each sentence. All sentences were delivered via iTunes as a pre-recorded playlist with eight seconds between sentences. No repetition was provided so that the test would measure real-time comprehension. After hearing each sentence, participants were asked to select one of the two possible interpretations, i.e. the preverbal noun or the post-verbal noun. A third option, *Not sure*, was provided in order to decrease chance effect, although participants were asked to use it only when necessary (see Figure 1). All answers were equally distributed. The sentence-level interpretation tasks were equivalent in both Polish and German.

(7) *Den Vater stört die Tochter während des Mittagessens.*
the $_{ACC}$ father disturbs the$_{NOM}$ daughter during lunch$_{GEN}$
"The daughter disturbs the father during lunch."

No	Question	Noun 1	Noun 2	Not sure
1.	Who disturbs?	□ father	□ daughter	□

Figure 1: An example of stimuli sentence and a selection task in German.

3.4.2 Production task

The production data were collected through a sentence-level production task (adapted from Henry 2015). The test consisted of four different sets of three sequential pictures showing a story for the creation of a total of twelve sentences. Visual contexts in each set of pictures showed a person handling an object or dealing with another person (see Figure 2). Having seen each set of pictures, learners were asked to write three sentences describing the actions seen in the three pictures. Learners were provided with key vocabulary needed to complete the task and produce the target structure in the appropriate case, i.e. nominative or accusative. The sentence-level production tasks were equivalent in Polish and German.

In order to increase the internal validity of the study and to avoid material bias or test effect, all assessment materials were distributed across three lists, which formed the basis of three different versions of the tests. After complete sentences were formed, they were then piloted and counterbalanced in three test versions. Participants were randomly allocated a test version in both Polish and German.

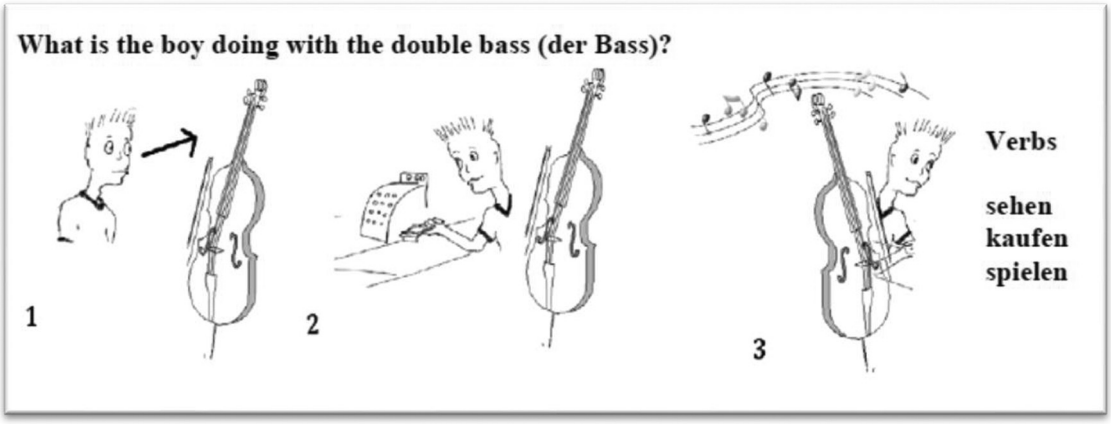

Figure 2: An example set in a sentence production task in German.

3.5 Data scoring and analyses

The assessment materials were prepared in such a way so as to present interpretation and production tests in the same format in Polish as in German. This ascertained the same scoring procedure could be employed. In sentence interpretation tests, both distracter and target sentences were scored either 0 or 1 point. However, the scoring was kept separate. A sentence was awarded 1 point when a correct reading was selected. 0 point was awarded when an incorrect reading was chosen. Specifically, a sentence was awarded 1 point when a nominal reading which was selected answered the question pertaining to agency in a given sentence correctly. In contrast, when a nominal reading which was selected did not answer the question pertaining to agency in a given sentence correctly, 0 point was awarded.

In sentence production tests, there were visual contexts for the creation of six target and six distracter sentences for a total of twelve sentences. Distracter sentences received no scoring at all, while the target sentences were scored either 0 or 1 point. A sentence was awarded 1 point when an accusative case marker *den* on masculine nouns (in German) or *-a* (in Polish) was correctly produced. If this condition was not met, a sentence was awarded 0 point.

The analyses were conducted in 0 point two stages. First, correlations with Kendall's tau test were carried out on all data to establish potential links between the factors under investigation, i.e. age, proficiency, Polish interpretation (OVS and SVO), Polish production, and German interpretation (OVS and SVO). Trends were checked for the three groups exemplifying the different levels of bilingualism. Following this stage, language dominance was considered as a factor and group comparisons were carried out with independent samples *t*-test. The analysis compared two newly formed groups, i.e. Polish- and English-dominant.

4 Results and discussion

Data on participants' age, Polish proficiency, Polish interpretation (both SVO and OVS), and production as well as German interpretation (both SVO and OVS) were inputted in IBM® SPSS Statistics software. German production scores were not inputted for analysis as none of the participants managed to produce the target structure in German. Correlations with Kendall's Tau-b tests were carried out on data from all participants in order to determine potential links between these variables. As the study sample was relatively small, effect sizes were not calculated; instead, a visual representation of data is provided to better account for the results obtained. Alpha level was set at $\alpha = 0.01$, but the results should still be treated as indicative.

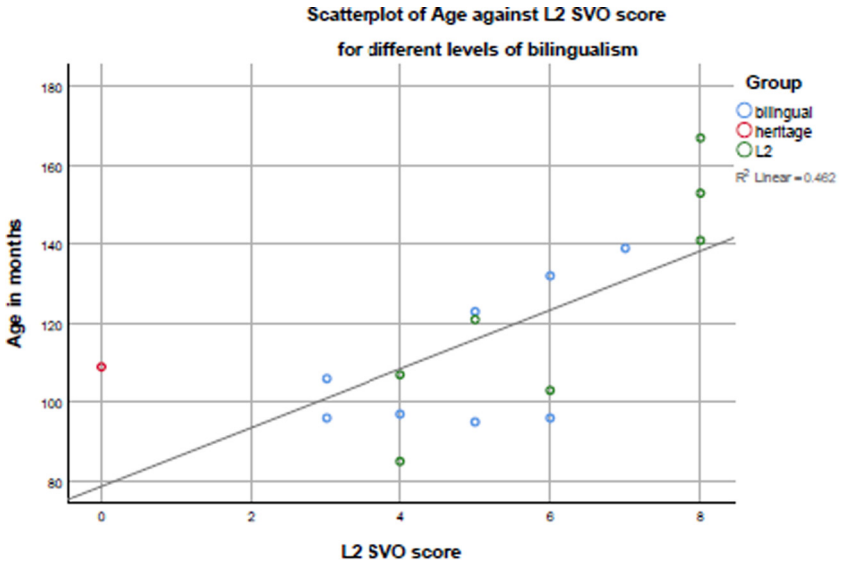

Figure 3: The scatter plot for age against Polish SVO score correlation.

4.1 Levels of bilingualism

The first factor to be considered was age. The Kendall's Tau-b correlation test indicated a positive correlation between age and the Polish SVO word order interpretation ($\tau_b = 0.514$, $N = 16$, $p = 0.008$). A scatter plot was used to visualise the data (see Figure 3). The plot showed that with age, there was a tendency for learners to interpret Polish SVO sentences better. A closer look at the three types of learners also revealed that there were significant differences between the heritage participant and the other two groups. Specifically, the heritage participant performed much poorer on the test despite the fact that learners of the same age in the other groups interpreted between 40 and 60% of sentences correctly. The participants in the L2 group achieved the highest scores, which were grouped at 80%. In fact, the L2 group showed distinct trends for participants of up to 10 years of age, who scored between 4 and 6 points, and participants over 11 years, 8 months of age, who reached 8 points. In contrast, the bilingual group followed a more linear trend with a maximum number of points scored being 7.

Looking at Polish proficiency, the Kendall's Tau-b correlation test indicated relationships with four different scores. First, the test showed a positive correlation with Polish interpretation ($\tau_b = 0.568$, $N = 16$, $p = 0.003$). Once the data were visualised on a scatter plot (see Figure 4), it became clear that they were

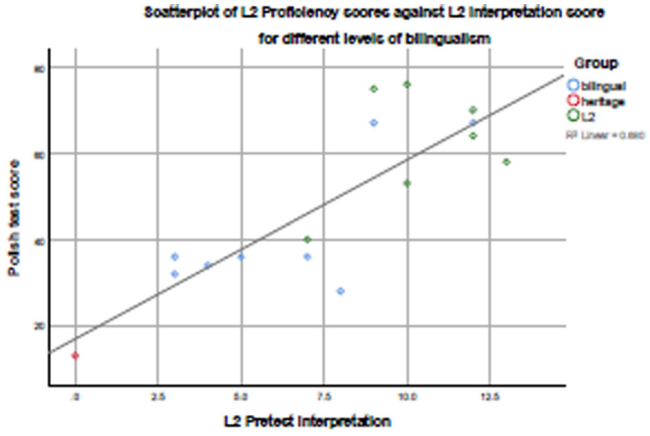

Figure 4: The scatter plot for Polish proficiency against Polish interpretation correlation.

clustered in two areas, rather than being distributed across a continuum equally. This finding would have been far more robust if the entire range of scores was present.

A closer look at the scores further suggested that the correlation was with the OVS items ($\tau_b = 0.665$, $N = 16$, $p = 0.001$), not the SVO ($\tau_b = 0.413$, $N = 16$, $p = 0.035$). In other words, with higher proficiency in Polish, learners managed to interpret OVS sentences better. A second scatter plot was therefore used to understand the distribution of the data (see Figure 5). The scores were again grouped in two areas, mostly, which indicated a possibility of a relationship. Collectively, the two plots revealed similar trends for the three groups. Specifically, the bilingual group scored mostly in the low 30%, largely not reaching more than 20% on the OVS items interpretation. The L2 group, on the other hand, scored higher on both tests, never falling below 30% on OVS items.

Second, the Kendall's Tau-b correlation test showed a positive correlation of Polish proficiency with the Polish production test ($\tau_b = 0.755$, $N = 16$, $p = 0.000$). To understand the data distribution, a scatter plot was used (see Figure 6) and revealed two very distinct clusters in the scores. The trends were very different in the two groups. The majority of the bilingual group scored very low on both Polish production and Polish proficiency tests. In fact, many failed to produce the target structure at all. At the same time, a large number

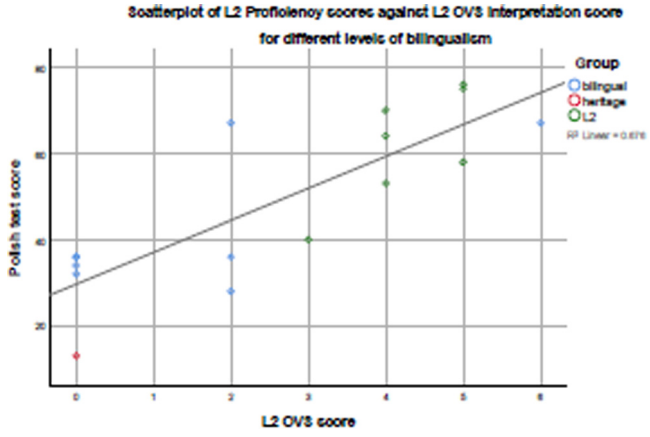

Figure 5: The scatter plot for Polish proficiency against Polish OVS score correlation.

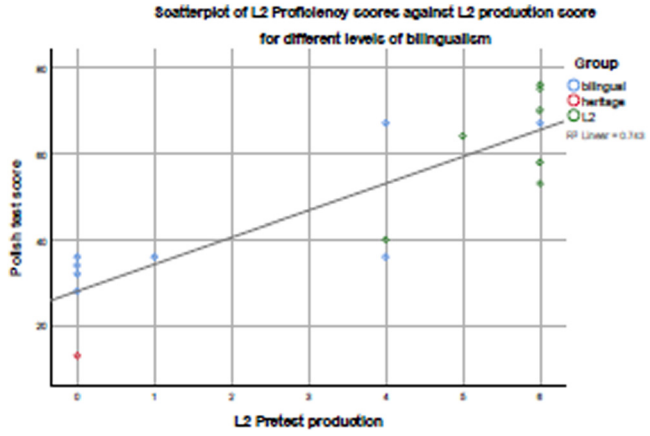

Figure 6: The scatter plot for Polish proficiency against Polish production correlation.

of L2 participants scored much higher on both tests. In fact, the lowest scores they reached in Polish proficiency was 40% and Polish production was 33.3%.

Finally, the Kendall's Tau-b correlation test revealed a positive correlation between Polish proficiency and German interpretation score ($\tau_b = 0.568$, $N = 16$, $p = 0.004$). A closer look showed that the correlation was with the SVO items, specifically ($\tau_b = 0.573$, $N = 16$, $p = 0.004$). A scatter plot was used to understand the data (see Figure 7). It indicated that with higher scores on Polish proficiency, participants scored higher on the German interpretation test. As before, interesting trends among the groups were present. The majority of the bilingual group largely scored low on both proficiency and German interpretation test, with Polish proficiency scores clustered below 40% and in this subgroup, German scores not reaching more than 4 points. In contrast, 4 points were the minimum score for the L2 group on the German interpretation test.

Moving on to the Polish interpretation, the Kendall's Tau-b test revealed correlations between the overall Polish interpretation test and a number of other tests, namely Polish proficiency, Polish production, Polish OVS and SVO as well as German interpretation and German SVO scores. The correlations with Polish proficiency were presented and discussed earlier, while the correlations with Polish OVS and SVO scores were disregarded as they formed a part of the same test and were expected to show. The two relationships that remain to be explored are between Polish interpretation and, first, Polish production and, second, German interpretation, specifically the SVO scores.

The Kendall's Tau-b correlation test revealed a positive correlation between Polish interpretation and Polish production scores ($\tau_b = 0.579$, $N = 16$, $p = 0.005$). A scatter plot was used to visualise the data (see Figure 8). It showed two distinct trends in the groups under investigation, suggesting more data are needed to make definitive claims. The bilingual group mostly scored below 40% on the interpretation test and did not manage to produce the target structure at all. In contrast, most of the L2 group interpreted 45% of sentences correctly and the majority of the group produced the target structure 100% of the time.

The Kendall's Tau-b correlation test also revealed a positive correlation between Polish interpretation and German interpretation scores ($\tau_b = 0.521$, $N = 16$, $p = 0.008$). A closer look revealed that the correlation was stronger with the SVO items ($\tau_b = 0.580$, $N = 16$, $p = 0.004$) than with the OVS items ($\tau_b = 0.434$, $N = 16$, $p = 0.035$). A scatter plot was used to visualise the data (see Figure 9). The plot showed an indication of a positive correlation trend, although the groups demonstrated different patterns. While most of the bilingual group did not score over 8 points on Polish interpretation (which amounts to 40%) and 4 points on German interpretation (i.e. 20%), the L2 group scored a minimum of 7 points on Polish interpretation (i.e. 35%) and 4 points on German interpretation (i.e. 20%).

The final analyses which will be discussed are the correlations between the individual components of Polish interpretation test, i.e. SVO and OVS items. Breaking down the Polish interpretation score into

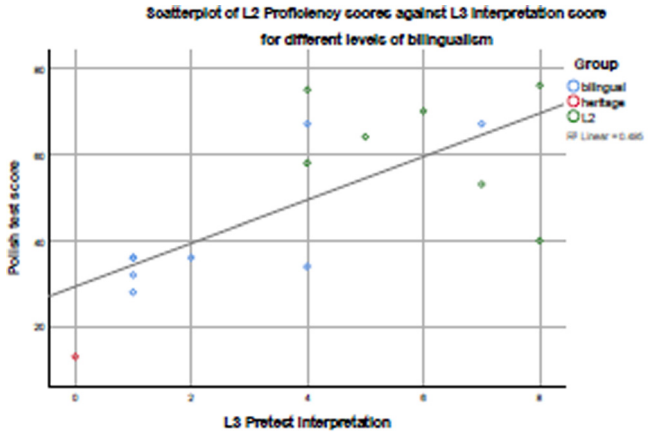

Figure 7: The scatter plot for Polish proficiency against German interpretation correlation.

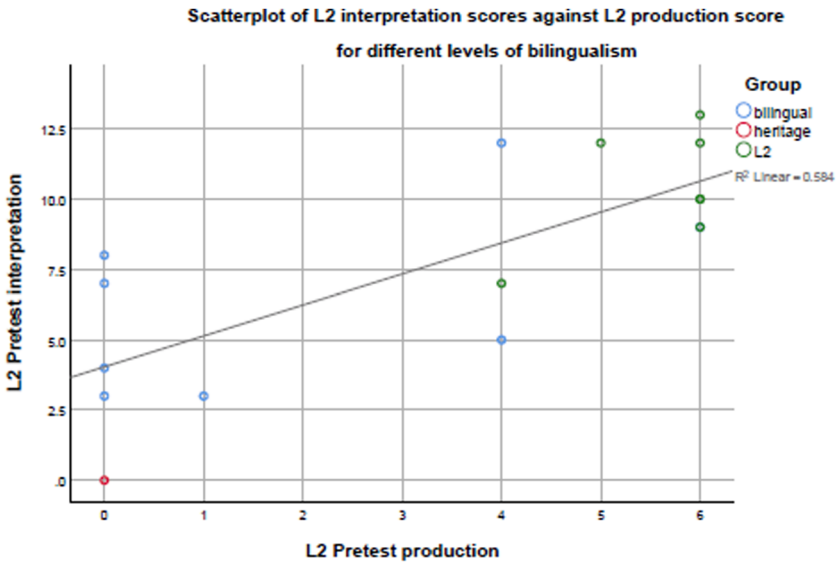

Figure 8: The scatter plot for Polish interpretation against Polish production correlation.

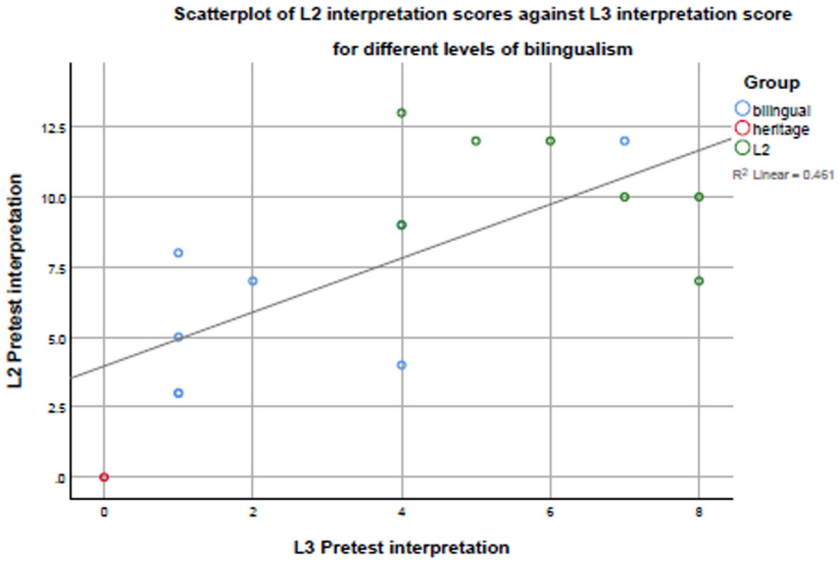

Figure 9: The scatter plot for Polish interpretation against German interpretation correlation.

respective SVO and OVS components revealed only one potential relationship, that between OVS sentence scores and German interpretation ($\tau_b = 0.590$, $N = 16$, $p = 0.004$). A closer look at the German interpretation scores showed that the correlation was in fact with both the SVO items ($\tau_b = 0.564$, $N = 16$, $p = 0.007$) and the OVS items ($\tau_b = 0.565$, $N = 16$, $p = 0.008$) in German. In other words, it appeared that the better the participants interpreted OVS items in Polish, the more likely they were to interpret both SVO and OVS sentences in German. To visualise the data, a scatter plot was used (see Figure 10) and, as before, suggested different patterns for different groups. While most of the bilingual group interpreted a maximum of 20% of Polish OVS sentences, and 20% of German sentences (i.e. 4 points), in the L2 group, the Polish OVS interpretation ranged between 30 and 50% and German interpretation between 20 and 40%.

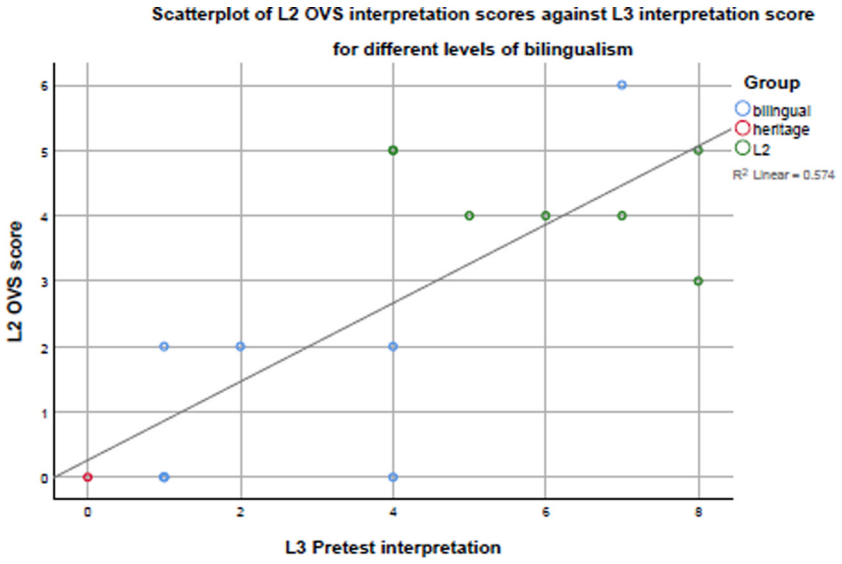

Figure 10: The scatter plot for Polish OVS interpretation against German interpretation correlation.

4.2 Language dominance

In order to explore the data further, language dominance was then taken into account and the three original groups were regrouped to reflect the Polish- and English-dominant participants. Based on the information provided in the language use questionnaires pertaining to language use and exposure, all participants (N = 16) were divided into two groups: English-dominant (n = 9) and Polish-dominant (n = 7). Group comparisons were then carried out to reveal any potential differences between the two new groups on all variables under investigation. Specifically, a series of independent t-tests were run at α = 0.05. As the groups were small, these results should be treated as an indication only, without relying solely on significance levels. Instead, a more holistic view of the data is needed.

The independent samples t-tests revealed differences between the two groups on a number of scores. First, the two groups differed in terms of their Polish proficiency at $t(14) = -2.959$, $p = 0.01$. As expected, the Polish-dominant group scored higher than the English-dominant group on the proficiency measure, a finding which was corroborated by the descriptive data (M = 64.5 vs M = 37.5). Second, the two groups also differed on Polish interpretation at $t(14) = -3.057$, $p = 0.009$. The descriptive data confirmed that again, the Polish-dominant group outperformed the English-dominant group (M = 10.8 vs M = 6.2). Again, this was expected. More in-depth analyses revealed that the cause for the difference was the sentence interpretation of Polish OVS items, $t(14) = -3.683$, $p = 0.002$, rather than SVO items, $t(14) = -1.782$, $p = 0.096$. This was an interesting finding which suggested that while simple SVO sentences tended to be processed fairly similarly by both groups, the Polish-dominant participants were more likely to process OVS sentences better than the English-dominant group. Third, the two groups differed on Polish production, $t(10.198) = -4.669$, $p = 0.001$. As before, the descriptive data confirmed that the English-dominant group did not do as well as the Polish-dominant group (M = 5.6 vs M = 2.1); again, this was not an unexpected finding. Finally and most importantly, the two groups differed on German interpretation $t(14) = -3.575$, $p = 0.003$. The descriptive data confirmed that the Polish-dominant group again was slightly more likely to interpret German sentences correctly than the English-dominant group (M = 6 vs M = 4.3).

4.3 Discussion

To remind the reader, the aim of the study was to explore whether, first, readiness to process morphosyntactic information could be related to age, proficiency, and prior linguistic knowledge among Polish–English

bilingual children of different levels of bilingualism, and second, whether differences would be found between participants reporting Polish- and English-language dominance.

To answer the first question, Kendall's Tau-b correlation tests were run on all data and trends were checked for the three groups representing the different levels of bilingualism. A relatively small sample was a limitation of the study and so results should be treated as indicative; a larger-scale replication of the results would be a useful next step. Participants' age (7 to 13 years) was added to the analyses on interpretation and production and appeared to correlate positively with the interpretation of Polish SVO items. This finding suggested that with age, learners were able to process those sentences better. It also suggested that learners may have been using word order as an initial strategy which is why they managed to process SVO sentences early and more confidently with time. As such, the way learners initially process incoming input may be guided by the first noun principle (VanPatten 2004). An interesting example was the participant who was the child of a heritage Polish speaker (the *heritage group*) who scored very poorly on the SVO sentences, despite the fact that she was not the youngest participant. It seems, then, that it is not age alone that is the determining factor for processing.

Polish proficiency appeared to be related to Polish sentence comprehension, especially the OVS sentences and to sentence production. Collectively, these results indicated that with higher proficiency in the minority language, the participants were able to not only both comprehend the incoming input, which also included sentences that required more processing abilities, but also to produce the items. At the same time, a closer look at these data revealed that the groups differed in how they managed Polish sentences. The visual representation of the three sets of data showed that the learners who were classified in the *bilingual group* mostly performed on the lower end of the spectrum, while the majority of learners in the *L2 group* managed to score higher on all tests. This suggests that the proficiency in the minority language could be a significant, potentially even determining, factor in developing the ability to process language, including sentences that are cognitively very challenging.

Considering the fact that all participants attended the same Polish Language School for a minimum of a year, their exposure to Polish in an instructed setting could have evened out their processing abilities. It seems, however, that this amount of Polish input was not sufficient in achieving this goal. This can be seen especially in the difference in processing OVS sentences. While SVO sentences were managed by all learners fairly comparably, the sentences which included preverbal objects caused too much difficulty to most of the *bilingual group*. It may be that it took these learners a longer time to abandon word order as a processing strategy. While all learners were highly proficient in spoken English, they were not formally tested on their English proficiency, which is a limitation of the study. No claims were made on the role of English in the processing of Polish and German sentences, but this score could have provided a useful means to measure the overall language-ability among learners – it is possible that the heritage Polish speaker had lower proficiency in English than participants in other groups, which could have prevented her from managing to process input. Although not likely, it is also possible that those learners who had higher English proficiency managed Polish input better.

While it was impossible to evaluate the role of English proficiency, the use of minority language, i.e. Polish, could explain some results. Looking at the different levels of bilingualism, the study suggested different patterns of processing and acquisition and indicated that using minority language at home can have beneficial effects on language development and acquisition. The participant in the *heritage group* never spoke Polish at home, only in the Polish school and she did not manage to interpret or produce many sentences in Polish. In contrast, children who reported Polish as their L1 along with English (i.e. the *L2 group*) had a higher proficiency in Polish (significant although other differences were even more pronounced). Their minority language development was much greater with participants reaching 100% in Polish production and consistently outperforming the other groups on a number of tests. Finally, the *bilingual group,* which comprised of children of mixed parents and stated English as the only L1, revealed a different development of Polish. The slower development of their minority language may have hindered their ability to interpret Polish sentences, specifically the more challenging OVS sentences, and to process accusative case marking, which is non-existent in English.

The most interesting finding of this study, however, pertains to the possible relationship between the minority language and the novel L3 learners were exposed to. There were clear differences between the two

groups on L3 processing with the *bilingual group* reaching quite a low ceiling and not managing to deal with OVS sentences. On the other hand, the *L2 group* managed to process some sentences in German, including the challenging OVS, albeit not consistently. The positive correlations that were found with Polish interpretation against German interpretation scores, in particular the SVO items, suggest that the learning trajectory in minority language, Polish, and novel L3, German, was similar as participants first managed to deal with SVO sentences and initially processed input seemingly using word order as a strategy. These results further may be taken as indication that improved knowledge of a minority language can assist learners in processing a new language altogether. The correlation between Polish proficiency against German interpretation and German OVS items would also suggest this as a strong possibility.

Interestingly, no direct correlation was found between the two target structures in the study, i.e. the accusative case markings in both languages expressed in OVS word order. One possible explanation of this could be that learners were not proficient in L3 sufficiently to be able to discern the structure implicitly. As they received absolutely no training on German, it was not expected of them to process the structure perfectly. At the same time, typological similarity in terms of the types of cues used in these two languages to express case and determine agency makes it an interesting case in L3 processing investigations. Therefore, future studies could consider learners of higher L3 proficiency in evaluating relationships with processing a typologically similar L1 or L2.

Looking at current literature on L3 morphosyntactic processing, the results suggest that prior linguistic knowledge may have a facilitating impact on the acquisition of L3, as originally stated by Flynn and colleagues (2004). It seems that Polish, whether treated as a L1 or L2, aided learners in the processing of L3. At the same time, as participants were early bilinguals, the study did not aim to determine whether it was specifically the L2 that was the source of morphosyntactic transfer which would be the prediction of the *L2 status factor* (Bardel and Falk 2007). Assuming that for learners in *the bilingual group* Polish had the status of L2, i.e. it was represented in a different part of the brain, it would be expected to transfer more readily to L3. This was not the case as it was the *L2 group* which showed more inclination to process L3 input. It is also important to note that if a higher cognitive similarity between L2 and L3 systems as per Paradis' model is to account for the results, Polish would need to be treated as L2 in the *L2 group*. This could be true if we assume that the exposure those learners received to Polish before they were 2 years old would account for a different classification.

At the same time, the results also suggest that learners' improved proficiency and processing of a typologically similar language supported them in processing a novel L3. It were learners with more developed Polish who were able to abandon word order as a strategy and adopt case marking as a cue in processing Polish. This seems to indicate a trend towards the *typological proximity model* (Rothman 2010, 2011, 2013, 2015) which would expect L3 learners to select a system to transfer to L3. As Polish system was better developed in the L2 group, it is those learners who predominantly attempted to process incoming L3 input, even though this would be expected of all learners eventually. As such, these results mirror the finding by Kulundary and Gabriele (2012) in that syntactic development in L2 could affect L3 development. Furthermore, they are in line with previous studies on bilingual first language learners who relied on the typologically similar language in processing their L3 (Giancaspro et al. 2015). I argue that these observations can be accounted for when we assume that bilingual learners have access to both mental lexicons and functional features such as case.

To answer the second research question, participants in the study had to be regrouped to reflect their language dominance. Information from language use questionnaire was used in order to operationalise language dominance, which was established by factoring in language exposure, i.e. the quantity of aural and written input participant received, as well as the language the participants used more at home. In terms of the development of Polish as a minority language, it was expected that Polish-dominant participants would be able to process sentences for agency better than the English-dominant participants. It was also expected they would better manage the processing of items which require more processing capabilities, such as accusative case marking in OVS word order, specifically. In terms of processing naïve L3 German, there were no hypotheses. However, it was hoped that if the two groups did reveal differences in processing the L3, the Polish-dominant group would be the one able to process it. The results were mostly in line with these expectations.

There were three key observations. First, language dominance was found to be relevant in processing morphosyntactic information as, collectively, the two groups differed on a number of tests. One of the key differences was on Polish proficiency, which showed that the Polish-dominant learners had higher proficiency scores than the English-dominant learners. In other words, being dominant in a language they used more translated to higher proficiency scores in that language. This result is in line with the view of Grosjean (2010) who argues language use is highly linked to language proficiency. This could also explain why the Polish-dominant group was able to produce Polish significantly better than the English-dominant group.

Second, the results showed language dominance to be aligning with the processing ability of learners' minority language. Somewhat surprisingly, learners in both groups did well on the SVO items in Polish and managed to establish agency in those items at a similar level. This finding suggests that learners were able to process simple declarative sentences well, even despite their differences in proficiency. In other words, they had already developed a processing strategy that allowed them to manage these sentences. As learners repeatedly selected the first noun as the agent in SVO sentences, this, again, would indicate that initially word order is used as a processing strategy (VanPatten 2004). However, in terms of the accusative case on masculine nouns in OVS sentences, the two groups showed variation. These sentences were cognitively more challenging and required learners to use case markings rather than word order as a cue. The results showed that not all learners were able to do this. The Polish-dominant group was able to do that better compared to the English-dominant group. A possible explanation could be that case marking as a strategy is developed at different times in those learners. This finding is in line with previous research on English learners of German who largely ignored case markings in OVS sentences (LoCoco 1987). It also aligns with previous studies demonstrating differences in the use of morphological cues among learners of different L1s (Kilborn 1989; Staroń and Kail 2004). Therefore, future studies could focus on further exploring the relationship between language dominance and the use of case marking as a cue in bilingual learners.

Finally, looking at L3 processing, the results of this study indicate that the two groups indeed showed a tendency to process the target structure slightly differently. This was the most exciting finding, in that dominance seemed to have mattered in how naïve L3 was processed by the two groups. The results suggested that the Polish-dominant group attempted to process L3 more so than the English-dominant group. This indicates that the ability to process a given structure prior to L3 can support the processing of typologically similar structure in L3 as well. This finding supported Rah (2010) who also found that L3 learners tended to select a processing strategy that was based on their dominant prior language. Therefore, since learners in the present study were using case morphology to process OVS sentences in Polish, it is possible that they attempted to adopt the same processing strategy in L3. At the same time, the fact that there were no significant differences between the two groups on OVS items in L3 specifically could indicate that learners did not have sufficient knowledge of L3 at this stage. With higher proficiency in L3, they could demonstrate even higher ability to process this complex structure, as was found by Hermas (2015). Therefore, considering that in the study learners were naïve in L3 and showed an indication to process it, a replication involving learners of higher proficiency in L2 and L3 could form further research.

5 Conclusion

To conclude, the findings in the present study attempt to provide greater insight into the processing abilities of Polish–English bilingual children, which is significant for a number of reasons. First, they indicate that maintaining migrant learners' L1 can assist them in the acquisition of that language. Second, for 2L1 learners born in the UK, to support their non-dominant L1 may be beneficial as well. These findings emphasise the ongoing criticism of UK policy on minority languages used in the mainstream class (cf. Lamb 2007 for initiatives in Sheffield). Third, and more poignantly, these results do not negate the possibility that helping learners process their L1 and L2 can potentially improve their ability to process and acquire the L3. The implications of this finding are vast, although it is recognised that more research to corroborate these results is first needed. Even though UK National Curriculum Statutory Guidance requires

that teachers consider the needs of students whose language is not English (Department of Education 2014), it lacks specific initiatives. Taking Polish as an example, instruction in Polish as a minority language is currently provided by private initiatives only due to lack of provision within UK educational system. It would be, therefore, beneficial to review both policy and practice.

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