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The assessment of language maintenance in bilingual children

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Abstract

This study investigates potential shifts in relative language dominance in early sequential bilinguals across the primary school years. The subjects are thirty-eight Polish-English speaking children. A new test, the Child HALA (Dubiel & Guilfoyle 2017), is introduced, which measures shifts in relative language strength by comparing lexical accuracy and response time between two languages. This test has been designed specifically for use with children, and is based on the HALA psycholinguistic tool (O’Grady, Schafer et al. 2009). The aim of this study is twofold. The first goal is to evaluate shifts in the relative language strength in both languages by examining changes in lexical accuracy and response time (RT). The focus is on the impact of word frequency on lexical accuracy and access, and the link between the frequency of language use and its relative strength and maintenance in bilinguals. The second aim is to examine the CHILD HALA’s suitability, reliability and applicability in research on language acquisition and maintenance in young bilinguals. In particular, the objective is to evaluate whether the test will show a pattern of shifts in language strength comparable to the outcomes of previous research. The results show that the children’s relative language dominance shifts from the initially stronger L1 Polish to the more dominant L2 English between the age of eight and eleven. The Child HALA test discovers reliable results across age groups and languages when compared with other studies that investigated lexical accuracy and access (Kohnert, Bates & Hernandez 1999; Jia, Kohnert, Collado & Aquino-Garcia 2006), and therefore may be considered as a reliable method in assessing language strength and maintenance in children. The results also support the earlier finding by O’Grady et al. (2009) and Tang (2011) of the response time measure being more sensitive and precise in the assessment of language strength than lexical accuracy alone. This study contributes to the broader field of bilingual language acquisition, and the

Child HALA may be considered as a reliable method in assessing language strength and maintenance in young children.

Keywords: *heritage language acquisition, first language maintenance, early sequential bilinguals, language dominance, language access*

1. Aims

Child bilingual speakers display uneven progress in the acquisition of their two languages that leads to a switch in language dominance in middle childhood from the initially stronger minority language to the majority language (Jia, Kohnert, Collado & Aquino-Garcia 2006; Jia, Aaronson & Wu 2002). The differences are not only quantitative, in terms of the size of the lexicons, but also qualitative, as studies highlight the impact of restricted sources of input on vocabulary richness, word comprehension and language proficiency in bilingual speakers (de Houwer, Bornstein & Putnick 2014; Marchman et al. 2016; de Houwer 2018).

The above studies demonstrated that reduced input in the minority language and an increasing exposure to the majority language result in a slower progress in lexical acquisition and language access in the minority language, and in a switch in language dominance around the age of 10. However, there is insufficient evidence documenting the gradual changes and the characteristics of the lexicon of young bilingual speakers that occur before the onset of the shift in language dominance (Montrul 2008, 2015).

The overall aim of this study is to examine the changing relative strength of the languages in bilingual children across the primary school years. The participants are early sequential bilinguals who acquired the L1 Polish in the context of home and used it solely until the first continuous exposure to the L2 English at the start of schooling around the age of 4 (Montrul 2008; Paradis 2008). As documented by previous studies (Jia, Kohnert, Collado & Aquino-Garcia 2006; Jia, Aaronson & Wu 2002; Oller & Eilers 2002), the hypothesis is that the children will decrease the amount of L1 use and limit it only to the context of home, and increase their proficiency and use of L2. Consequently, following claims made by de Bot (2001), Köpcke (2007) and O'Grady et al. (2009) that in bilinguals, language strength correlates directly with language use, it is predicted that the youngest children will have a stronger L1 in comparison with the L2, whereas the oldest participants will be already dominant in the L2. This is viewed as a consequence of their growing proficiency in the L2

due to being schooled in that language and socializing with friends and limiting the use of Polish to the context of home.

The first goal is to evaluate shifts in the relative language strength in both languages by examining changes in lexical accuracy and response time (RT) across the primary school years. Accuracy and response time, viewed as the speed with which speakers can access words from their mental lexicon and then produce them, will be assessed with respect to a specific set of nouns divided into two frequency of use strata, which will allow for an investigation into the relationship between the frequency of language use and its accessibility and ultimate strength. The response time is viewed here as a measure that can assist in evaluations of language strength as it has been shown that the speed with which speakers can produce words in a language and the frequency of its use are positively correlated and thus can be viewed as predictors of relative language strength in bilinguals (O'Grady et al. 2009). The analysis of word frequency will provide more detail into the changes that occur before the onset of the shift in language dominance. In order to examine the dynamics of lexical development in both languages, this study introduces a new version of the HALA psycholinguistic tool (O'Grady et al. 2009) called the Child HALA, which measures lexical accuracy and response time to evaluate language strength in children. The second goal is thus to evaluate the suitability and applicability of the test in studies on language maintenance in bilingual children.

2. Theoretical underpinnings

2.1. Language dominance in bilinguals

In the field of bilingual acquisition, the phenomenon of language dominance is usually defined as 'a situation where one of a child's languages is more advanced or developing faster than the other' (Yip and Matthews 2006, p.4). Most researchers analyse the phenomenon in terms of proficiency (Petersen 1988, Genesee, Nicoladis & Paradis 1995), however, in this study language dominance is considered in terms of language use and exposure that underlie and significantly impact language proficiency in bilingual speakers. According to Wang (2013, p. 738), language dominance cannot be only linked to language ability, but is a "global measure of relative frequency of use and proficiency in each language" (in Treffers-Daller and Korybski 2016, p. 106). Language dominance is thus viewed here as a direct link between a psycholinguistic factor of processing proficiency and sociolinguistic factors of language exposure and use. In other words, the language that bilinguals are exposed to and use more frequently becomes the language in which they can

access words without pauses and hesitations, and thus it is the language they are more dominant in. According to de Bot (2001), the sociolinguistic factor of language exposure determines the amount of language use which in turn affects language processing. Similarly, Köpke (2007) and O'Grady et al. (2009) claim that frequency of language use contributes most directly and significantly to the maintenance of a language and its relative strength. O'Grady outlines this view by further stating that the more often the lexical items and phrases of a particular language are activated, the more accessible they are, and consequently speakers can produce them quicker and with ease. This process becomes a natural cycle, where infrequent use impacts negatively language accessibility, and as a result its speakers become reluctant to use the language, which further decreases its accessibility.

The above assumptions that relate to language dominance in terms of an interface between sociolinguistic and psycholinguistic factors have also been supported by the Weaker Links Hypothesis (Gollan et al. 2008) and the Activation Threshold Hypothesis (Paradis 2004). In the Weaker Links Hypothesis, Gollan and her colleagues claim that bilingual speakers perform worse than monolinguals in production tasks and in non-dominant versus dominant language comparisons because of an imbalance in frequency of language use. The support for this hypothesis comes from the fact that bilinguals produce fewer low-frequency words than high-frequency words, as compared with monolinguals, and in the dominant versus non-dominant language comparisons. In the Activation Threshold Hypothesis (2004), Michel Paradis emphasizes the role of inhibition and frequency of use. He claims that frequent use leads to a lower activation threshold, which in turn results in a shorter response time. Consequently, items that are infrequently used have a higher activation threshold which in turn results in longer time necessary to produce the items.

2.2. Shift in language dominance in early sequential bilinguals

It has been widely acknowledged that bilingual speakers are exposed to a varied quantity and quality of input which may impact the rate and level of acquisition in both languages, and cause a situation where one language develops faster and shows more complex advancement at any given time (Yip & Matthews 2006; Gathercole & Thomas 2009). This dominance in one language may, however, shift, and the once stronger language may become weaker depending on the changes in input (Yip & Matthews 2006). These shifts in language dominance over time are characteristic of bilingual speakers who might not have fully

acquired their first language due to an early exposure to the L2, in most cases in a school environment.

Previous studies that investigated parallel lexical accuracy and access of the L1 and L2 in early sequential bilinguals documented that the two lexicons develop unevenly, with greater progress in the L2 and slower in the L1, leading to a switch in language dominance, from the initially stronger L1 to L2 by middle childhood. Kohnert, Bates & Hernandez (1999) assessed performance in a picture-naming task of Spanish-English early sequential bilinguals who were tested in four age groups that spanned the duration of primary school years. The outcomes revealed that despite balanced accuracy, response times (RT) rates in English expressive vocabulary overtook Spanish by 8–10 years of age, indicating a shift from early dominance in the L1 to a stronger L2 for expressive vocabulary. As for receptive vocabulary, Kohnert and Bates (2002) obtained similar results in a timed picture-verification task. Jia et al. (2006) replicated the design of those studies to investigate verb processing in a similar population. The results showed that the trajectory of growth was steeper for English than for Spanish leading to a switch in language dominance between the age of 8 and 10. This trend of fluctuations in the relative language strength that ultimately lead to a switch in language dominance by middle childhood has also been reported in other linguistic domains, like phonology, morphology and syntax for similar age- and type of bilingualism groups of various heritage languages (Oller & Eilers 2002; Yeni-Komshain, Flege & Liu 2000; Jia, Aaronson & Wu 2002).

The above discussed studies pointed to fluctuations in parallel lexical acquisition in the L1 and L2. However, there is not enough evidence documenting the characteristics of those fluctuations, and therefore it is the aim of this study to examine the lexical development in more detail by looking at the impact of word frequency of use on lexical acquisition and response time.

3. Methodology

3.1. Participants

The participants were thirty-eight children divided into four age groups. In order to be included in the study, the children had to meet the following criteria:

All children:

- 1) were primary school pupils aged between 4;6 and 13,
- 2) had both parents of Polish nationality who were first generation immigrants,
- 3) were born in Ireland or have immigrated to Ireland before the age of 5,
- 4) met the criteria to be classified as early sequential bilinguals i.e.: their first consistent contact with English could not have occurred before the age of 3;6 – 4;6.

The families live in Dublin suburbs with a high population of immigrants from Poland. The language of the family and community is Polish.

The participants were divided into four groups based solely on their age. Twenty-four participants aged between 4;7 and 6;11, and fourteen children aged between 7;3 and 13 were gathered for this study. It was decided to form four age groups that would span all primary school years, and due to the uneven distribution of the participants according to their age, a decision was made to split the younger children aged between 4;7 and 6;11 into two groups. This division allowed for an observation of changes in the acquisition of both languages after only twelve months of consistent English exposure, and thus it was possible to observe early signs of a reduction in the L1 input and an increasing exposure and proficiency in the L2.

The first age group, Group A, consists of children who were in the first year of primary school, and were tested in October/November after 1-2 months of education in English.

The second age group, Group B, comprises children after one full year of primary education. They were tested either in June, the last month of their first year in school, or in the following September.

The following age group, Group C, consists of children attending classes 1st, 2nd and 3rd, while the oldest children, pupils of between 4th and 6th classes, formed Group D.

Table 1 below presents the statistical analysis and the division of the participants according to age.

Group	Number	Mean age	SD	Age Range
A	10	4;10	0.28	4;7 – 5;3
B	14	5;10	0.52	5;1 – 6;11

C	8	8;0	0.67	7;3 – 8;9
D	6	11;5	1.07	10;4 – 13;0

Table 1: Age at testing

As can be seen in Table 2, half of the children in this study began their first consistent exposure to English after the age of three, while the rest started to learn English in the first year of primary school at around the age of 4;6 – 5.

Group	Number	Mean age	SD	Age Range
A	10	3;8	0.55	2;6 – 4;6
B	14	3;11	0.54	3;1 – 4;10
C	8	4;6	0.59	3;3 – 5;3
D	6	4;11	0.89	3;3 – 5;7

Table 2: Age at first consistent exposure to English

3.2. Method

In order to investigate the changes in the relative strength of both languages over time, a picture-naming task, the Child HALA psycholinguistic tool (Dubiel & Guilfoyle 2017) was used. It is a modified version of the HALA psycholinguistic tool (O’Grady et al. 2009) which compares relative lexical accuracy and speed of response time between languages and has been designed for use with children.

The tool includes body part terms because they are universal, have counterparts in all languages, and their basic status may prevent replacement by borrowing. Also, they are acquired by all users of a language at an early age in the context of a home environment, and therefore, according to O’Grady et al. (2009), low accuracy and RT scores might be interpreted as indicators of language endangerment or weakening.

The test consists of 27 nouns (see: Table 3) that are divided into two strata according to word frequency, following guidelines set by O’Grady et al. (2009). The word frequency was verified for Polish using data from the spoken channel in The National Corpus of the Polish Language (Przepiórkowski, Bańko, Górski, & Lewandowska-Tomaszczyk 2012).

High-frequency nouns	Low-frequency nouns
Ear	Arm
Eye	Cheek
Face	Chin
Fingers	Eyebrow
Foot	Nails
Hair	Forehead
Hand	Neck
Head	Thumb
Knee	Bellybutton
Leg	Elbow
Mouth	Heel
Nose	
Shoulder	
Stomach	
Teeth	
Tongue	

Table 3: Child HALA test items by word frequency stratum

The method chosen for this study is an on-line, closed conditions picture-naming task that allows for an examination of fluctuations in relative language strength. By evaluating the participants' speed of response time, the aim was to add to the existing knowledge by using a method that allows for an examination based on the interplay of the factors of language use and speed of response time. As shown by O'Grady et al. (2009), Tang (2011) and Dubiel and Guilfoyle (2017), the measure of response time (RT) is more precise and sensitive in the assessment of language strength than accuracy alone, and is strongly dependent on the amount and quality of exposure to a language.

3.3. Testing procedure

The implementation of the test is simple and straightforward. The participants are presented with an animated cartoon image of a boy on a computer screen, and are required to name highlighted body part terms as quickly and accurately as possible (see: Figure 1).

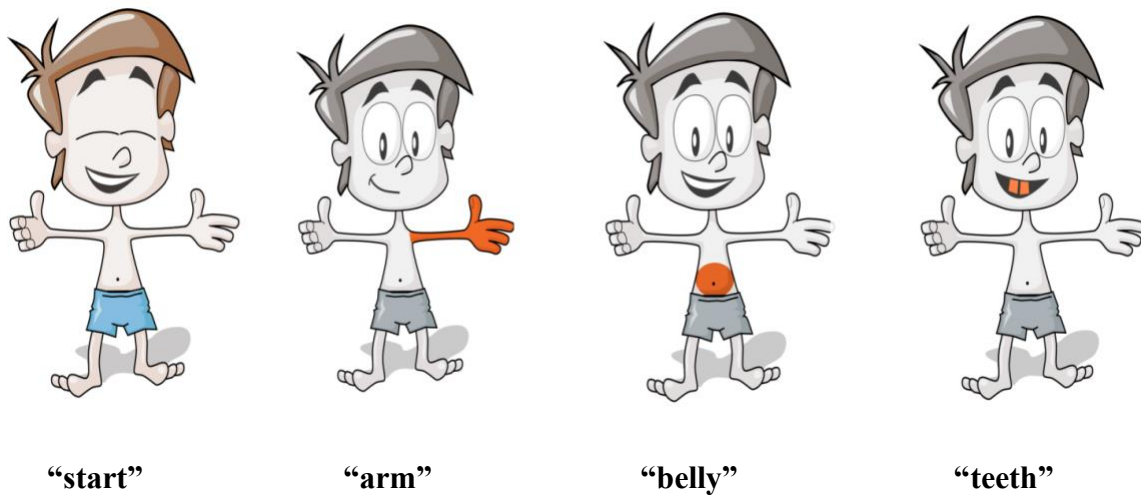


Figure 1: Sample images from the Child HALA test

First, the responses are assessed for accuracy, and then the response times of the accurately named nouns are calculated in milliseconds from the onset of the body part being highlighted to the onset of the response. Afterwards, these scores are compared for the two languages of interest.

The testing took place at the children's homes. The subjects were seated in front of a Toshiba 14 inch laptop with an embedded microphone. The recordings were made using an Olympus VN-8600PC digital voice recorder which was placed in front of the participant and next to the laptop.

During the test, an animated cartoon image of a boy was displayed in the centre of the laptop monitor. The body part terms to be named were highlighted in red, one after another. The onset of the body part term being highlighted was synchronised with a beep to allow precise transcription, and to attract the subject's attention.

The tester controlled the speed rate with which the images were highlighted, and the decision to move to another image was made when the participant either named the body part term, asked/gave a sign to move on, or indicated that they did not know the term. Following that, the particular body part remained highlighted for around 2000ms so that the child could complete the response and prepare for the next image.

3.4. Coding

The output was analysed with respect to accuracy and response time. The level of accuracy was established based on the number of correct responses given by each child. The following types of responses that were produced in the target language were counted as correct:

- responses that corresponded to either the dominant name of the highlighted image or were an appropriate synonym/dialectal variation of the item (e.g. in Polish, *buzia* and *twarz* were both correct responses for the target ‘face’¹)
- diminutive forms
- plurals
- correct lexical forms with wrong inflection (e.g. *uchy* – ‘ears’).

Some type of responses were scored as accurate and used to establish the level of accuracy, however, they were counted as incorrect for the response time analysis. They included: repetition of the first syllable (e.g. *ra-ramie* - ‘sho-shoulder’) or audible hesitations (e.g. *eeebrzuch* - ‘eeeebelly’). Accurate responses that were excluded from the RT analysis were 3.8% of the total answers.

Items eliminated from further study of the RT analysis included:

- lack of response
- responses not in the target language
- guesses (e.g. *Nie wiem ... czolo?* / ‘I don’t know...forehead?’)
- two or more responses (e.g. *stopa nie ... pieta* / ‘foot ... no... heel’)
- responses interrupted by sneezing or coughing
- responses which failed to trigger the timing device due to background noise, e.g. car engine, siblings playing in the other room, etc.

The response time analysis was conducted only for those items that fulfilled the above criteria. In the psycholinguistic literature, response times of more than 2000ms are discarded from the analysis for monolingual speakers (Jescheniak & Levelt 1994). However, as the participants of this study are bilingual children with an assumed reduced language proficiency, a decision was made not to follow this procedure.²

In order to eliminate the extreme values, it was decided to narrow the RT analysis to a 4000ms response-window, following criteria used by Bates et al. (2003) and Jia, Kohnert, Collado & Aquino-Garcia (2006) in their timed-picture naming studies. Also, as is common in psycholinguistic research, a further screening was applied to eliminate any response times for each participant that were more than 2 standard deviations from the overall mean response time for accurate responses from that participant.

4. Main findings and discussion

The results include the accuracy and response time (RT) measure, and are presented with regards to two categories: word frequency effects and overall cumulative results.

4.1. Accuracy scores according to word frequency

As we can observe from the results shown in Figures 2 and 3, accuracy gains have been made at both frequency levels across all age groups in both languages, with a stable improvement in Polish, and considerable shifts in English, especially for the low-frequency words.

The results of the high-frequency words analysis in English, presented in figure 2, show that the participants double their score after only 9–12 months of English exposure, and manage to equal the score with the Polish equivalent by the end of primary school.

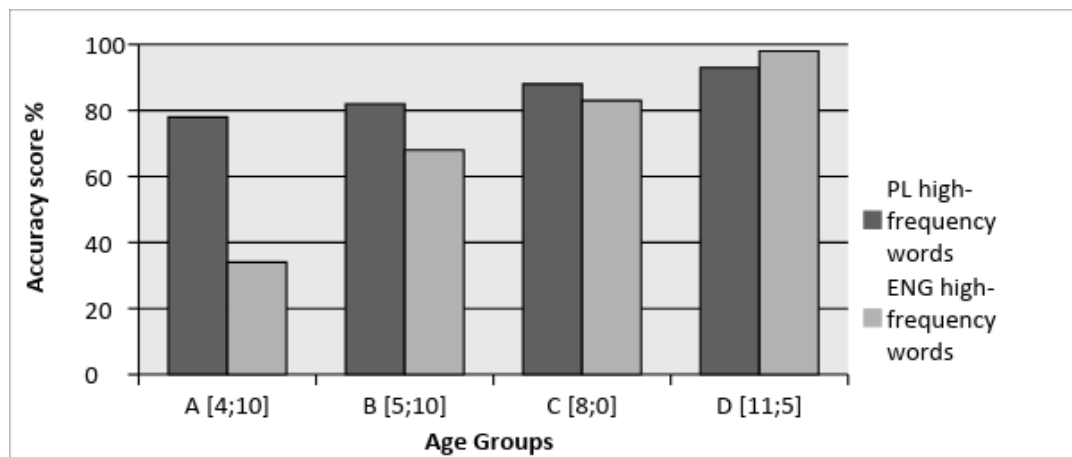


Figure 2: Accuracy scores in Polish and English for the high-frequency words

The knowledge of low-frequency words in English is limited in the youngest group, however, we can observe in Figure 3 that they improve significantly across the age groups. The children make 800% progress after their first year at school, following by a 263% gain, and then again with a 190 % gain between the last two age groups. Despite this significant

improvement in English, the participants do not achieve the same level of accuracy in the low-frequency measure as in the Polish language.

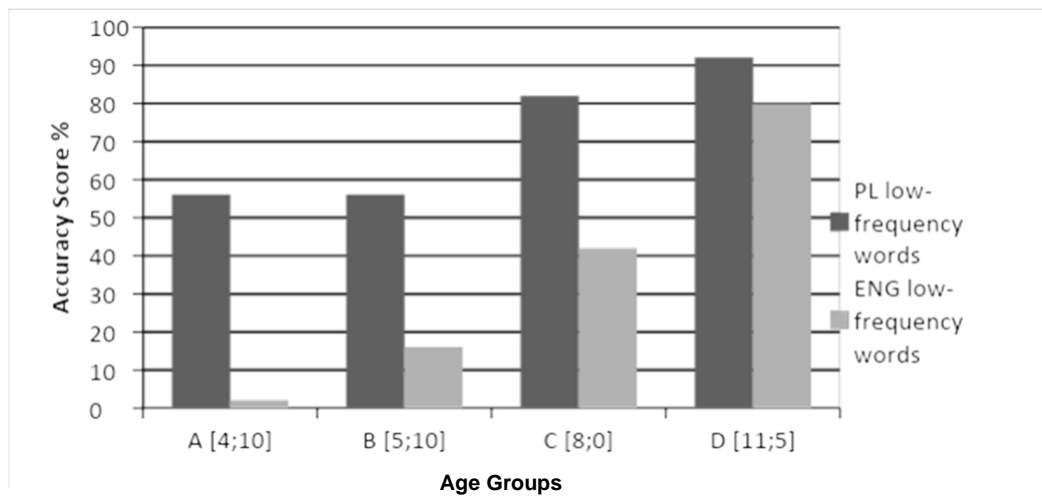


Figure 3: Accuracy scores in Polish and English for the low-frequency words

The above results support the correlation between accuracy scores and word frequency, as it can be observed that the high-frequency words produce higher accuracy scores than the low-frequency words.

4.2. RT scores according to word frequency

The scores reveal that, again, gains have been made across both high- and low-frequency words in both languages. However, the improvement has been more dynamic in the L2. Figure 4 shows that the overall increase in the RT for high-frequency words in Polish is 0.395 ms, while in English, it is 0.655: almost double that of Polish.

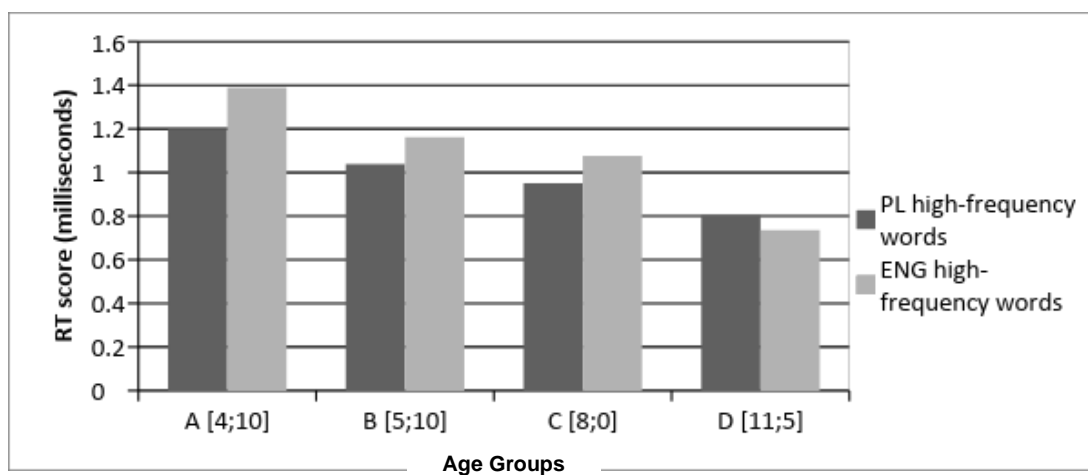


Figure 4: RT scores in Polish and English for the high-frequency words

The analysis of the low-frequency words, shown in figure 5 below, has revealed the overall gain, from the youngest to the oldest age group in Polish, to be 0.291 ms. Thus, there is a slight advantage of the younger B group over the C group, though it is not statistically valid. As for English, due to the fact that the accuracy levels have been so low in the two youngest groups (see: section 4.1), a decision was made not to evaluate the total gain.

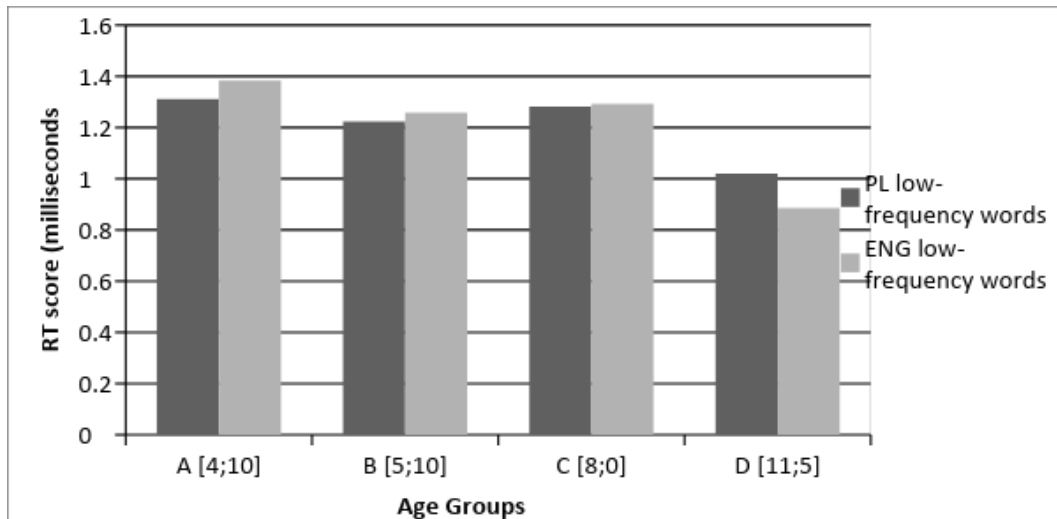


Figure 5: RT scores in Polish and English for the low-frequency words

Despite that, as can be seen in figure 5, the children display substantial progress in the English response times as a function of age, in other words, the older children name the body part terms much faster than the younger children. Also, the children's English RT scores are lower than Polish by 0.135 ms. Comparisons of the RT scores across both languages, shown in figures 4 and 5, have revealed that despite quicker responses in Polish in the youngest group, the dynamic process of the acquisition in the L2 results in quicker responses in English by the mean age of 11;5.

4.3. Overall accuracy scores and RT scores: evidence for a shift in language dominance

Figure 6.a) shows the cumulative accuracy scores. They support the separate word frequency results, and evidence a steady improvement in Polish and a steep growth trajectory in English. The divergence in accuracy between the languages is substantial in the youngest age groups, however, it becomes balanced (reaching the 90% score in both languages) after mean 6;8 years of education in primary school. Statistically, a mixed measures analysis of variance (ANOVA) found a significant increase in participants' picture-naming accuracy with

increasing age $F(3, 33) = 27.925, p < .001$, and between languages $F(1, 33) = 1600, p < .001$. This confirms that accuracy was higher for the older groups than the younger ones, and it differed between the two languages with all groups except for the oldest children. Most importantly, the results illustrate that the measure of accuracy does not point to any switch in language dominance. The children initially have a stronger command of the Polish lexicon and gradually achieve relative balance in both languages.

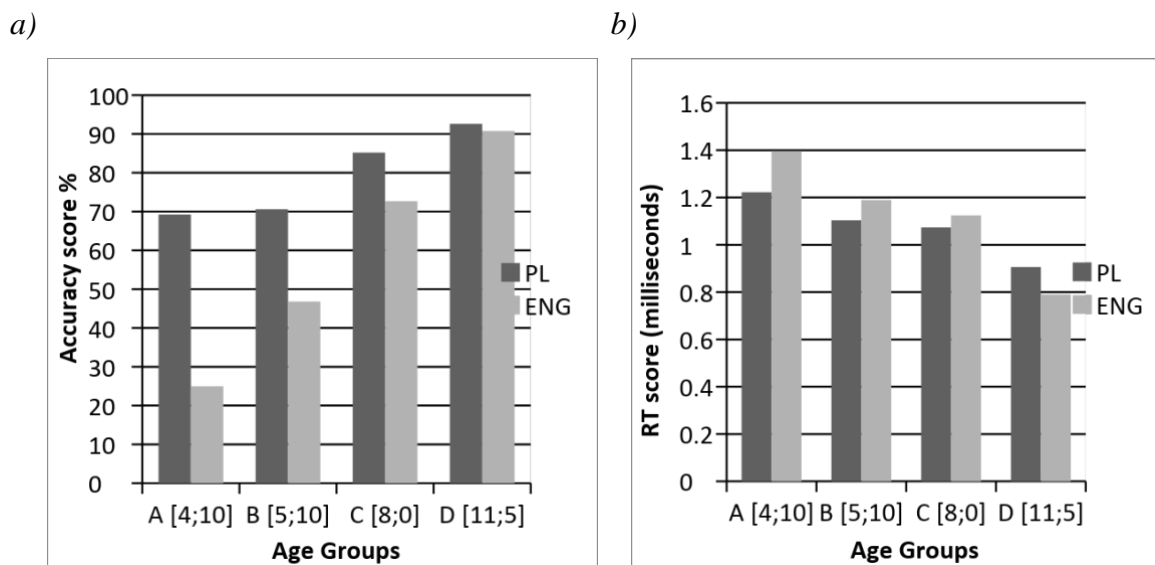


Figure 6: Comparison of overall a) accuracy and b) RT scores between Polish and English

The analysis of the cumulative RT scores reveals, however, a different pattern than the accuracy results which pointed to a state of relative balance in the strength of both languages. The results in Figure 6b show that the overall mean gain in Polish is 0.316 ms (from the youngest to the oldest group), whereas in English the mean gain is 0.605 ms. Despite initial slow access to the nouns in English as compared with Polish, the oldest children name the words quicker in their L2 than in L1, which can be indicative of a switch in language dominance at the oldest age level. We entered the overall individual mean scores into a mixed measures analysis of variance (ANOVA), which showed significant effects of age, $F(3, 33) = 6.114, p < .002$, and language, $F(1, 33) = 1261.6, p < .001$.

In order to support the RT results that point to a shift in language dominance from the initially stronger L1 to L2, following O'Grady et al. (2009), I calculated the size of response

time differentials by dividing the mean response time in the L1 by the mean response time in the L2. This yields the results shown in Table 4.

Group and mean age	Polish	English	Differential
A – 4;10	1.222	1.395	0.87
B – 5;10	1.104	1.189	0.93
C – 8;0	1.074	1.124	0.95
D – 11;5	0.906	0.790	1.15

Table 4: Overall RT scores in Polish and English and differentials (milliseconds)

According to O’Grady et al. (2009), differentials can be indicators of language dominance measured by response time calculation. The scores nearest 1.00 denote balance in the strength of the speaker’s two languages. As we can see in table 4 above, the youngest group A is clearly dominant in Polish, while the two middle groups – B and C are closer to a state of balance in the lexical access in the two languages. Assuming after O’Grady et al. (2009), that differentials above 1.00 indicate a shift in language strength, we can conclude that at the oldest age level, the children become dominant in English.

The results have shown that the participants display steeper progression in the L2 than in the L1, despite initially worse scores in the L2 accuracy and response time measure. The younger children are more accurate and have faster response time in Polish than in English. By the time they are 11;5, they are as accurate in Polish as in English (Figure 6a), however, they can produce words faster (have shorter RT scores) in English (Figure 6b). This shift in language access may be interpreted as evidence of a switch in relative language strength, and occurs between the mean age of 8 and 11;5. The analysis of the impact of word frequency of use detailed the trajectory of lexical development in both languages before the switch in language dominance. The frequency strata and cumulative results support the claims made by e.g.

O'Grady et al. (2009) and Gollan et al. (2008) with regards to the correlation between language and word use and their accessibility.

The results also support the earlier finding by O'Grady et al. (2009), Tang (2011) and Dubiel & Guilfoyle (2017) of the response time measure being more sensitive and precise in the assessment of language strength than lexical accuracy. Although the accuracy scores show an overall balance between the lexicons at the oldest age level, the results of the RT analysis indicate that a switch in linguistic dominance is about to occur.

The second aim of this study was to evaluate the suitability of the Child HALA test for use in studies investigating language maintenance in bilingual children. First, the evidence of the Child HALA's suitability, reliability and applicability for use with child subjects are the results that are coherent, parallel, and consistent as totals, and relevant in between-group and strata divisions. The test produced reliable and transparent results that are not only applicable to one group or one measure, but reflect a clear pattern of credible outcomes over several age groups and measures (frequency strata and overall). Second, the final outcomes are in line with the findings of previous studies that examined relative language strength through assessments of lexical accuracy and access (e.g. Jia, Kohnert, Collado & Aquino-Garcia 2006; Jia, Aaronson & Wu 2002), and thus support the method's applicability, suitability and reliability for use in research on language acquisition in bilingual children. The results that point to slight fluctuations and shifts in lexical accuracy and access that are evident as early as after twelve months of the L2 exposure highlight the Child HALA's sensitivity in the assessments of language weakening and early endangerment.³ The Child HALA test has been shown to be sensitive and precise in detecting minimal shifts in lexical fluency, measured by the speed of response time, which, according to previous studies, is an indicator of language use.

5. Implications for practice/policy/research

There are important issues emerging from this study that would require further investigation and should be addressed in future research. The aim of this study was to shed light onto the parallel lexical development of the L1 and L2 in early sequential bilinguals. It was shown that, during this period, bilingual language acquisition is extremely susceptible to the dynamic and changing pattern of language exposure and use. The results revealed that although the L1 Polish was acquired from birth and is still the main language of

communication in the context of home, the amount and quality of input in the language was not sufficient for the children to keep the language as their dominant one towards the end of primary school. Due to sociolinguistic and environmental factors such as, schooling, growing proficiency and socializing in the L2, after only 6 years of exposure to the language the children can access words in English more quickly than in their first language Polish.

The results showed that the primary school years are a transitional stage between a relative dominance in the L1 and the L2, and therefore more research is necessary to examine how the acquisition patterns of the two languages interact during that period. Additionally, as the study only examined lexical development, an interesting question remains as to what extent the pattern of lexical acquisition mirrors syntactic and phonological development. It can be tentatively expected that such correlations could be positive on the basis of earlier work by Kagan and Friedman (2004) and Maria Polinsky (2008) who pointed to the issue of speech rate (words/minute) as a valid diagnostics in evaluating language maintenance in heritage speakers. Assuming that lexical development correlates positively with the bilinguals' knowledge of grammar, which has been documented for adult speakers (Polinsky 1995, 2006), the next step could be to evaluate whether these indicators of early changes that were documented in this study correlate with the pattern of the children's grammatical development. Such evidence of early signs of the heritage language weakening could be informative to the emerging field of heritage language pedagogy in terms of the exact areas of language acquisition that require additional support. Therefore, the question may be asked as to whether early preventative pedagogical intervention could assist in delaying the onset of this lexical weakening in the heritage language. Also, if however, diagnosed, could we prevent further changes in the lexical system or lessen their scope? And finally, could these early interventions and pedagogical support delay the ultimate switch in language dominance? Further studies could assist work on language policy, curriculum developments and teacher training with regards to support for minority language maintenance and balanced bilingualism in primary schools.

With regards to the Child HALA test, the issue of further correlations was already suggested by O'Grady et al. (2009), who stated that more work would be necessary to compare the results obtained from the original HALA method and from other methodologies used to examine language proficiency, e.g. MLU (mean length of utterance). This issue could have implications for the usefulness of the Child HALA as an assessment tool. The Child HALA

and HALA tests share the same theoretical assumptions, and therefore if such correlations bring positive outcomes, both tests could become universal and compact tools applicable in projects aiming at quick and straightforward diagnostics of language proficiency in any language.

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¹ Despite the possibility of different frequency values for various synonyms accepted for one term (graphical representation) in one language, it is assumed that the frequency values can be comparable across different pairs of languages. As they are characterized by basic status and an early age of acquisition in the context of a home environment, the words are likely to be of comparable relative relevance in all communities and languages. On this basis, O’Grady, Schafer et al. claim that there will be positive cross-linguistic correlations between lexical accuracy, access and frequency of use. This assumption was also based on Bates et al.’s cross-linguistic study (2003), where the researchers found positive cross-linguistic correlation between frequency of use and response times in the seven languages they examined.

² See also Hulsen (2000) and Kang (2011) who adopted the same approach in their studies on bilingual adults and children.

³ Further support for the Child HALA test comes from positive correlations between the results of this study and a study examining bilingual primary school children’s noun production in narratives (see: Dubiel 2015)