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LIKE TWO PEAS IN A POD?  
Linguistic Differences in Bilingualism  
and Specific Language Impairment:  
A Twin Case Study

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*Dla mojej Mamusi.*

*Für meinen Papa.*



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## Abstract

Nowadays, bilinguals are the norm rather than the exception (e.g.: Ellis 2005; Grosjean 2010) and yet a large number of linguistic measurements are standardised on a monolingual rather than a bilingual norm. This often leads to the misdiagnosis of typically developing bilingual children as language impaired – a misdiagnosis which can have a large impact on their social and academic development. It is thus necessary to understand and disentangle the overlaps between bilingual and impaired speech, which was the aim of this study<sup>1</sup>. Using a twin case study design, the linguistic differences between a typically developing and a language impaired English-Polish bilingual were analysed. The twin boys have been assessed aged 4;8, 4;10 and 5;6 years in both their languages using one non-linguistic measurement, productive and perceptive lexical tests, sentence repetition tasks, recognition of grammar assessments and narrative tasks. Their results differ significantly in regard to phonological processing, morphosyntactic knowledge, grammaticality, length and complexity of narratives, metalinguistic awareness and their strategic competence. The latter is a new finding and indicates that a difference in communicative strategies might be a crucial differentiating factor between typically developing bilingualism and SLI.

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## List of Abbreviations

(according to their appearance in the text)

|                     |                                                                                     |
|---------------------|-------------------------------------------------------------------------------------|
| <b>SLI</b>          | Specific Language Impairment                                                        |
| <b>SLA</b>          | Second Language Acquisition                                                         |
| <b>COM[2003]449</b> | Action Plan for Language Learning and Linguistic Diversity/Mother Tongue + 2 Policy |
| <b>ESBOM</b>        | Eurostat Statistical Book on Migrants in Europe                                     |
| <b>RoPPzG</b>       | Raport o Polonii i Polakow za granica                                               |
| <b>SD</b>           | Standard Deviation                                                                  |
| <b>PLI</b>          | Primary Language Impairment                                                         |
| <b>TD</b>           | Typically Developing                                                                |
| <b>LI</b>           | Language Impaired                                                                   |
| <b>MLU</b>          | Mean Length of Utterance                                                            |
| <b>NDW</b>          | Number of Different Words                                                           |
| <b>RI</b>           | Region of Interest                                                                  |
| <b>MZ</b>           | monozygotic                                                                         |
| <b>DZ</b>           | dizygotic                                                                           |
| <b>MRI</b>          | Magnetic Resonance Imaging                                                          |
| <b>ERP</b>          | Event-Related Potential                                                             |
| <b>BISLI</b>        | a research area that focuses on bilingualism and specific language impairment       |
| <b>NICU</b>         | Neonatal Intensive Care Unit                                                        |
| <b>LIB</b>          | Language Impaired Bilingual                                                         |
| <b>TDB</b>          | Typically Developing Bilingual                                                      |
| <b>EVT</b>          | English Vocabulary Test                                                             |
| <b>BPVS</b>         | British Picture Vocabulary Scale                                                    |
| <b>SR</b>           | Sentence Repetition (Task)                                                          |
| <b>SASIT</b>        | School Age Sentence Repetition Task                                                 |
| <b>OTS</b>          | Obrazkowy Test Słownikowy<br>Polish Productive Naming Test                          |
| <b>OTS-R</b>        | Obrazkowy Test Słownikowy (Recepcja)<br>Polish Perceptive Naming Test               |
| <b>TROG</b>         | Test of Reception of Grammar                                                        |



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## 1. Introduction

Ja się zawsze śmieję, że oni mówią w poniedziałek po polsku a w piątek po angielsku.

*I am always joking that they speak Polish on Monday and English on Friday.*

The twins' mother

Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its life thinking it is stupid.

Albert Einstein

This first quote perfectly sums up the nature of bilingualism and, at the same time, also points to the problematic situation arising from it. Bilingualism is not clear-cut. It is not black or white. It is not a question of either or. Bilinguals, by definition, speak two languages and that is who they are. They are not two monolinguals, nor two halves of a monolingual, they are neither better nor worse than monolinguals, the two groups are simply not comparable. Bilinguals are their own species with their own, independent ways of speaking and yet they live their lives in the shadows of the big, supposedly omniscient monolinguals – the norm. It is the monolinguals' speech which is referred to in order to decide what is normal and what is not and it is their speech the vast majority of language tests is standardised on.

This standardisation of linguistic measurements on a monolingual cohort is, obviously, quite problematic as it does not provide for the peculiarities of bilingual speech and hence dual-language speakers are prone to be misdiagnosed as linguistically impaired despite their language development following a typical (bilingual) course. Such a misdiagnosis can, quite evidently, have a huge impact on the social and academic development of bilingual children and should, therefore, be prevented whenever possible.

In order to be able to do so, however, one first needs to understand where typical bilingual development ends and language impairment begins and it is at exactly this crossroads that the *COST Action IS0804 - Language Impairment in Multilingual Society: Linguistic Patterns and the Road to Assessment* is located. The aim of this European project is to disentangle the overlaps between impaired and bilingual speech in order to adapt language assessment and to prevent bilingual children from a misdiagnosis with language impairment. As part of this project, a group of Polish psycholinguists under the guidance of Ewa Haman and

Zofia Wodniecka set up a study (bi-sli *PL*) with the goal to investigate the linguistic and cognitive differences and similarities between a group of Polish-English bilingual children living on the British Isles and a Polish monolingual cohort residing in Poland (cf. Otwinowska 2012). Their project, *Cognitive and language development of Polish bilingual children at the school entrance age - risks and opportunities*, is carried out at the Faculty of Psychology at the University of Warsaw and the Institute of Psychology at the Jagiellonian University in Krakow and was partially supported by the *Foundation for Polish Science (FOCUS* subsidy to Zofia Wodniecka).

Research in the area of bilingualism is not always straightforward, though, as the vast number of varying factors in bilinguals, such as their exposure to the second language and their age (of acquisition), make for a highly heterogeneous cohort and hence make across-group comparisons very problematic. Thus, it seemed like a great opportunity when I came across a bilingual twin pair during my work as a research helper in London for the aforementioned Polish study. As they are twins, they are, quite obviously, of the same age, they have the same exposure to their two languages, (approximately) the same age of acquisition, the same socio-economic background and they even share 50% of their genes. They only differ in one (crucial) aspect; one of the two boys was previously diagnosed with Specific Language Impairment (SLI), whereas the other twin's language follows a typical pattern of development. In other words, the siblings represent the two groups of investigation in the COST IS0804 project on a small scale and it was hence decided to investigate their linguistic output in a case study. In order to so, they were tested twice in both their languages, employing a number of linguistic and non-linguistic measurements. One series of testing took place as part of the *bi-sli PL* project, whereas the second one represents a follow-up study, which was carried out with the permission of the head of the *bi-sli PL* team and employed the tests used and partly developed or adapted by this group of researchers.

The results obtained from these measurements form the crucial part of this thesis. Before they will be discussed in the second part, a theoretical framework for the analysis will be provided in the first three chapters. These are concerned with bilingualism, the linguistic profile of *Specific Language Impairment* (SLI) and,

finally, the similarities between the two. This review of the current research on this topic will be followed by quantitative and qualitative analyses of the data and, ultimately, a discussion of the findings and their possible implications for the research on and the assessment of bilingualism and specific language impairment.

## 2. Bilingualism

As the introduction to this paper already indicates, it has been common practice to compare bilingual speech to a monolingual standard although sheer numbers alone would rather justify an inverse practice. Ellis (2005), for example, describes the global linguistic situation as follows:

multilingualism is humankind's norm. With perhaps 6,000 languages of the world, far more than the 200 or so countries, an equally rough-and-ready calculation suggests that human beings are more likely than not to be able to speak more than one language. (Ellis, 2005: 3)

This claim is supported by Grosjean (2010: 22), who suggests that at least half of the world's population is able to speak more than one language. This prevalence of bilinguals over monolinguals is not only a product of national bi- or multilingualism such as, for example, in Canada, Switzerland, or South Africa but also the result of our globalised world, where business partners have to communicate in what often is not their native language, where TV-programs and internet sources are accessible in numerous foreign languages and where second language acquisition (SLA) plays an important role in the development and reforms of school curricula. The *Action Plan Promoting Language Learning and Linguistic Diversity* (COM[2003]449), which was introduced by the European Union in 2003 and which encompasses the early acquisition of at least two foreign languages on top of its citizens' native languages, clearly illustrates the importance of foreign language acquisition across the EU. The fact, however, that their policy is entitled "Mother tongue plus two other languages" (COM[2003]449: 7), using the singular over the plural of *mother tongue*, undoubtedly reflects their assumption of a monolingual norm for EU citizens. In the light of current demographic developments, however, this can only be interpreted as a certain level of ignorance toward and as a reflection of traditional assumptions regarding the actual linguistic situation in Europe.

According to the 2011 *EU Migration and Migrant Population Statistics* (Eurostat 2011b), the number of non-nationals (people whose country of residence is not their country of citizenship) amounted to 33.0 million in 2011. This number, obviously, does not include any of the 776.000 people who acquired the citizenship of their country of residence in 2009, nor any of those who did so in any of the years before or after this date. Neither do these statistics contain any information on second-generation immigrants or people with double citizenships. (Eurostat 2011b, 30 December 2012). The important point, however, is that these numbers are an indication of people's mobility. They show that people are not bound to their home countries and whether their migration is voluntary or involuntary, it will most likely result in their and their children's bilingualism. A further important aspect to mention in this regard is that the non-national population in Europe tends to be younger, with a greater representation of 20 to 47 year-olds than among the national population of the respective countries. Assuming that the vast majority of non-nationals will maintain their native languages, once they have children, an even steeper increase in the number of bilingual children can be predicted for the coming years. It is hence of great importance to better understand and investigate their specific linguistic output and to analyse it independently from supposed monolingual norms – a task that will be taken up in this thesis. Before this can be done, however, it is necessary to understand the status quo of the research in this area, which is why this chapter will provide an overview of the most important insights on bilingual linguistic and cognitive development before the particular situation of Polish immigrants in the UK shall be mapped out, in order to provide a profound basis for the subsequent analyses.

## **2. 1. Bilinguals – Similarities and Differences**

Bilinguals or *dual language learners* as Paradis, Genesee and Crago (2011: 5) prefer to refer to them, can roughly be divided into two groups: on the one hand, children who grow up hearing and using two languages simultaneously from birth and who are hence called *simultaneous bilinguals* (e.g.: McLaughlin, 1978 or Bialystok & Hakuta 1994) and, on the other hand, children who learn a second

language after their first has already been established to a large extent and who are usually referred to as (early) *sequential, successive bilinguals or second language learners* (Lakshmanan 2009: 377; Paradis, Genesee and Crago, 2011: 6).

When discussing second language acquisition (SLA), it seems fairly impossible not to take Krashen's theory of *Second Language Acquisition and Second Language Learning* (1981) into account. While not the newest theory, it still provides the crucial basis for a distinction between institutionalised *second language learning* and more natural *second language acquisition*.

Both, SLA and *second language learning* have in common that learners can already draw on their experiences with their first language and that they tend to be cognitively more mature, when they start to learn/acquire their L2. This is not the case for *simultaneous bilinguals*, who acquire both (first) languages at the same time, which makes a distinction between L1 and L2 impossible (De Houwer 2005: 31).

There has been much debate on when to set the cut-off point to distinguish between *simultaneous* and *early sequential bilinguals* with researchers usually agreeing on, what Lakshmanan calls a "somewhat arbitrary" (2005: 278) lower cut-off point of age three but disagreeing on the higher limit, which can range from seven years of age to post-puberty. In other words, it has somewhat been agreed upon that children have to be exposed to a second language before the age of three, in order to be classified as *simultaneous bilinguals* but disagreement still prevails on whether they have to encounter this language before the age of seven or before the onset of puberty (see Lakshmanan, 2009: 377-379 for a review) in order to count as *sequential bilinguals*. The various suggestions are based on bilinguals' performance on linguistic and cognitive tests, which show a difference between their and the monolingual control group's performance at different points of their development.

This problem of establishing a cut-off point between L1 and L2 acquisition or between simultaneous, early sequential and late bilinguals is taken up by Foster-Cohen (2001), who very clearly points out the drawbacks of such sharp cut-off points. She argues that linguistic development is far too diverse in order to be

classified into such strict categories and that L1 can be distinguished from L2 from at least three points of view; the individual linguistic biography, individual learning differences and neurological and psychological underpinnings (2001: 335-336). In addition, she states that a far too big range of mechanisms (e.g.: metalinguistic development, lexical development, theory of mind development, etc. [341]) is involved in linguistic development, which each peak and slump at different points in time and make it close to impossible to set the boundary between L1 and L2 at a certain age. She therefore puts forward a concept of a “sliding window” (2001: 342), which slides over the ages and establishes which skills peak at what point in time, showing that boundaries between L1 and L2 are fuzzy, rather than clear-cut.

This proposition of flexible boundaries, while interesting and reasonable, seems quite unhelpful for research practice where the comparison between different sub-groups is essential. It is, hence, no surprise that researchers have tried to pin down the boundary between L1 and L2 to a certain aspect, in order to make in-group and across-group comparisons feasible. The question remains, however, why this aspect is bound to be age alone. As Foster-Cohen (2001) quite clearly illustrates, age is not necessarily the only factor which needs to be taken into account when differentiating between monolinguals and bilinguals or between simultaneous and early sequential bilinguals. While research on “feral” children, such as Genie (Curtiss, 1977; Fromkin, Krashen, Curtiss, Rigler, & Rigler, 1974 in Harley, 2008: 77) in psycholinguistics and evidence from neurolinguistics (e.g.: Wattendorf et al. 2012) point toward an existence of a critical period in regard to cognitive and neurological development for bilinguals, research on the effects of *Age of Acquisition* (AoA) could not yet present unambiguous evidence for its exclusive importance (see e.g.: DeKeyser & Larson-Hall, 2005 or Birdsong, 2009 for a review).

Paradis, Genesee and Crago (2011: 5-7) therefore suggest to include the membership in ethnolinguistic communities as a further category to distinguish between different groups of bilinguals. The inclusion of this criterion in addition to the age of acquisition leads to their establishment of following sub-groups;

1. Children from a majority ethnolinguistic group who have learned or are learning two majority languages simultaneously from birth or at least before 3 years of age.
2. Children from a majority ethnolinguistic group who have learned or are learning a second language after their first language was established. The second language could be a minority or majority language of the community.
3. Children from a minority ethnolinguistic group who have learned or are learning two languages simultaneously from birth, or at least before 3 years of age. One language could be a majority language.
4. Children from a minority ethnolinguistic group who have learned or are learning a second language after their first language was established. The second language is typically the majority language and the language of schooling.

(Paradis, Genesee & Crago, 2011: 7)

It becomes clear from this classification that they also draw the lower cut-off line for simultaneous bilingualism at the age of three but take into account whether children learn two majority or minority languages or even a mix of both. At first, the inclusion of membership in any of these ethnolinguistic groups might look like one criterion only but a closer investigation shows that it actually encompasses many more sociolinguistic factors which are regarded as essential in the linguistic development of bilingual children.

Firstly, quantity and quality of input of minority languages can be expected to differ significantly from input patterns of majority languages. While a child growing up with two majority languages has the opportunity to speak both his/her languages in various settings and also be schooled in both languages (e.g.: in Canada or Switzerland), a child who grows up with one minority language will usually receive input in either language that is restricted to a certain domain (i.e.: home language vs. education language). Secondly, minority and majority languages are quite likely to differ in prestige, which is also likely to influence the learning outcomes of dual-language learners. And thirdly, such a distinction might even be an indicator of socio-economic status if assumed that the largest proportion of minority language speakers are part of the migrant population. The Eurostat Statistical Book on *Migrants in Europe (2011a: 41-136)*, ascribes a higher unemployment rate, a higher risk of poverty and social exclusion as well as a considerably lower income to first and second generation migrants in relation to the native-born population. These statistics clearly indicate a division between minority and majority language users and hence a higher probability of the first to be categorised as having a lower socio-economic status, which might then again



lead to differences in their children's linguistic development, when compared to results of a majority-language-only group.

This list quite clearly shows the variety of factors influencing bilingual language development and indicates the difficulty to find a homogenous group for studies on bilingualism – an issue that was already indicated in the introduction to this paper. This is to say that while the large (and constantly increasing) number of bilingual children makes it easier than ever to compile a sufficiently big cohort of bilinguals, it needs to be borne in mind that these test subjects might come from different socio-economic backgrounds, might have been exposed to their two languages for a different period of time and so on and so forth. All of these factors could then influence their performance on linguistic tasks which is why psycholinguistic experiments tend to be carried out on highly controlled groups of subjects. However, due to their homogeneity, they do not necessarily represent an authentic sample of the bilingual population, which is why it seems valid at this point to to emphasise the importance of case studies. Such qualitative studies can then focus on the subjects which fall through the grid in highly controlled study groups. This is not to say that quantitative studies are not essential in order to find out more about the general tendencies in language acquisition, but they should be complemented by qualitative analyses such as the one presented in this paper. These can, admittedly, only investigate a limited number of cases but those in very much detail. A combination of the two can then provide the information to describe general tendencies in L2 development, the most important of which shall be presented in the following sections.

## ***2.2. General Tendencies in L2 Development***

Tabors (2008 in Paradis, Genesee & Crago 2011: 111) describes four crucial stages in L2 development, which she derives from a two-year longitudinal study in a nursery. In this study she focuses on children who acquire a second language once their home language has already been established to a large extent. In other words, Tabors' research projects investigates the linguistic development of those children who fall into the fourth category of the sub-groups described in the previous chapter and they are also the focus of this paper. According to her,

typically developing dual-language learners first go through a phase of “home language use” when they first encounter the second language, before they go through a “nonverbal period“, which preceeds “formulaic language use“ and, ultimately, “productive language use“.

The first of these stages often does not last very long, as children tend to realise quite quickly that their school surroundings do not understand their home language, which leads to their remaining silent for some time. During this period they are said not to use the second language actively but to process it internally. Tabors states that younger children tend to remain in this phase for a longer period of time than older children who are acquiring a second language. The reason for this tendency might be their advanced cognitive development which allows them to abstract rules from their new language and connect items to their home language much faster than this is the case for younger children. Older children might further have a greater need to communicate than younger ones who often play non-verbally.

The usage of formulaic language gradually develops into productive language use. This starts with a “frame and slot“ stage (Paradis, Genesee & Crago, 2011: 112) during which children usually use simple verb phrases, such as “I want + noun“ or “I do + noun“. During their first year in (pre) school, dual language learners tend to reach the stage of productive language use, which is not necessarily to say that they have acquired the language on a native-like level in all aspects. Some of these non native-like aspects may include a foreign accent in their L2 and/or telegraphic sentences in a sense that some grammatical morphemes might be missing. For English these could, for example, include plural –s, past tense –ed, determiners or auxiliary verbs. Transfer errors from the learners’ L1 are also common but not the only error type which occurs in their interlanguage. A more thorough analysis of error patterns in different parts of speech will be presented in the subsequent sections.

### **2. 3. Child L2 Phonological Acquisition**

Despite numerous claims not to measure bilinguals against a monolingual norm (Grosjean, 2010; Zurer-Pearson, 2010), a comparison of these groups is useful in order to find out which errors are developmental and similar for mono- and bilinguals and which are transferred from the speakers' L1. Quite like monolingual children, who are acquiring the phonology of their first language, bilinguals have been observed to omit consonant clusters and to either leave out one of the consonants in such a cluster (i.e.: *say* instead of *stay*) or to insert a vowel in order to facilitate pronunciation (Gilhool, Burrows, Goldstein, & Paradis, 2009; Sorenson Duncan, Tessier, & Paradis, 2009, qt. in Paradis, Genesee, & Crago 2011: 114).

Despite these similarities with monolingual phonological acquisition, bilinguals' first languages also seem to play a crucial role in the development of a foreign sound system. Anderson (2004, qt. in Lakshmanan, 2009: 388) observed in a longitudinal study of various bilingual children that L2 learners seemed to rely on their L1 phonology in order to acquire unknown sounds in their second language. She did, however, also observe that this positive transfer of phonological information did not hinder children to keep their two phonological systems apart. Holm and Dodd (2006 qt. in McLeod, 2010: 62) have further found bilingual English-Cantonese speakers to make more vowel errors than monolinguals and to produce phonemes which could not be said to belong to either of the two languages. This last point might suggest the existence of an interlanguage not only in regard to morphosyntactic elements of a language but also in respect to phonology. Bialystok (2001) reports on a number of studies that have shown a bilingual advantage in tasks that required metalinguistic knowledge of phonology, such as phoneme-replacement or omission tasks but adds that these advantages are not necessarily persistent throughout the life-span and often limited to easier tasks. As mentioned by McLeod (2010), Lakshmanan (2009) and Paradis, Genesee & Crago (2011) further studies specifically focusing on bilingual phonological development are needed in order to shed light on the questions as to how far dual language learners transfer knowledge from their L1 and as to precisely which errors could be classified as belonging to a phonological interlanguage.

## **2.4. Child L2 Lexical Acquisition**

One of the very few relatively undebated issues in language development in general and in bilingual acquisition in particular, is the crucial role of input for lexical development. Furthermore it should not come as a surprise that bilinguals tend to get less input in either language than monolinguals, which might be reflected in their achieving milestones in vocabulary acquisitions at different points in time. Hui (2010) has found in a study of bilingual children in Singapore that their vocabulary size is directly linked to their exposure to the respective language. At this point it seems noteworthy that exposure is yet another factor which is very hard to control for as even parental questionnaires might not always reflect the actual language situation in bilingual households.

The importance of exposure for lexical development is further reflected in an older case study of a 5-year-old English-Japanese L2 learner (Rescorla & Okuda, 1984 qt. in Lakshmanan, 2009: 388) who showed a different lexical development in her L2 than in her L1 and in comparison to monolingual standards. A similar observation was also made by Rescorla and Okuda, who have found their subject's lexical acquisition to occur much faster than typical L1 acquisition, which they traced back to the prior knowledge of another language and the existence of English-Japanese cognates (qt. in Lakshmanan 2009: 389). An additional striking finding was their subject's extensive use of pronouns, lexical and auxiliary verbs, conjunctions, and prepositions, which is definitely not part of the early stages of L1 development. This finding might, however, be related to the higher age of their subject as it could not be found in a similar study (Yoshida, 1978 qt. in Lakshmanan, 2009: 389) with a three-year-old bilingual. This bilingual child used mostly verbless phrases, a phenomenon called two-word utterances in L1 development.

One might hence argue that transfer of metalinguistic knowledge such as the importance of closed-class words for successful communication only starts to occur at an older age or that its use is dependant on the subjects' L1. This positive transfer of knowledge from one language to a second, is referred to as "bilingual bootstrapping" (Paradis, Genesee & Crago, 2011: 119) and describes a process where not every part of each language needs to be acquired separately. While,

obviously, lexis itself needs to be acquired anew for each language (excluding loan words and cognates), general knowledge about linguistic functions are likely to be used and maybe re-evaluated with every new language a person learns. Evidence from as early as Piaget's famous sun-moon experiment (1929), which showed a clear advantage of bilingual children over monolinguals, suggests that the knowledge of a second language enhances the understanding of words as abstract labels of real-world phenomena, rather than those phenomena themselves. In his study, Piaget interchanged the labels for the two celestial bodies and investigated in how far this change of name would influence the children's perception of their respective functions in the sky.

The results showed that bilingual children were more tolerant (or indifferent?) to the ambiguity arising from this change in names. This is, the vast majority of them simply accepted the fact that the same celestial body can also carry a different label without changing its function. Such higher levels of tolerance toward ambiguity result from the fact that bilinguals are used to the same phenomena carrying two different labels because they are exposed to two different lexical systems referring to (largely) the same items on an everyday basis. The results obtained from this experiment have been replicated with similar results on numerous occasions (cf. Bialystok 2001 for a review) providing profound evidence for better metalinguistic understanding of lexical items in bilinguals.

### **2.5. Child L2 Morphosyntactic Acquisition**

In contrast to bilingual phonological and lexical acquisition, studies on their morphosyntactic acquisition are numerous and it is this category which is mostly used to distinguish typically developing (TD) bilingual and language impaired children (Paradis, 2010). Studies have shown that L2 learners tend to skip the "lexical/thematic-only stage", which is associated with a lack of inflection, determiners and complementiser phrases (Lakshmanan 2009: 390). This finding indicates that these categories might be transferred from the speakers' L1 to their L2. This hypothesis was developed on the basis of the *maturational model*, which sees language development as the interplay between a genetically-fixed time schedule and linguistic input and which stands in close relation to Chomsky's

*Universal Grammar*. Furthermore this model was developed in order to argue for language processes to be domain-specific and hence independent of other cognitive mechanisms (Rice 2004). Quite unsurprisingly, an oppositional theory was proposed by a group of scholars who see language development rather as one part of a bigger group of general cognitive processes than as an independent mechanism. This understanding of language processes also encompasses the interpretation of atypical language development as a result of a larger problem on the cognitive level rather than a break-down exclusive to the linguistic system (Paradis 2010: 238). These scholars would hence argue that positive transfer from L1 to L2 is not limited to language but is part of a larger phenomenon, encompassing a number of problem-solving and theory of mind skills.

Apart from the lack of functional categories in L2 output, studies have also repeatedly (see Lakshmanan 2009: 391) shown irregularities in the use of free and bound morphemes in comparison to monolingual production. While L2 learners tend to grasp the auxiliary and the copular *be* fairly quickly, they have been reported to show bigger problems in the acquisition of bound morphemes, such as past tense *-ed* or third person *-s*. These findings stand in opposition to results from L1 studies, which could not replicate a similar profile for first language acquisition (Kakazu & Lakshmanan, 2000 qt. in Lakshmanan 2009: 391). According to Paradis (2008) it takes English L2 children 2-3 years to produce plural *-s* and progressive *-ing* but up to 5 years to acquire third person *-s* and past tense *-ed*.

## **2.6. Bilingual Cognitive Development**

Apart from the advantage of being able to communicate with speakers of two different languages very early in life, the overview of specific linguistic knowledge in the areas of phonology, lexis and morphosyntax also suggested some bilingual advantages in regard to certain metalinguistic tasks. The fact, however, that these advantages could not be observed for all tasks, puts the question as to whether language is a domain-specific or a domain-general process back on the table. Defenders of the first strand argue that the observed proficiencies of bilinguals are merely a product of native-speaker competence, whereas followers of a domain-

general approach propose that the abstraction of rules in one language and its transfer to another requires a wider range of cognitive functions than the ones involved in language perception and production. If this was the case, bilingual children should outperform monolinguals on a range of non-linguistic cognitive tasks, or so the hypothesis of many psycholinguists who have focused on the (non-linguistic) cognitive development of dual language learners.

In her chapter, Bialystok (2005) provides a historical literature review of studies that have focused on arithmetic competence, task switching and *Theory of Mind* (ToM) in bilinguals. The latter term refers to the ability to recognise and react according to other people's feelings and also encompasses the accurate interpretation of what is shared knowledge between two interlocutors and what is new to the listener and thus requires longer explanation. *Theory of Mind* tasks hence traditionally require children to interpret protagonists' feelings and/or to understand the different levels of information of an omniscient narrator (and hence themselves) and the characters in a story.

Bialystok's literature review showed that arithmetic tasks which involved a certain level of language competence were tendentially solved at a slower rate and with a lower accuracy by bilinguals (2005: 419-420) but they showed higher levels of accuracy in tasks that only required counting and a conceptual understanding of numbers and size (2005: 421). While the latter tasks were easier from an arithmetic point of view, they required the ignorance of distracting input, a skill that has been reported to prevail in bilingual children (2005: 422). Similarly, bilinguals have been shown to adapt to new rules of a game and hence ignore the obsolete input and to perform better in theory of mind tasks, which required them to think from the perspective of a protagonist in a story rather than their own or that of an omniscient narrator (2005: 423-424). In a different article Bialystok (2007: 213) describes results from earlier grammaticality judgement experiments, which link the ability to ignore unwanted input to a task that requires metalinguistic knowledge of grammar, without focusing on meaning and replicates the results found in the experiments described above. She adds, however, that tasks which did not require the capacity to ignore distracting input, were fulfilled equally well by monolinguals and bilinguals (2007: 214) and concludes by stating that bilingualism

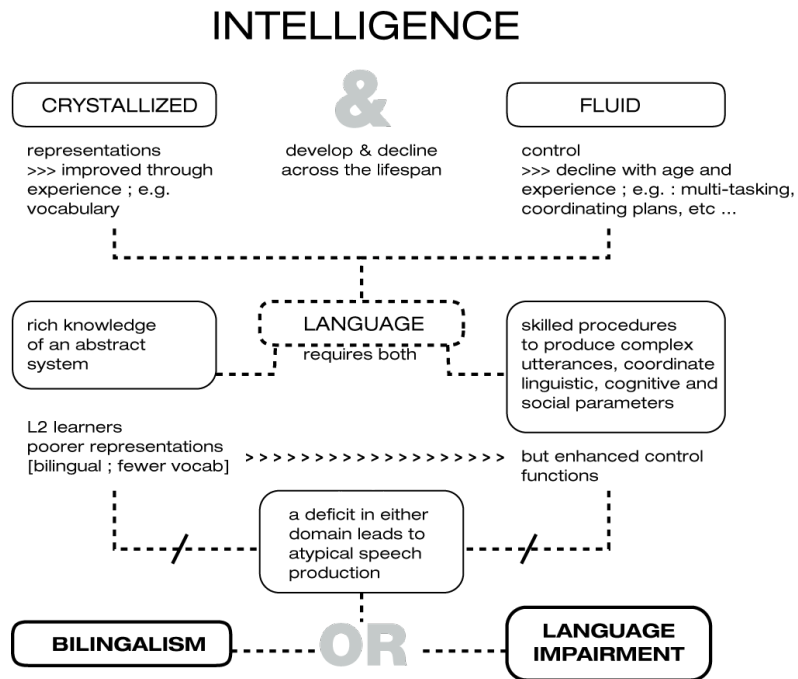
might have an effect on executive processing but not on general cognitive processing (2007: 215). This is to say that bilingual children are not to be seen as either more or less intelligent but rather as having a “more enhanced ability to control the use of their knowledge in performance” (Bialystok 2007: 215).

From this distinction between general cognitive ability and capacity to applying knowledge appropriately in a given context, Bialystok (2010) derives her theory of a speech development model that combines the *maturational* (i.e.: language is a system independent from other cognitive processes) and the *domain-general* (i.e.: language is a cognitive process like any other) approach. Together with a colleague, she argues for an integration of these two approaches in one model, based on the concept of *fluid* versus *crystallised* intelligence (Cattell, 1963). In regard to language, *crystallised intelligence* stands for representations of a language which are improved through experience. *Fluid intelligence*, on the other hand, are control processes such as multi-tasking, the ability of which declines with age. In other words, *crystallised intelligence* is the abstract knowledge of a language and *fluid intelligence* is what speakers need in order to assemble these pieces into a complex whole.

From this distinction it becomes clear that typically developing knowledge needs to encompass both these processes and a break-down or untypical development in either of these parts will result in a speech production that is different from a certain norm. Using this model, a gap between bilingual scores in linguistic tasks, such as the arithmetic tasks (involving language) and non-linguistic tasks, such as basic counting tasks (requiring advanced control functions) could be explained. This is, Bialystok and Peets argue that the bilingual experience of being exposed to two languages simultaneously improves *fluid intelligence* (i.e.: control functions) while it might lead to lower scores on tasks requiring *crystallised intelligence* (e.g.: vocabulary) when compared to monolinguals. This divergence between monolinguals and bilinguals in regard to *crystallised intelligence* is, once more, a result of bilinguals’ limited exposure to each of their languages when compared to monolingual peers.



Fig 1: Bialystok's and Peets' (2010) integrative model of language development



By proposing this integrative model of language development (see Fig. 1), Bialystok and Peets suggest to combine the insights of cognitive psychology and linguistics in one model rather than to only investigate “strictly linguistic features” (2010: 316). While this is a valid point and already a step closer to a more wholistic picture of language production, it still lacks the sociological factors, such as the ethnolinguistic community a child is or is not part of (see section 2.1.) and the prestige of their first language in their country of residence. This is why the following section will give an overview of the situation of the Polish community in the UK, which the subjects of this study are members of.

## 2.7. Situation of Polish immigrants in the UK

As mentioned in the introduction to this chapter, migration is a major factor in bilingualism and the number of Polish migrants in the EU between 2001 and 2010 was only exceeded by one other nation, namely Romanians (Eurostat 2011b, 4 January 2013). A report on the current situation of Polish people abroad that was compiled in 2009 by the *Polish Ministry for Foreign Affairs* with data from Polish embassies in 30 countries, estimated the number of what they call “traditional Polonia” (the general term used for Polish people abroad) to lay somewhere

between 120-150 thousand. This number does, however, not encompass any Poles who came to Great Britain after 2004 in search of employment as this number is fairly hard to estimate due to unregistered returns to their home country. Nevertheless a number of 850 thousand economic migrants from Poland to the UK is suggested in the report, with the latest statistics indicating a decline in Polish immigration by 32%. Even so, the number of people with a Polish background living and working in the United Kingdom is quite likely to approach one million, with the majority living in London, followed by other major cities in England, Scotland and Wales. Similarly to the majority of migrants in Europe, most recent Polish immigrants are very young with 81% between the ages of 18 and 34, a fact that is quite likely to result in a further increase in bilingual Polish-English children in the coming years. This expected increase together with the already high number of children with Polish background call for a profound investigation of their (linguistic) situation.

In line with numbers on employment patterns of first and second generation migrants in the Eurostat Statistical Book on *Migrants in Europe (ESBOM, 2011a)*, the vast majority of Polish immigrants finds short-term employment in agencies in the following economical sectors: manufacturing, food and accommodation, farming, wholesale and retail trade, human health and construction. Short-term employment in these sectors does not require tertiary, or in some cases even secondary education, which reflects the general tendency of migrants in Europe finding employment in jobs that require lower qualifications (ESBOM, 2011a: 46). This is not to say that they might not be overqualified for the job they are doing; a fate that strikes a large number of immigrants, especially during their first eight years of residence in a country (ESBOM, 2009: 52-53). In addition to low-income jobs, the report on Polish citizens abroad mentions an increasing number of Polish families applying for financial aid, which is seen as a result of the current economic situation (RoPPzG, 2009: 256).

Regarding factors which motivated their immigration to the UK the majority of Poles indicated an improvement of their economic situation as well as the possibility to pursue personal goals, which suggests a mix of voluntary and involuntary migration. Their motivation toward their new home country is quite

likely to influence their own linguistic development as well as their children's and is therefore a factor that must be taken into account, when analysing bilingual speech.

The Polish community in Great Britain is organised in the *Polish Socio-Cultural Club* (*Polski Ośrodek Społeczno-Kulturalny, POSK*), which has a 30-year-old history and is responsible for the establishment of numerous institutions and facilities, such as a Polish library, a theatre for children and adolescents, clubs, an art gallery, the Polish University Abroad, The Polish Academic Circle, The Polish Circle of Technicians, The Group of Polish Writers and many others (RoPPzG, 2009: 256). One of the most important of these institutions is definitely PMS (*Polska Macierz Szkolna*), the *Organisation of Polish Schools Abroad*, which is not only responsible for the establishment of Polish Saturday schools but also provides them with school books and other forms of funding. According to the report, there were around 100 Polish Saturday schools in the whole of Great Britain in 2008, employing 500 teachers, which is not considered a sufficient number by the authors.

Section 2.1. of this chapter, which was concerned with general linguistic development in bilingual children, raised prestige of the native language as an important issue for the acquisition of a second language. In this regard, Polish immigrant children are quite likely to be confronted with negative emotions, at least according to the report quoted here. While until 2008 80% of the news coverage of Polish migrants in the UK was positive, this number has declined and tabloids are said to feature articles on the theft of jobs by Polish immigrants on a regular basis (RoPPzG, 2009: 260). It needs to be added that the stories appearing in tabloids should certainly not be considered as a 1:1 presentation of the actual perception of immigrants in the UK but they do have a big readership, which is why it seems necessary to take their standpoint into account.

Taking all these issues into consideration, it can be assumed that a substantial part of the Polish immigrant population has a fairly low socio-economic status, a fact that might severely influence the bilingual language development of their children. On the other hand, the central organisation of Polish schools as well as the numerous socio-cultural institutions, such as a theatre for children and

adolescents or a library should be mentioned as these seem to indicate a high status of education among the immigrant population. In addition, the large number of Polish organisations allows for the assumption that connections within the Polish community are very strong and that the heritage culture as well as the language play a significant role among this group. Children's membership in this ethnolinguistic group might, therefore, make the minority language that is Polish in the UK, a majority language in their surroundings. As has previously been discussed, quantity and quality of input plays a significant role in the acquisition of an L2, which is why the roles and distribution of each language should be analysed in detail, before categorising subjects as belonging to one group rather than another.

## **2.8. Summary**

This chapter on bilingualism set out with an argument on why a monolingual norm is no longer appropriate in the current European context before describing the different categories of bilingualism, taking crucial factors such as exposure, age of acquisition and the relationship between minority and majority languages into account. Then the four crucial steps in L2 development in early sequential bilingualism were presented. A more detailed account of the linguistic development in bilingual children encompassed the categories of phonology, lexis and morphosyntax and, ultimately, the most important insights on bilingual cognitive development were discussed. The current findings in the area of second language phonological development show that bilingual children commit the same errors as their monolingual peers in some cases such as, for example, consonant clusters but that they also rely on their first language to acquire new sounds in their L2. Regarding their lexical development, exposure has been reported to have a very large impact on the acquisition process and studies have further shown that L2 lexical acquisition differs most evidently from L1 development in the use of pronouns. Such bilingual bootstrapping was further reported for their skipping the *lexical/thematic-only stage* in morphosyntactic development which indicates that they are able to transfer the function of determiners, inflection and complementiser phrases from one language to the other. Bound morphemes, on the other hand,

seem to represent a bigger challenge to bilingual children as the acquisition of plural –s, past tense –ed and third person –s can take up to five years. The chapter on bilingual cognitive development reported on studies showing better performance of bilinguals on tasks which required executive processing but equal results for mono – and bilinguals for tests that did not demand such capacities. These differing results are explained by Bialystok's and Peets' *integrative model* of language development, which combines the *domain-specific* and the *domain-general* approaches and divides language into *crystallised* and *fluid* intelligence. This model also provides the basis for a fairly recent discussion concerning the definition of *Specific Language Impairment* – the topic of the subsequent chapter.

### **3. SLI – Specific Language Impairment**

*Specific Language Impairment* (SLI) is a neurodevelopmental disorder which affects approximately 3-7% of the population (depending on the cut-offs used), with boys outnumbering girls by two per cent (Leonard 1998: 3, Tomblin et al. 1997, Rice 2004). Children who are diagnosed with this form of language impairment show significant limitations in their linguistic abilities without any apparent underlying reason. They do not present with developmental or acquired aphasia, neither is their hearing impaired and they do not meet the criteria to be diagnosed with autism or any other developmental disorder (e.g.: Leonard 1998, Tomblin 1997, Rice 2004, Nußbeck, 2007, Paradis, 2010). These children struggle to acquire their native language (or languages) and the reason why they do so is yet to be discovered.

In addition to the exclusionary criteria mentioned above, the diagnosis of SLI traditionally requires a significant discrepancy between subjects' verbal and non-verbal intelligence. This is to say that children in order to be diagnosed with SLI, have to present with below average linguistic scores (often a score of 1.25 below the *Standard Deviation* is used as a cut-off point, based on Tomblin 1996), while scoring within age-appropriate levels on non-verbal IQ tests (Leonard 1998: 16). While researchers have generally agreed on the exclusionary criteria, regarding brain or any other sort of sensomotory damage, the question as to

whether a significant discrepancy between verbal and non-verbal IQ scores is really necessary (or even possible) has led to far more discussions. As stated in the previous chapter on bilingualism, different groups of psycholinguists either believe in linguistic processes being entirely independent of any other cognitive processes (*domain-specific approach*), or the complete opposite (*domain-general approach*). Researchers who argue for a separation of linguistic and other, more general, cognitive processes, also argue for a clear separation between children's verbal and non-verbal intelligence, in order to be diagnosed with SLI. On the other hand, however, cognitive psychologists who believe in a *domain-general approach* to language, raise the claim that a clear-cut separation between verbal and non-verbal intelligence in SLI cannot be required as an inclusionary criterion, as the break-down in one of the two processes would immediately influence the performance of the other (cf. chapter 2). Bialystok's and Peets' *integrative model* of language development questions the gap between non-linguistic and linguistic scores for a diagnosis with SLI and proposes that language impaired children might perform differently on tasks requiring *fluid intelligence* (e.g.: processing tasks) and those demanding the application of *crystallised intelligence* (e.g. vocabulary tests).

The last two approaches, which also account for subtle difficulties in non-linguistic tasks among SLI children, have gained significance in the past years (cf. Leonard et al. 2007, Hill 2001). This has led Kohnert and Ebert (2007) to suggest the alternative term PLI (*Primary Language Impairment*) for SLI, in order not to imply an etiology for this impairment. While their term acknowledges the linguistic difficulties of children as the primary characteristic, it avoids excluding any other underlying or parallel feature. Even though the term PLI, together with its explanation sounds, indeed, very appealing, the term SLI will still be given preference in this paper, as it is (still) more commonly used in this research area.

The substantial question as to whether a discrepancy between verbal and non-verbal intelligence should be considered crucial for the diagnosis of SLI, already indicates the heterogeneous nature of this impairment. Some children show a significant gap between their overall intelligence and their linguistic abilities, with the latter falling within a below-age-level range, whereas others do

not show such an obvious gap. Yet another group of children might present with a substantial gap between their IQ test results and their standardised linguistic test result, without any of the two being considered below average. Finally, a fourth group might fall into a grey zone in regard to their IQ, which is too high to classify them as mentally impaired but too low to count as age-appropriate (Leonard 1998: 17). This leads to an evanescent difference between their intelligence scores and their linguistic abilities. Despite the differences in these four groups, they do not fit into any other diagnostic category, which makes them perfect candidates for the diagnosis of SLI.

Apart from this discussion, attempts have also been made to differentiate between children who primarily show productive difficulties and those whose perceptive language skills seem to be affected as well (Leonard 1998: 23). A differentiation which, according to Nußbeck (2007: 97), is to be considered incremental, rather than categorical. Basing her argumentation on Bishop (1997 qt. in Nußbeck), who found the expressive language ability of children with SLI during standardised testing to be much lower than initially assumed, she states that perceptive language problems might simply not be as evident in everyday communication. Especially older children might have developed problem-solving strategies, which allow them to infer the appropriate meaning from a situation, rather than from the linguistic unity itself. Additionally, the input they receive from their caretakers has been found to be adapted to their productive language level (Scheffner Hammer et al. 2001: 193). The combination of these two factors could hide perceptive linguistic problems for a longer period of time than is the case for productive difficulties.

This heterogeneity of linguistic profiles leads Leonard (1998: 19) to conclude that despite some general tendencies in the linguistic profiles of SLI children, not all of them necessarily fit all of the inclusion criteria, which makes the description of this phenomenon all the more difficult. It will be the aim of the subsequent sections to provide a relatively brief overview of the most important findings in regard to children's lexical abilities, their phonological difficulties as well as their morphosyntactic knowledge. After having done so, the genetic as well as the pre- and post-natal factors, which might play a role in the development of SLI

will be presented, before the chapter concludes with a discussion of the similarities and differences between SLI and bilingual language development.

### **3. 1. Lexical Abilities in Children with SLI**

Even though *Specific Language Impairment* is often diagnosed at some point around three years of age, evidence suggests a much earlier starting point for the lexical impairment in children with SLI. Leonard (1998: 44) concludes from his literature review that language impaired children tend to utter their first words approximately twice as late as typically developing (TD) children (23 months as opposed to 11 months). He adds, however, that such a late onset time for first words while not astonishing is not necessarily the only logical development. Children might just as likely utter their first words on schedule (or only with a slight, unremarkable delay) but then suddenly stagnate in their lexical development. In other words, he argues that children with SLI might not go through a phase of vocabulary burst, a stage in first language acquisition during which young children acquire a large number of lexical items quite rapidly (e.g.: Harley 2008: 123-124).

Even though the amount of words children with SLI acquire is much lower than that of TD children, the two groups do not seem to differ significantly in regard to the types of words they learn. At the early stages, children with SLI, just as their TD peers, acquire by far more general nominals than referents for actions (Leonard 1998: 44). A differentiation in regard to word types, only seems to become relevant at a later stage of vocabulary acquisition. Several different studies (cf. Leonard 1998: 44) have found children with SLI to lag behind their age-matched peers in regard to the variance of words in their utterances. They mostly uttered verbs with a high frequency, such as *do*, *go*, *get*, *put* or *want*, which were also used by typically developing (TD) children but the latter have additionally been observed to employ verbs with a lower frequency. This striking difference between the two groups of children, stretches well into the early school years where the linguistically impaired group shows more difficulty to acquire action names than their typically developing peers (cf. Leonard 1998: 46). Researchers have also found the word order to play a role in the acquisition of new words. Children with SLI found it most arduous to learn lexical items that were presented



at a rapid rate or in their inflected form, while they best learned word stems in sentence final positions (Leonard et al. 1983 qt. in Leonard 1998: 46). Moreover, school children with SLI have been found to make particularly long pauses while speaking, to commit naming errors, which can be both semantic and phonological in nature. Such instances of word-finding difficulties have traditionally been explained in two different ways.

Some researchers, among them Bishop (2000) argue that the lexical problems in SLI are rooted in inefficient or time-consuming ways of storage and retrieval. A claim that is supported by Sheng and McGregor (2010), who interpret their results on non-word repetition tasks as evidence for weak lexical-semantic links in children with SLI (156). Leonard (1998), on the other hand, states that SLI should be understood as a sort of shield, which does not allow for the affected child to process and memorise every single linguistic encounter, which is why it takes them longer to add certain words, especially the ones with a lower frequency to their long-term memory (47). In other words, he argues that the difficulty for children with SLI is not one of retrieval but of storage, which stands in exact opposition to Bishop's suggestion. In order to shed more light on to the question as to how exactly children with SLI differ from TD developing children in regard to their lexical development and word retrieval strategies, a large number of studies on word learning have been published in the last two decades. Some of them are comprised and analysed in Kan's and Windsor's (2010) recent meta-analysis.

In their investigation of 28 studies, which have been published between 1992 and 2008, they come to the conclusion that typically developing children outperformed children with SLI on all word learning tasks. The interesting fact in this regard is, however, that language impaired children performed 0.6 standard deviations (SD) below the typically developing cohort, which is much higher than the 1.25 SD suggested by Tomblin (1997). Additionally, Kan's and Windsor's analysis also showed a larger effect size for higher exposure to words, which is to say that the gap in performance between SLI and TD children increased with the number of repetitions of a target item. In other words, the performance of TD children increased steadily over the course of the experiment while the affected children's result stagnated at their initial position, leading to a growing difference in

performance between the two study groups. The same was found for the provision of context to facilitate word learning. While context increased the performance of TD children, it did not have a significant effect on the linguistically impaired group. Finally, Kan and Windsor could also confirm the particularly weak performance of SLI children in regard to verb learning (752). While Kan's and Windsor's meta-analysis provided crucial information to further illustrate the differences in lexical output between SLI and TD children, they did not go as far as to suggest an underlying reason for the varying performances.

This task was taken up by Mainela-Arnold, Evans and Coady (2010), Alt and Suddarth (2011), and Gray, Brinkley and Svetina (2012) who tried to find out more about the underlying mechanisms that might lead to worse word memory and retrieval in SLI. The authors of the first study took a slightly different approach to word learning than the studies summarised in Kan's and Windsor's meta-analysis and investigated the role of auditory perception, phonological working memory and lexical competition in the weak lexical-semantic mapping in SLI children. This is to say that they did not focus solely on the differences in form but also on their semantic representations, suggesting that children with SLI might have a weaker depiction of the meaning of words. This might explain why it is more arduous for them to retain lexical items and once they have done so, to keep them apart. They hence aimed at providing a reason for the semantic naming errors that have previously been observed (see Leonard 1998: 46), using three possible hypotheses.

Either, children with SLI have difficulties discriminating between phonologically similar words. Or, their phonological working memory does not work as effectively as in TD children, turning phonological processing and storage into a particularly arduous task. Alternatively, the problem could lie in their inability to inhibit competing lexical choices, which leads to their choosing the wrong word in a context. The results of their non-word repetition and sentence completion tasks, led to their conclusion that deficits in lexical-semantic mapping in SLI children are most likely to be due to their limited ability to inhibit unwanted input (1752). In other words, the authors argue that the affected children's problems are quite simply grounded in the fact that they have problems choosing the appropriate words for a

given context. This conclusion is influenced by the fact that SLI children did not perform significantly worse on words with a high density in phonological neighbours and their performance on the non-word repetition task did not yield results significant enough to assume a deficit in their phonological working memory. They add, however, that this unusual last result might be linked to the relatively high age (8 years) of the subjects and hence not necessarily be applicable to younger children, who are the main interest in this paper. Nevertheless, they provide an interesting hypothesis for the lexical acquisition problems in children with SLI.

Alt and Suddarth (2011) took yet a different approach to the topic of word learning and investigated the differences in phonological representations during initial stages of word learning in children with SLI and a typically developing control group. Their investigation of mispronunciations and detection of errors in target words in word initial and final positions, as well as a change in syllable structure, led to the conclusion that children with SLI showed the largest number of mispronunciations and ignorance of errors in word final positions (91). Surprisingly, even though longer words generally posed a bigger problems for both groups, they did not seem to affect the between group differences (93). Another finding seems to confirm the authors' initial hypothesis that children with SLI process the phonological structure of words in a different manner than TD peers. According to Alt and Suddarth's findings, SLI children outperformed their TD peers in the detection of errors in word initial position (91). After having rejected the form of the error as well as a change in prosody as a possible explanation for their outcomes, Alt and Suddarth propose a weakness in phonological working memory for children with SLI. They argue that their focus on the word initial phoneme might be a compensation strategy, which helps them to recognise and distinguish words, without having to process the whole lexical unit. This claim is supported by the fact that SLI children's performance did not decrease with longer words, which suggests that everything after the initial phoneme(s) is not processed by their phonological working memory – or at least not fast enough to really matter (93). With an argument along these lines, they stand in stark contrast to Mainela-Arnold, Evans and Coady (2010) who interpreted their findings as evidence against the

involvement of phonological working memory in the lexical processing of children with SLI.

Despite the different research question and focus of Gray's, Brinkley's and Sventina's (2012) study, their findings on the role of phonotactic probability and unfamiliar object-word learning can be interpreted as providing further evidence for different phonological processing in SLI. They asked a group of 114 children, 40 of whom were diagnosed with SLI, to learn a number of new words, which were either high or low in phonotactic probability. This is, they were either phonologically similar to words they already knew (high) or not (low). Additionally, participants had to either learn new words for familiar items or novel names for unfamiliar things (1292). Their results suggest no significant difference between SLI and TD children. Both groups learned words with a low phonotactic probability and low object familiarity faster than words which followed a known phonological structure or which were synonyms for common objects. One could now argue that children with SLI were more likely to remember lexical items which did not follow a familiar phonological structure, as the words' initial phonemes already gave away that a new word was about to follow, which activated the word learning process. The same cannot be said for words with a similar sound structure as familiar words, as the initial phonemes would fit a known lexical item and even though a following sound might not correspond to a known word, it would be too late in the word to be processed by a child with SLI. This is, of course, merely a further interpretation of Gray's et al's (2012) findings but it does seem like phonological working memory is not to be underestimated in the processing of language, which is why the subsequent chapter takes a closer look at productive and perceptive phonological skills in children with SLI.

### **3.2. Phonological Profile in SLI**

As some of the studies in the previous chapter indicate, a phonological processing difficulty might be (one of) the reason(s) why children with SLI struggle to acquire their native language(s). The auditory processing skills of linguistically impaired children, have been the focus of attention from as early as 1929 onwards when Worster-Drought and Allen coined the term *congenital auditory interception* (qt. in

Leonard 1998: 133) for a language impairment which is now typically referred to as SLI. Research during the 1960s tried to better understand the auditory processing deficit they observed in SLI, by first playing the same two tones and then two different tones to linguistically impaired children and a group of controls. Children with SLI were found to require a much longer pause (36ms vs. 19ms for the same tones and 250ms vs. 40ms for different tones) to be able to discriminate the tones from each other. A similar result has been replicated for a differentiation between the sounds [f] and [tʃ] as well as [s] and [ʃ], where again only longer intervals (200ms in this case) made the two items distinguishable for children with SLI. Additionally, performance of linguistically impaired children also increased with longer stimuli, which led to their being able to distinguish better between the vowel sounds [ɜ] and [æ] than between consonants, as vowels usually have a longer duration in speech production (cf. Leonard 1998: 133-141). This suggests that children with SLI process auditory input at a much slower rate than their typically developing peers. A hypothesis which has also been suggested by Alt and Suddarth (2011), whose research has been presented in the previous chapter.

The phonological processing problems in children with SLI are, however, not solely restricted to their perceptive skills. They have been found to actually make the errors that might have already been indicated by their performance on perceptive phonological tasks. Girbau and Schwartz (2007) have found a weaker performance in non-word repetition tasks for linguistically impaired children (and their mothers) than their typically developing peers (134). Such non-word repetition tasks are usually employed to exclusively test phonological processing. This is achieved through the creation of non-words that follow the phonotactics of the target language but which are stripped from any semantic context which might facilitate their retrieval.

Girbau and Schwartz found SLI children to produce vowels with a slightly lower accuracy than the control group but the gap in their consonant production was even more significant (135). This finding confirms previous research that suggested vowels to be easier to distinguish for linguistically impaired children, due to their relative length in speech production (see above). However, children with SLI produced by far more consonant errors than their typically developing

peers, even in isolated positions. Gathercole and Baddeley (1990 qt. in Leonard 1998: 269) propose three possible explanations for the weaker performance of linguistically impaired children on non-word repetition tasks. Either, their initial phonological representation of a word is not precise enough, which leads to their wrong retrieval. Alternatively, the phonological traces left by words in children's working memory might not be strong enough, which is why they require more repetition than their peers to retain and subsequently produce them correctly (compare Bishop's hypothesis on weak links between word meaning and their phonological representation, which was presented in section 2.1). Or, ultimately, their weaker performance might be due to a smaller phonological storage, a hypothesis Leonard (1998) also opts for (see point 2.1 for details).

Unfortunately, Girbau and Schwartz (2007) only provide a quantitative error analysis, which does not contain any further information on whether any consonants were omitted or substituted particularly often. This is unfortunate as this study could have provided further evidence for Tallal's, Stark's and Curtiss' (1976 in Leonard 1998: 143) findings that plosives and plosive clusters posed a larger problem for children with SLI than nasal consonants. Similarly, Stark's and Tallal's findings (1979 in Leonard: 143), who saw the highest number of substitutions for voiceless consonants instead of voiced consonants in word initial positions and velar for alveolar sounds, could not be re-evaluated with the quantitative information Girbau and Schwartz provide.

Chiat (2001) traces the language difficulties in children with SLI back to deficits in their phonological mapping process. In order to fully understand her argument the concept of mapping first needs to be described. In the *Mapping Theory* language learning is understood as the process of connecting form chunks to the appropriate meaning chunks. That is, children need to divide the string of words they are exposed to into the right unities and assign the appropriate meaning to them. Chiat argues that the language problems of children with SLI are to be traced back to a deficit in this process (114). Basing her argument on detailed empirical evidence, she goes on to explain how such a deficit would influence the syntactic and lexical development of children.

Firstly, a phonological theory of SLI would explain the affected children's difficulty with repetition tasks that do not require any grammatical knowledge but merely the capacity to listen and repeat auditory input (127). Secondly, this theory would account for the observation that children with SLI have greater difficulty with the acquisition of verbs that do not correlate directly with their experience than with those that can be derived immediately from their own observations (125). In other words, language impaired children have been observed to produce specific verbs (e.g.: close) in some contexts they were familiar with but not in others. This can be explained by the fact that they acquired the verb for a specific context (e.g.: to close the door) but were unable to apply the same word to a visually different event, which would have required their phonological recognition of the word and its application to a new action. Chiat further argues that a phonological mapping theory of SLI would account for the children's problems with grammatical morphemes and syntactic relations (129) as their meanings cannot immediately be derived from experience (e.g.: past tense) and their phonology is demanding. That is, they are usually unstressed, sub-syllabic and they can extend beyond the word (131). Chiat thus comes to the conclusion that the linguistic deficits in children with SLI are to be explained by difficulties in their phonological processing rather than a general processing weakness (137) or a peripheral auditory processing deficiency.

Drawing on the findings that have been presented in this section (and partly in section 3.1) one might infer that the weak phonological processing, whether it is caused by a weak link between a word and its phonological representation, by a limited processing capacity or a small phonological memory, will not only affect the lexical development of children with SLI but also their morphosyntactic understanding and production. Morphemes, by their very definition the smallest semantic unit or grammatical function (e.g.: Yule 2006: 63), can be expected to be particularly prone to omission or substitution, due to their shortness. And indeed, studies in the field of morphosyntax in SLI, provide evidence that morphosyntax is particularly susceptible to errors in language impaired children. The following section will serve the purpose to briefly illustrate the most common mistakes encountered in children with SLI over the years.

### **3.3. Morphosyntactic Knowledge in Children with SLI**

The available data on morphosyntactic use in SLI suggests that this area is, indeed, the most highly affected domain (e.g.: Leonard 1998, Rice 2004). Morphosyntax comprises the syntactic organisation of a language as well as grammatical morphology - a differentiation that this section will follow as well. It will start by discussing the findings on weaknesses in regard to inflectional morphology, derivational morphology and function words, before some insights on unusual syntactic organisation in SLI will be introduced.

A peek into the historical literature review provided by Leonard (1998: 59-71) leads to the following interesting insights on grammatical morphology in SLI. Studies which compared language impaired children to control groups that were matched on similar MLU (mean length of utterance) rather than age, found children with SLI to require a higher MLU before the correct use of some grammatical morphemes. In other words, linguistically impaired children have been found to use certain grammatical morphemes correctly only once they were able to construct relatively longer sentences (a skill usually developed with advancing age). It can hence be assumed that children with SLI acquire grammatical morphemes at a much slower rate than their TD peers – a notion that has been confirmed in a longitudinal study by Albertini (1980 qt. in Leonard 1998: 60).

He tracked the learning process of the grammatical morphemes *-ing*, plural and third person *-s* as well as the prepositions *in* and *on* in SLI children and younger children with the same mean length of utterance (MLU). According to his findings, the group of language impaired children only acquired the two prepositions correctly, while their peers were able to learn all four target items in the same period of time (same frame of MLU). Similar results have been replicated by a vast number of studies (see Leonard 1998: 60ff.), adding past tense *-ed*, irregular past, infinitival *to* and copular *be* to the list of items, which seem particularly hard for SLI children to acquire. An interesting fact in this regard is that children with SLI committed more omission than commission errors, which might point toward a lack of metalinguistic awareness. This is, if these children were aware of the role certain grammatical morphemes play (such as e.g.: the past *-ed*), they could be expected to overgeneralise (e.g.: use a regular past tense form



instead of an irregular form) rather than to leave out certain grammatical morphemes.

And indeed, children with SLI have been found to produce fewer instances of regular past tense, than control groups (Leonard 1998: 65) and to make fewer mistakes due to over-regularisations in irregular past tense forms (Marshall 2012: 136). On a similar note, it has been demonstrated by Leonard (2007a) who compared past *-ed* and progressive *-ing* use in SLI and TD children that the first group showed weaker metalinguistic awareness than their peers. The control group exhibited a higher use of past *-ed* for nondurative, telic verbs (e.g.: drop) than for atelic verbs (e.g.: play), where they correctly applied the past progressive. Children with SLI, on the other hand, could not be observed to make such a distinction (771). In contrast to previous findings, they were not only found to make omission errors but also to substitute *was* for *were* in past progressive constructions (773). In relation to what has previously been noted about the superior processing of word initial sounds as opposed to weak phonological representations of word endings, it should not come as a surprise that grammatical suffixes seem to be particularly arduous for SLI children to acquire. According to Leonard (2007b) this deficiency is due to their lack in paradigm building capacities. In other words, it takes them longer to detect a morpheme, hypothesise about its function and place it at the appropriate spot in a paradigm, which is why they require more repetitions before they finally learn to use certain grammatical morphemes appropriately (152). Thus, these studies seem to provide further evidence for deficient metalinguistic knowledge in language impaired children.

It would be too far-fetched, though, to assume that children with SLI suffer from a complete lack of metalinguistic awareness, it seems more likely that their notion of it is not equally developed in all areas of grammatical morphology. This assumption is based on the fact that they have been found to struggle less with some areas of inflectional morphology than others. While their production of noun plural, for example, has been reported to pose a relatively minor problem, their verb morphology has been shown to cause larger difficulties. A discovery that seems only logical, bearing SLI children's general verb acquisition difficulties in mind (see section 2.1). Leonard's (2007b) report on this matter supports the claim

that SLI children acquire noun plurals much faster and more accurately than the present simple third person –s (an observation that can also be made in L2 learning). A phenomenon that he traces back to the shorter duration of third person –s, as opposed to plural –s, which makes the latter easier for linguistically impaired children to acquire. A similar observation can be made for the use of pronouns, where accusative for nominative use (Leonard 1998: 68) has been reported for English. One of very few studies of SLI in a Slavic language – Serbian in this case - (Loeb & Mikesic, 1992 qt. in Leonard 1998: 68) added that wrong use of cases has been found to occur with a higher percentage in language impaired children.

Quite similarly to morphology, one of the most common mistake in SLI syntax is omission and variety. According to Leonard's (1998: 56-71) literature review, children with SLI tend not to use major syntactic categories in as many different contexts as their peers, which often leads to a lower NDW (number of different words) score in narrative tests. Despite the relative monotony in regard to lexis, Leonard (1988 qt. in Leonard 1998: 57) found SLI children to use major syntactic phrases, such as noun phrases and prepositional phrases, in their spontaneous speech. More precisely, he saw nouns with determiners in preverbal (e.g.: The girl runs) as well as postverbal positions (e.g.: I see the girl). Johnston and Kamhi (1984 qt. in Leonard 1988: 57) measured fewer prepositions in SLI syntactic structures and Bishop reported on children with SLI having difficulties to understand passive sentences. Lely and Harris (1990 qt. in Leonard 1998: 58) explain this last findings with a difficulty to assign agents and themes to sentences. A more recent study (Morton and Schwartz 2003), on the other hand, provides more evidence for an impaired working memory in children with SLI. The authors of this article investigated the performance of language impaired children on non-word repetition and sentence comprehension tasks and found the complexity of sentences to influence their performance to a much greater extent than length (1149).

Apart from sentence repetition or comprehension tests, narratives are a common way to elicit longer utterances from children with SLI. They provide the possibility to test children on lexical, morphosyntactic, phonological and pragmatic

competences, while allowing for relatively much freedom during the actual execution of the experiment. Leonard's (1998: 85) review on this matter suggests that children with SLI usually follow the global outline of stories, by talking about them in a chronological manner but often their anecdotes lack details that make for a more cohesive and engaging tale. On a syntactic level, these parts of speech may include prepositions or complex clauses, which often results in a repetitive sentence structure.

Cleave et al. (2010) give a very detailed account of SLI narrative structure in their study, which compares monolingual with bilingual children with SLI. In their narrative analysis they focus on four different dimensions, in order to get a broader picture of their subjects' linguistic abilities. These categories subsume story length, story structure, language form and use of literate language (517). Monolingual and bilingual children told stories of similar length, which were much shorter than those of unimpaired (both mono – and bilingual) children (518). Additionally, the majority of their syntactic structures were what the authors refer to as “ungrammatical”. Unfortunately, again without providing a detailed error analysis, which could have shed more light on this matter than mere numbers. The same is true for their analysis of literate language, which they measure using five different categories; the average number of simple noun phrases, complex noun phrases, adverbs, conjunctions and mental state verbs per utterance (517). Despite a detailed table which meticulously describes the mean number of occurrences and standard deviations, practically no linguistic information on the actual structures the children produced is available. The authors of this study, regrettably, only conclude that both monolingual and bilingual children did poorly on all aforementioned categories during their experiment. Regardless of the lack in qualitative data analysis in this last study, it still provides a useful indication of an RI (region of interest, as they are referred to in Neurolinguistics), around which to organise future narrative analyses in the area of mono- and bilingual SLI.

This chapter has so far given a relatively brief overview (in relation to how much has been published on these matters) of the linguistic skills that are usually associated with *Specific Language Impairment*. Besides descriptions of lexical, phonological and morphosyntactic difficulties, it also contained a number of

possible explanations of what might cause certain problems. Likely reasons range from auditory processing difficulties to weak links between phonological and semantic representations of words and deficiencies in paradigm building capacities, to only mention some of them. While any sort of brain damage or developmental disorder has been established as a strong exclusionary criterion for SLI, a lot of research in neurolinguistics has been carried out quite recently to find an underlying cause for this mysterious neurodevelopmental disorder. An abridged account of the most important research in genetics, neuroanatomy as well as pre- and post-natal factors which might influence the development of SLI will be discussed in the adjacent section.

### ***3.4. Genetic, Pre – and Postnatal Factors for the Development of SLI***

According to Leonard (1998: 149) the possibility of genes playing a role in the development of SLI was ignored by researchers for a long time, a situation which changed drastically with the discovery of a British family with a history of severe speech and language impairment in approximately half of its members in 2001 (e.g.: Harley 2008: 114). The affected relatives show severe difficulties in controlling their tongues, in making grammaticality judgements and in perceiving and producing speech. The large number of affected family members spread over three generations, could lead to the immediate assumption that SLI might, indeed be a genetic illness. On the other hand, the possibility of language impairment being caused by inappropriate environmental input also needs to be taken into account.

This dilemma is one of the reasons which led Bishop (2002) to further investigate the role of genes in SLI, employing a twin-study design. Twin studies are particularly handy in questions regarding the etiology of illnesses, as differences in concordance rates between monozygotic (identical) and dizygotic (fraternal) twins, who either share 50% or 100% of their genes, are an excellent indicator for the heritability of impairments. And indeed, Bishop found a far larger number of MZ (monozygotic) co-twins meeting the criteria for SLI than in dizygotic (DZ) twins (319). This significant difference in concordance, highly suggests a strong genetic component in SLI. Apart from evidence for genetics influencing the

development of language impairment, Bishop's study yielded another startling result. She found genetics to play a more significant role for non-word repetition scores than for auditory repetition tasks, where environmental factors seemed more influential (323). This result was obtained by comparing test results of monozygotic and dizygotic twins within and across groups. This unexpected result leads Bishop to conclude that SLI probably has one underlying, genetic cause after all but that genetics are not solely responsible for this severe linguistic problem. It is more likely to be caused by the interplay of biological and environmental factors (325).

A more recent twin study (2006), in which she also included tests on non-linguistic auditory perception (i.e.: the discrimination of two different tones), led to a similar result. Another in-group and across group comparison, supported the assumption of high heritability for non-word repetition tasks (and hence a low phonological working memory capacity). A comparison of the non-linguistic perception task, on the other hand, suggested a higher involvement of environmental factors in this area. Bishop explains this discrepancy with the amount of live music children experience in their environment, a factor that she had previously found to have a significant influence on the development of auditory perception skills (219). The sum of these findings confirms Bishop's initial hypothesis of SLI having a multi-factorial origin. A conclusion, she also draws from a meta-analysis (2009), which compares insights on the linguistic skills of children with various developmental disorders, such as SLI, autism and dyslexia.

Hayiou-Thomas (2008), who collaborated with Bishop on some of her work, also found strong evidence for a correlation between environmental and genetic factors in SLI. In her study, she examined twins' performance on a number of language (i.e.: expressive semantics, expressive syntax, receptive syntax, verbal memory and receptive phonology) and speech (i.e.: articulation and phonological memory) tests (400). The analysis of the obtained data led the author to conclude that environmental factors play a larger role in language, whereas genetics seem to be more significant for speech, which might be responsible for individual differences in SLI (401). Even though such a differentiation between speech and language skills provides some more insight on their etiology, it needs to be borne

in mind that a combination of the two is necessary for (successful) communication. Consequently, both functioning as well as impaired language are a result of a coalescence of biological and environmental factors, a remark the author adds in her discussion (405).

Even if this interplay between environmental and genetic factors is assumed as given, it remains unclear in what way such genetic deficiencies might manifest themselves. In her literature review, Bishop (2000) reports on studies that have found unusual neurological developments in classic “speech areas” of the brain, such as Broca’s and Wernicke’s areas. Additionally, MRI images of brain areas involved in control functions (e.g.: the pars triangularis in the inferior frontal lobe) have found them to be smaller in children with SLI (139). An observation which is confirmed by Friederici (2006), who carried out an extensive neurolinguistic study, comparing the brain structure and the neurological speech processing of children with SLI and control groups. Furthermore, her ERP (event-related potential) study of phonological processing in infants of different age-groups, who were born into families with a history of SLI, showed decreased brain responses for discrimination tasks (947). Based on this finding, Friederici argues for brain systems already being in place in very early development.

Stromswold (2006) also takes a nativist approach to language in her meta-analysis but draws attention to a number of pre-, peri- and postnatal factors, which might play a significant role in linguistic development and impairment. Her study is based on her own meta-analysis of identical twin studies, which found genetic factors to account for one half to two thirds of the variance in language impaired twins and for one quarter to one half of linguistic variance in normally developing controls (334). Based on this finding, she takes a closer look at factors which might influence infant language development during pregnancy, straight after birth and throughout the first months of life. Firstly, she mentions premature birth as a major risk factor for subsequent language development. Premature children have been reported to reach language milestones later than full-term peers (341). Independent of prematurity, low birth weight has repeatedly been shown to have a negative influence on language development. While prematurity can only account for a larger percentage of SLI in twins than in singletons, low birth weight could

also be responsible for a discordance in linguistic abilities in MZ twins (342). Stromswold goes on to summarise studies that showed the significance of a number of prenatal problems, such as e.g.: various types of infections and complications during labour and delivery, which might further result in delayed or impaired language competence. The same can be said for hyperbilirubinemia (jaundice) which might again explain between-twin differences, if only one of them suffered from this common illness shortly after birth. Finally, basing her claims on previous studies, Stromswold explains how the perinatal (first weeks after birth) environment might influence the language development of children, particularly in connection with premature birth. She argues that children who are born prematurely are exposed to high frequency sounds earlier than their brain might be able to cope with them. While still in the womb, amniotic fluid prevents babies to hear frequencies that are higher than 1000 Hz (Harley 2008: 119), which it cannot do anymore once they are born. The combination of premature birth and the resulting prolonged stay at the hospital, often in NICUs, where noise levels are inappropriately high for neonates can also result in poor language and cognitive development in children.

Quite obviously, the environmental influences do not stop a few weeks after birth but they continue to have a large impact on the development of children, which is why Scheffner et al. (2001) investigated the relationship between parenting behaviours and SLI. Using a parental questionnaire, they found no significant difference between parents of TD developing children and children with SLI in regard to the following three categories; talking with their children about TV programs, encouraging children to talk or to listen and teaching children colour names (200). According to their self-reports, parents of children with SLI were, however, less likely to read or tell stories to their children or to discuss daily events, activities and feelings with them (201). Even though this study provides further evidence for the significant role of children's linguistic environment in relation to their language development, it does not necessarily resolve the question whether SLI is a product of parental input or the other way around. Apart from this issue, the study also solely focuses on parental speech patterns, not taking any other family members into account. While it definitely seems reasonable

not to assess the communication with each and every single wider family member, it would have still been desirable for the study to include some information on siblings and their communicative behaviour.

Leonard's review on this matter suggests that children with SLI are interrupted more often by their siblings, even if the latter are younger (1998: 175). Bishop (1998) reports on twin-language having a possible detrimental effect on language development. While she stresses repeatedly that it is certainly not the mere presence of a co-twin that causes language impairment, she implies that twinning might serve as a trigger in children with genetic predispositions. She argues her case by referring to some of her previous studies, which showed an augmented risk for language impairment in late-born children of large families and the assumption that twins might be less motivated to communicate with people other than their sibling, which is why they develop their own, secret language, a phenomenon called *twinning*.

### **3.5. Summary**

The question as to whether genetic or environmental factors are responsible for the development of SLI, has been discussed in quite some detail with the preliminary conclusion that a combination of the two is most likely to cause this neurodevelopmental impairment. From the review presented so far, it can be concluded that children with SLI have some genetic predispositions for a linguistic impairment, which are then triggered by environmental influences.

One possible environmental factor, which has not yet been discussed but which becomes increasingly relevant in the light of current demographic developments, is bilingualism. Some overlaps and differences between linguistic profiles of bilingual children and children with SLI and what they mean for standardised assessments are going to be mapped out in the following chapter.



#### ***4. SLI and Bilingualism – Like Two Peas in a Pod?***

“We can no longer afford a monolingual norm“, Zurer-Pearson (2010: 339) states in her commentary to Paradis’ keynote article (2010) and quite rightly so. With the substantial demographic changes in Europe over the past decades which have led to a stark rise in bilingual children, we can no longer afford to look past them in our description of neither typical, nor impaired language development. And yet a quick look back at the previous chapter perfectly illustrates that bilinguals have not been taken into account in the research on SLI for a long period of time. A situation that is changing gradually with the establishment of a new research field, namely BISLI, which tries to disentangle the overlaps between bilingual and impaired language development in order to make language assessment more accurate.

A large number of these overlaps has been described by Paradis and her colleagues in numerous studies. Starting in 2000, Crago and Paradis looked at tense-marking in spontaneous speech of typically developing French monolinguals, French-English bilinguals and a group of language impaired children (838). In their experiment, children with SLI and bilinguals omitted finite verbs in obligatory contexts much more frequently than their TD monolingual peers, confirming previous studies which investigated their linguistic output separately (840). They also observed lower accuracy in the choice of future and past tense in bilingual children as opposed to the language impaired group (841). A subsequent error analysis of these two tenses revealed that SLI children used non-finite verbs more frequently, while bilinguals simply replaced the required tense by the present tense and both groups used temporal adverbials correctly in close to 100% of utterances (842). A review of their findings in relation to previously published studies, led Crago and Paradis to raise the question as to whether SLI and bilingualism are actually “two of a kind” or whether they merely represent two outcomes of the same underlying cognitive process (2003).

In order to answer this questions, Paradis and her colleagues once more investigated tense-marking morphemes in TD monolingual, bilingual and linguistically impaired children, with the sole difference that their language of interest was English, rather than French in this experiment (2008). Focusing on

their production of third person –s, past –ed, copular *be*, auxiliary *be* and *do*, they found significant between-group differences for the first two categories but not the rest with the bilingual children scoring lower than the remaining two groups (703). Furthermore they also documented more over-generalisations of auxiliary and copular –*be* in the bilingual group which directly resulted in their making fewer omission errors in this area than their impaired peers (714). It seems noteworthy in this context that the bilingual children had an average exposure of only 9.5 months at the time of testing (699) which might have influenced the striking differences between the TD bilingual and the SLI group in this case. This suggestion seems particularly relevant in the light of very recent studies that did not elicit similar results to Paradis and her colleagues.

One of the most recent issues of *Bilingualism: Language and Cognition*, which is entirely dedicated to BISLI studies, provides crucial insights on this relatively young field of research. In its introduction, Armon-Lotem (2012: 1) describes the problematic situation of BISLI due to the heterogeneity of the bilingual population, depending on socio-economic status, age (of acquisition), degree of exposure, birth order and acquisition contexts as well as the broad inclusion criteria for SLI. The latter refers to the fact that the criteria for a diagnosis with SLI are not very clear-cut and thus might be applicable to a fairly large and heterogeneous part of the population. With this introduction Armon-Lotem provides grounds for the hypothesis that exposure to the L2 is likely to play a crucial role in the comparison between SLI and bilingualism.

Despite the sheer impossibility to control for all possible differences within and across the two groups of subjects, researchers have still succeeded to describe a number of tendencies in their linguistic profiles. Chondrogianni and Marinis (2012), for example, have also investigated the processing of tense morphology in monolingual and sequential bilingual children and compared their results to previous findings among SLI children. They elicited present third person –s and regular as well as irregular past tense forms, using pictures from the *Test of Early Grammatical Impairment* and tested the processing abilities of both groups by presenting them with ungrammatical sentences where grammatical morphemes (e.g.: –ed, –s, –ing) were omitted (11). Unsurprisingly, L2 children were

found to perform by far less accurately on the grammatical production task than their monolingual peers but better than bilingual children from Paradis' studies who have had less than three years of exposure. Interestingly, Chondrogianni and Marinis found a moderate correlation between the acquisition of third person *-s* and years of exposure, suggesting that children's understanding of this grammatical morpheme does indeed improve over time. An observation which could not be confirmed in their use of *-ed*, a morpheme that a vast majority of the subjects had mastered at the time of the experiment (16).

Turning to the processing task of this experiment, bilingual children showed sensitivity to ungrammatical sentences, even if their production ability of the same morphemes was not target-like, or even below the criterion score (17). When compared to grammatical processing abilities of children with SLI, sequential bilingual children were found to perform more accurately, especially in regard to the omission of tense morphemes, which the majority of SLI children failed to discover. This is to say that bilingual children were better at detecting missing tense morphemes, even if they did not produce them in their speech. This points quite clearly to higher levels of metalinguistic awareness in dual language learners than in their language impaired peers. The only exception to this observation was progressive *-ing*, which points toward the affected children only lacking parts of metalinguistic knowledge, rather than an entire absence thereof. The only real similarity between sequential bilinguals and language impaired children which could be observed in this study was their longer reaction time when contrasted with their monolingual peers (18).

A previous study by Thordardottir and Brandeker (2011), which analysed the performance of typically and atypically developing bilingual children on non-word repetition and sentence imitation tasks, arrived at a similar conclusion. They report a higher rate of accuracy in both tasks for sequential bilinguals, independent of their exposure than for their atypically developing peers. Thus, these tests seem to measure group differences between TD bilingual and impaired children quite accurately. The same conclusion cannot be drawn from their respective scores on a receptive vocabulary measurement. This test only served to distinguish between the typically developing monolingual and the impaired bilingual group, whereas it

did not detect any significant differences between monolingual impaired and unimpaired bilingual children (12). In other words, based on this receptive vocabulary test alone, normally developing bilingual children would have been classified as linguistically impaired which might have a major (negative) impact on their further educational careers. This leads to the assumption that only a combination of various different language measurements can make an accurate distinction between typically and atypically developing children. This notion is taken up by Iluz-Cohen and Walters (2012) whose investigation of narratives by impaired and typically developing children adds further information in the fields of discourse, lexis, morphosyntax and code-switching.

According to their findings, impaired and TD bilingual children do not differ significantly on measures of narrative organisation, which include *setting, initiation of events, internal responses, attempts, consequences* and *endings* (59). Both groups used three to seven narrative devices, out of which settings and initiation of events were used most and internal response was employed least frequently (63). In contrast, the difference between TD bilingual and BISLI children in regard to lexis are striking. The typically developing group outperformed their linguistically impaired peers on nine out of ten lexical measurements, including number of words, word types, type/token ratio, number of content words, utterances which contained verbs and mean length of utterance (63). Additionally, a group effect can be observed for the omission of pronouns and articles, again putting the typically developing bilingual group in favour. Finally, the analysis of code-switching shows more instances in narratives of language impaired children but both groups switched between languages for nouns and noun phrases (65). A finding, which the authors replicated in a follow-up study that focused specifically on code-switching in the two groups respectively (68). On the basis of these results, Iluz-Cohen and Walters conclude that a wider array of measurements needs to be included in the linguistic assessment of language impaired and TD bilingual children in order accurately draw these two apart.

A preceding literature review by Kohnert et al. (2009) which did not only examine the linguistic but also the non-linguistic skills in typically developing monolingual, bilingual and language impaired children also suggested the

employment of a larger number of tests during the assessment of bilingual children. Kohnert and her colleagues specifically point to the significance of non-linguistic tasks in this respect, as they found subtle but relevant differences in the performance of all three groups on such tasks (108). It is hence no surprise that Kohnert (2010) also raises the claim to include non-linguistic measures in the assessment of mono- and bilingual children with and without language impairment, during her answer to Paradis' (2010) keynote lecture. In light of Kohnert's findings (and others mentioned before), it seems increasingly inappropriate to try and force non-linguistic and linguistic skills apart and to require a gap between the two for a diagnosis of SLI.

Bearing the superior performance of bilingual children on certain non-linguistic tasks in mind (see section 2.5), it seems relevant to raise the question as to whether bilingualism would, as a result, have a positive effect on children with SLI or whether it might cause a double delay. This is another issue Paradis (2010) raises in her keynote article and which has subsequently been taken up in some of the replies. One of her respondents is Armon-Lotem (2010), who investigated data on bilingual Russian-Hebrew children under the light of a possible positive effect of bilingualism, despite their language impairment. Her review shows that dual language learners with SLI achieve similar results to their impaired monolingual peers and even score better on some of the tasks, such as e.g.: in sentence completion tasks (257). Furthermore, she also reports on bilingual English-Hebrew children making more commission errors than their monolingual peers on preposition tasks, which she interprets as their having better metalinguistic knowledge (257) due to their knowing two languages. They thus seem likely to exhibit a boot-strapping effect, similar to unimpaired bilingual children. Mueller Gathercole (2010) suggests a slightly differentiated profile of the boot-strapping theory for children with SL which she bases on her study of (a)typically developing English-Welsh bilinguals. She proposes that bilingualism might have a positive effect on children with SLI for simple sentences and lead to a negative transfer for more complex structures (288).

In a highly theoretical article, which is rooted in the notions of minimalism, Roeper (2012) also explores the relationship between bilingualism and SLI and

also argues for domain-specific positive transfer in bilingual children with language impairment (98). He specifically suggests positive transfer for some prepositions and cases, in situations where children know one language that is richer in inflection than the other. His example of negative transfer is concerned with object drop in Chinese-English bilinguals and it might be equally applicable to L2 English speakers whose native language does not necessarily require the use of pronouns (99). Finally, Roeper also shows that in some cases, there might not be any transfer at all, such as in *wh*-fronting in questions by French-English bilinguals. Despite his meticulous analysis which is based on a large body of theoretical work and which, ultimately, leads to intriguing results, Roeper does not necessarily provide his readers with a conclusive answer to the question as to whether children with SLI are capable of transferring their knowledge from one language to the other. Even though a domain-specific transfer mechanism seems most likely at the current state of research, further studies are certainly required to investigate the boot-strapping theory in impaired bilinguals.

It was therefore one of the aims for the underlying empirical study to take a look at possible positive and/or negative transfers from L1 to L2 and vice versa, in both a TD bilingual and his linguistically impaired twin brother.

## **5. Methodology**

### **5.1. Participants**

This study evolves around a male dizygotic (fraternal) English-Polish bilingual twin pair who is part of the *bi-sli PL* cohort of bilingual children in England. Their personal information, which is presented in this section of the paper, was obtained using two parental questionnaires and a one-hour interview with the twins' mother. The first questionnaire is the Polish version of a questionnaire used by the COST ACTION IS0804, which is based on Paradis (2007) and investigates children's (bilingual) language development as well as their current linguistic status. The second questionnaire, on the other hand, was compiled by the author of this paper, applying the information obtained from Stromswold's (2006) article and

inquiring about a number of pre-, peri-, and postnatal factors which might have influenced the children's language development. To round up the information obtained from these two questionnaires and to better understand the sociolinguistic situation the two boys are growing up in, a semi-structured interview was carried out, during which room was given to more elaborate descriptions and anecdotes. The interview was carried out in Polish around the family's dinner table and it was recorded using a pre-installed recording programme and the built-in microphone on the researcher's own laptop.

The two boys were born in London to Polish parents and were 4;6, 4;8 and 5;6 years old at the times of testing. The younger twin was previously diagnosed with *expressive language disorder*, a sub-type of SLI (e.g.: Leonard 1997) that is defined by age-appropriate perceptive language skills and impaired expressive language. The impaired twin receives daily one to one support at school whereas his older brother does not show any atypical language development. The speech and language therapist's diagnosis could further be confirmed by the information obtained from the questionnaire on biological factors influencing language development. While the twins were not born prematurely, the language impaired bilingual (LIB) was born second at only 1.8kg, as opposed to his brother, whose birth weight amounted to 3.1kg. The diagnosed child had further spent eight days in the NICU, in contrast to the typically developing child (TDB), who was released from the hospital after only five days in the NICU. Apart from these pre- and perinatal factors, the brothers' differing results on every language test carried out as part of this study, provide further evidence for a diagnosis of SLI. Finally, the affected child does not meet any of the exclusionary criteria for SLI, this is he has normal hearing, he did not suffer any brain damage and he does not fall into the autism spectrum.

Apart from their general language development, the subjects also differ in regard to their language dominance. While the mother did not report any preference or dominance for the non-impaired twin, the dominant language of the linguistically impaired twin changed from Polish to English between the two rounds of testing, the second of which took place in the winter break of their second school year. In the light of their similar language history and sociolinguistic

situation such a difference seems particularly striking. Both boys uttered their first words in Polish, which was also their main form of interaction until the age of three when they entered pre-school. While English is the children's language of education, Polish has remained their family language despite the fact that both parents are balanced bilinguals and use both languages on a daily basis. It is the language that is spoken around the dinner table unless the boys start using English, which is when their mother reminds them to use Polish and their father sometimes replies in English. Books are read to them in Polish now that they have to read English books themselves for school and the boys prefer Polish television to English TV shows and films, which was not necessarily the case when they were still younger.

The mother further reports on using Polish in 95% of the time at home, unless they have English-speaking or other bilingual guests, which is when they either code-switch or speak English. School work is further mentioned as an exception to the general rule of speaking Polish at home as a reason for which the mother states the possible confusion that might arise in her children from assigning Polish terms to newly acquired phenomena. Apart from their parents, the boys also regularly interact in Polish with two aunts and two uncles and with their grandparents when they come to visit or they go to see them in Poland for a month during the summer holidays. In addition, they also attend Polish school for four hours a week on Saturdays, which is where their parents want them to learn about the Polish cultures, its traditions, customs and geography and how to read and write in this language, which they regard as important skills for their sons' future. When asked about the reason for this opinion, the twins' mother states that she wants them to be equipped with the skills to study, live and work in Poland if they (as a family or the boys themselves) ever choose to move (back) to the parents' native country.

In a regular week the children are said to speak English more frequently than Polish as they use the majority language at school and during their extra curricular activities, which is also reflected by the fact that they, as the mother jokingly puts it "speak Polish on Mondays (after the weekend) and English on Fridays (after the week at school)". This statement already indicates that the twins



switch between their two languages when interacting with each other, adapting to their environment and sometimes taking a domain-specific approach, when English is used during fights, whereas Polish is used to express their (positive) emotions for their brother and their parents.

Despite the fact that neither parent has been raised as a bilingual, their opinion about bilingualism is very positive, with a broader worldview, better cognitive development and bi-culturalness being stated as reasons. It is added, however, that the latter might also result in a lack of identity. When asked about her own children's identity, the mother talks about a fairly recent change of mind which led her to see her children as English, rather than Polish (in the future), a reason for which might be their going through the English school system, which according to her might have a strong influence on the formation of identity. In this regard it also seems noteworthy that the twin's family can be said to have a higher than average socio-economic status, when compared to the information provided in section 2.6 of this paper as both parents have completed tertiary education and now work in their professions. This is something that certainly needs to be borne in mind when their linguistic output will be investigated.

Finally, the mother was asked to characterise her children. She states that the older (non-impaired) twin used to be more dominant and more controlling, before they started school and went to different classes (a choice which is common practice for twins in the school the boys go to). This also led the older of the two to often take over responsibilities and to talk for his twin brother (cf. Leonard 1998: 175). He is reported to do less so nowadays but this is still reflected by his rather extrovert nature, which also leads him to seek people's attention. Quite contrarily, his younger brother is rather introvert, more creative and sensible and capable of playing or drawing quietly on his own for a longer period of time.

This description clearly paints a very diverse picture, despite their biological and sociological similarities, a tendency that will further be shown in their results on a number of linguistic tests, the nature and procedure of which will be discussed in the subsequent section.

## 5.2. Tests

The tests described in this thesis were designed within the framework of the European network in the COST Action IS0804 *Language Impairment in Multilingual Society: Linguistic Patterns and the Road to Assessment*. The research presented in the paper was supported by the research project *Cognitive and language development of Polish bilingual children at the school entrance age - risks and opportunities*, financed by the *Ministry of Science and Higher Education*, Poland (decision no 809/N-COST/2010/0). The study design was developed by the Polish researchers of the COST ACTION IS0804 and tests children's linguistic and non-linguistic abilities using a variety of tasks. The first two rounds of testing (one per language) took place as part of this very project and children were tested by trained native speakers of the respective language in one language only per sitting. Even if testers were speakers of the language they did not test, it was ensured that subjects were not aware of this fact in order not to foster code-switching. This is why testers only used the language to be tested in communication with both subjects and their caretakers. It was further ensured that bilingual testers only administered tests in one of their two languages. Testing took place at the children's home and on the university premises of *City University London*.

The third and fourth sittings were follow-up investigations and were conducted by a trained monolingual English speaker and the equally trained simultaneous German-Polish bilingual author of this paper, independently of the main project but with the permission of the head of the Polish research team. In this last round of testing, the twin pair did the English as well as the Polish version of a productive vocabulary task, the English version of a receptive lexical test, a sentence-repetition task, both language versions of a receptive grammar tasks, a narrative exercise in both their languages and the *Raven Coloured Matrices* test in English.

Parents gave their full written consent to their children participating in this study and to their data being used anonymously for research purposes. Furthermore the children's oral consent was obtained at the beginning of each

sitting and experiments were broken off as soon as they expressed their unwillingness to start or to continue a test.

### ***EVT-2***

The second edition of the *Expressive Vocabulary Test* (Williams 2007) is a measure of productive vocabulary and word retrieval for Standard American English which was standardised on 3,500 monolingual American individuals aged between 2;6 and 90+ years. In this study the pencil and paper version of this test was used, in which one fully coloured picture per page is presented on an easel and accompanied by a question that is indicated on the tester's scoring sheet.

Correct answers, which also include British English alternatives to the American English terms (e.g.: lorry for truck) and a number of synonyms as well as wrong responses, are also indicated on the scoring sheet. While some of these incorrect answers are simply to be marked as wrong, testers are allowed to prompt their subjects, asking them for an alternative answer in other cases. Before administering the EVT-2, testers are required to calculate their testees' chronological age in years and months, which they need in order to establish the first item to be distributed. This first item is, however, not necessarily the basal item, which is the lowest item in a row of five consecutive correct answers. If one of the first five items is not answered correctly, the administrator needs to test the test taker backwards until he/she achieves these five correct responses in a row. The ceiling item is reached once the test taker replies incorrectly to five consecutive items or reaches the end of the test. The raw score, which is obtained by subtracting the faulty answers from the number of the ceiling item, can then be transferred to a standardised score and the according standard deviation as well as age and grade equivalents. In this respect it is crucial to add that this test was standardised using a monolingual norm which does not necessarily provide a suitable reference for bilingual children as their vocabulary size is likely to differ significantly from this norm due to the fact that it only tests one of their two languages.

This is why also a Polish version of an expressive vocabulary test was administered to the children in this study. The *Zadanie Nazywania Obrazków*

(Haman & Smoczynska 2010) also consists of seventy fully coloured items, which are shown to test takers on a computer screen and, similarly to the EVT-2, accompanied by a specific question. As this test will only be standardised on the basis of results obtained from the bi-sli PL project, only one correct answer is given on the scoring sheet, which is to be indicated as either right or wrong.

While the aim of both word retrieval tests is merely to provide a quantitative score, indicating how many of the items were answered correctly, I decided to also analyse the obtained data qualitatively, doing an error analysis in order to better understand the types of mistakes the subjects make.

### **BPVS-3**

The third edition of the *British Picture Vocabulary Scale* (Dunn, Dunn et al. 2009) was used in this study in order to determine the subjects' passive vocabulary knowledge. The BPVS-3 was standardised on over 2500 monolingual English speakers, aged between three and fifteen and over 400 bilingual children aged between three and eight. It is an adaption from the *American Peabody Picture Vocabulary Test* (Dunn, Dunn & Williams 1997) and hence also includes British English vocabulary. Again, the pencil and paper version of this test was used, which presents to the test taker four different full colour items per page, out of which the one that corresponds to the auditory stimulus should be chosen. This perceptive vocabulary test consists of fourteen sets, which contain twelve items each and are allocated to certain age levels. In contrast to the EVT-2, this test does not require a single basal item but a whole basal set, which is the first set where the child does not make more than one mistake. The ceiling set, on the other hand, is reached as soon as the test taker makes more than eight mistakes in a single set. Lexical items in the BPVS-3 include abstract and concrete nouns as well as verbs and adjective from various semantic categories.

In addition to the English BPVS-3, the Polish OTS-R (Haman & Fronczyk 2010), which is also a test of word retrieval, has been administered to the subjects. In contrast to *Zadanie Nazywania Obrazków* (Haman & Smoczynska 2010) and similar to the EVT and the BPVS, monolingual norms exist for the Polish test of passive vocabulary.

In this study, the perceptive lexical tests were always administered before the productive ones as such a test layout gave our subjects the possibility to get used to the test situation during the only linguistic measurement which did not require them to speak. While the order of administration for the types of two vocabulary tests was fixed, the schedule of all remaining tests was altered between subjects, in order to rule out the possibility of the various measurements influencing each other and falsifying the results.

### ***Sentence Repetition Tasks***

As a measurement of syntax and morphology as well as to investigate the subjects' phonological processing, the *SASIT – School Age Sentence Repetition Task* (Marinis et al. 2011) and its Polish adaptation (Banasik, Haman & Smoczynska 2011) were used. Both tests require test takers to listen to a number of pre-recorded sentences (60 for the English and 67 for the Polish version) and to repeat them into a microphone. In order to encourage children to keep imitating what they hear and to maintain their concentration, smiley faces appeared on a computer screen after each ten sentences and a short break was made right before the most complex syntactic structures, during which the testers engaged in a short physical activity with the subjects. The children's responses were voice-recorded and analysed quantitatively and qualitatively. The pre-recorded sentences vary in length and complexity and were read out by native speakers in a rate of approximately 4 syllables/second, which corresponds to 240 wpm (words per minute).

### **TROG – Test of Recognition of Grammar**

Quite like in the *Sentence Repetition Tasks*, subjects also listened to pre-recorded voices through headphones during the *TROG* (Bishop 2003; polish translation Smoczynska 2005). Rather than to repeat the auditory input, though, children had to point to one out of four pictures which corresponded to the stimulus. The pictures were displayed on a computer screen and the children's responses were video-recorded. This test serves the purpose to investigate as to how far children understand relationships between items, which are solely expressed through slight

morphosyntactic alterations. This is, only the size, colour or position toward another item might change between the sentences, requiring children to listen closely and to be capable of understanding the role of (morpho)syntax. The TROG and its Polish translation are divided into twenty different sub-groups, which each contain four syntactically similar sentences. These range from simple to compound and complex syntactic structures and comprise negative, positive, active and passive sentences. Quite similar to the SRT, there are no basal or ceiling items but test takers are asked to complete the whole task, unless the experiment needs to be broken off, of course.

### **Narrative Tasks**

The last test which was used as a basis for this paper was a narration/re-narration tasks that combined the previously tested lexical and morphosyntactical knowledge and which was also carried out in both the subjects' languages. The four different stories (two per language and per task) have been developed by the a group of researchers as part of the COST IS0804 project (Gagarini et al. 2012) and have then been translated to Polish by Kiebzak-Mandera and colleagues (2012). Each story consists of six fully coloured pictures, which feature various animals as their protagonists. Both picture stories for the narration task feature a group of baby animals, which is endangered by a mammal of a different family and then, ultimately, saved by a third animal in the second to last picture of the story. The story of the re-narration task is similar to that of the narration task as it also features a story of one animal (either a cat or a dog) chasing another one (a butterfly or a mouse), a boy (quite strikingly a boy, rather than a girl in both stories) losing either a balloon or a ball and the animals stealing something they had previously bought.

This task starts with the experimenter asking a couple of warm-up questions about the children's reading habits and story preferences, encouraging them to tell a story from the top of their heads. Once the children have done (or refused to do) so, the testers investigate the subjects' metalinguistic awareness by asking them a number of questions about the structure of stories and fairytales, which focus on their beginnings and their endings. These questions serve the purpose to draw the

children's attention to the peculiarities of narrative structures and also to prime them to use past tense, rather than present tense during their storytelling. Once this warm-up conversation has come to an end and all crucial information has been exchanged, the experimenter gives the child the choice between three similarly coloured envelopes, all containing the same story for the narrative task. Believing that the envelopes actually contain three different stories, neither of which are known to the experimenter, the child chooses one story and looks at it without showing it to the tester. Once the subject has told the story, further questions about the plot and the protagonists' emotions are asked, in order to test the children's understanding and the Theory of Mind (cf. section 2.6).

Once this task is completed, the testing is resumed with the re-narration task during which the experimenter reads out a story, which is divided into six different sections, one per picture. While "telling" the story to the child, the tester always points to the respective image, without emphasising the role of any of the protagonists. Once the story is told, the test taker repeats the story as best as she or he can, which is again followed by a number of questions by the tester.

Similar to the TROG, the EVT-2, the BPVS-3 and the sentence repetition task, the narrative section of this experiment was also video-taped in order to be able to refer back to the children's gazes during their storytelling.

### **Raven Coloured Progressive Matrices**

To round up the linguistic data obtained from the vast number of tests described above, both subjects were also tested on a well-known and highly acknowledged non-linguistic task in their dominant language only. This is, they were only tested once during the first round of testing and once during the follow-up study and only in their respective dominant language at the time.

The *Raven Coloured Progressive Matrices Tests* (Raven 1981) is a nonverbal test for children between 5 and 11 years of age, which requires them to choose the fitting pattern out of a selection of six options in the easiest items and to abstract a pattern from the same number of items, in the most difficult set. In total this non-linguistic test comprises 36 items divided into three different sets with

differing levels of difficulty. Again, there is neither a basal nor a ceiling item but children have to complete the whole test in order for it to be valid.

Now that the participants have been introduced and the methodology has been explained, the quantitative and qualitative results obtained from the various tests will be presented and analysed in the following chapter.

## 6. Quantitative Results

This section is concerned with the results obtained from the previously presented non-linguistic and linguistic measurements. They will first be analysed from a quantitative point of view, comparing the twins' scores on each test and measuring them against norms where these are available. In this regard it needs to be remembered that the vast majority of standardised tests do not provide norms for bilingual children, which might lead to their scoring below their age levels. This is also why the quantitative analysis of the subjects' data will be followed by a qualitative analysis, as part of which the twins' performance will be investigated in regard to the types of errors they make and in what aspects their linguistic output differs or resembles each other.

### 6.1 Non-linguistic assessment – Raven Coloured Progressive Matrices

Table 1: Raven Colours Progressive Matrices - Results

| <b><i>Raven Coloured Matrices</i></b> |                         |                         |
|---------------------------------------|-------------------------|-------------------------|
|                                       | <b><i>4;8 years</i></b> | <b><i>5;6 years</i></b> |
| <b><i>TDB</i></b>                     | 19                      | 27                      |
| <b><i>LIB</i></b>                     | 18                      | 22                      |

The twins' scores on the only non-linguistic measurement in this study indicate a noteworthy contrast in their non-linguistic intelligence. While this difference amounted to only four points in the first round of testing, their results diverged by eight points in the follow-up study. It seems particularly interesting that the unaffected child's errors occur almost exclusively at the end of each category, which is reserved to the more difficult item, whereas the affected child's mistakes are rather spread out across the different categories. This results in the language



impaired bilingual answering accurately three of the more complicated items, which were answered incorrectly by his brother. These might, of course, merely be good guesses but it is equally likely that fluctuating levels of concentration cause his low result. This would also explain his capacity to answer some of the more complex items correctly. This hypothesis is supported by the fact that his answers show a fairly regular, wave-like pattern in which incorrect answers are not necessarily restricted to the more complicated items.

One way or the other, the difference of eight points between the twin brothers' results in the second round of testing is remarkable and it points toward SLI not being as domain-specific as the term *Specific Language Impairment* might suggest. It thus favours a *domain-general* approach of SLI, rather than a *domain-specific* interpretation of this neurodevelopmental disorder. It also needs to be taken into account that any non-linguistic task, whether it is a psychological test or any maths problem, requires instructions in a spoken or written form, which might put children with language impairment in a disadvantaged position from the start. Despite the relevance of this argument in regard to all forms of testing, if as part of an experiment or in school, it is not necessarily applicable for this test as it would require the affected child to have scored particularly low on the first items right after the instructions, which was not the case. It is, nevertheless, an issue which needs to be taken into account when analysing the data obtained from the remaining tests which are the focus of the rest of this chapter.

## 6.2 Productive Lexical Tests – EVT-2 and OTS

Table 2: Productive Lexical Tests – Results

|            | EVT-2     |        |              |          |      |           |        |              |          |      |
|------------|-----------|--------|--------------|----------|------|-----------|--------|--------------|----------|------|
|            | 4;6 years |        |              |          |      | 5;6 years |        |              |          |      |
|            | Ceiling   | Errors | Stand. Score | Age Equ. | %ile | Ceiling   | Errors | Stand. Score | Age Equ. | %ile |
| <b>TDB</b> | 83        | 13     | 113          | 5;7 y.   | 81   | 96        | 15     | 110          | 6;5 y.   | 75   |
| <b>LIB</b> | 82        | 30     | 94           | 4;3 y.   | 34   | 96        | 32     | 96           | 5;2 y.   | 39   |
|            | OTS       |        |              |          |      |           |        |              |          |      |
|            | Errors    |        |              |          |      | % correct |        |              |          |      |
|            | 28        |        |              |          |      | 44%       |        |              |          |      |
| <b>LIB</b> | 37        |        |              |          |      | 26%       |        |              |          |      |

The subjects' performance on the English productive vocabulary test clearly illustrates their linguistic differences. While both of them reached approximately the same ceiling items (82 for LIB; 83 for TDB at first testing and 96 for both at second testing), they differed significantly in the number of errors they made. The unaffected twin answered 13 items incorrectly in the first sitting and 15 during the second round of testing nine months later. His affected twin brother, on the other hand, provided wrong answers for as many as 30 items during the first examination and for 32 questions during the follow-up study. The resulting raw scores of 52/64 for the impaired twin and 70/81 for his unimpaired brother correspond to standardised scores of 94 and 113 for the first sitting and 96 and 110 for the second round of testing. This seemingly small difference in standard scores can be explained by the fact that this test, like many others, has been standardised on a very large and thus fairly heterogeneous group of children. These children's performances were then added up and normalised, which leads to the standard scores representing a range of performances rather than a specific score. In other words, these scores represent in how far the subjects of this study diverge from what has been established as the "norm" during the standardisation process of this test.

A conversion of these rather abstract standardised scores to age equivalents, shows the differing performance of the two subjects more clearly. According to the conversion table provided in the EVT-2 manual, the TDB's standardised score for the first round of testing, when the twin pair was 4;8 years old, corresponds to an age equivalent of 5;7 years, whereas his brother's performance compares to the average score of a 4;3 year-old. When directly compared, this difference in age equivalents, amounts to a gap in linguistic performance of 16 months. In other words, when tested for the first time, the twin brothers differed in their language abilities by nearly 1.5 years. It needs to be added, however, that it was not only the affected child's performance which caused this gap as he only performed five months below his age. His twin brother's score, on the other hand, corresponded to that of a child nearly one year older than himself. When tested nine months later, the performance had decreased slightly and amounted to 15 months. The most remarkable fact in this

regard is certainly the LIB's increased score, which now only diverged from the mean by four months. This slight but nevertheless remarkable increase in performance might be influenced by the daily one-on-one language therapy the language impaired child receives.

Despite the twins' highly differing scores on this test, both of them performed within one standard deviation (1SD) within the mean. This is, the affected twin fell into the 34 percentile at the first sitting and into the 39 percentile during the follow-up study, both of which correspond to a low but average performance. The unaffected child, in comparison, scored within 1SD above the mean, falling into the 81 percentile at the first testing and into the 75 percentile nine months later. With such a performance, both subjects score equally to 68% to the population, who would earn scores within 1SD of the mean. It can hence be said, that while a comparison between the twins yielded striking results, which clearly point toward a drastic gap in their linguistic abilities, the impaired twin's standardised score alone would have not necessarily sufficed to diagnose him with language impairment. This is due to the fact that his performance on this test was low but still above Tomblin's 1.25 SD, which he suggested as a cut-off point for language disorder. A negative deviation from a norm might hence be an indicator for language problems but the types of mistakes made probably provide more evidence for a digressing performance. A more profound investigation of the subjects' errors patterns will be undergone in the following chapter.

Similar to their performance in English, the subjects also differed significantly in regard to their Polish language skills. Once again the non-impaired bilingual twin outperformed his younger brother even if not to such an extent as in the EVT-2. In the Polish naming task, the impaired bilingual only scored nine points below his brother with both of them only scoring correctly on less than 50% of the items. While the unimpaired twin answered 44% of the questions correctly, the affected child provided the right answer to only 26% of the items.

Unsurprisingly, both of them scored better on the easier items, which were administered first and worse on the more complex words which came later during the test. Their overall rather low scores on this Polish naming task might be influenced by the fact that it was standardised on a Polish monolingual community,

rather than on a bilingual cohort. It might hence be the case that the subjects in this study are familiar with some of the vocabulary in only one of their two languages, which is why the qualitative analysis of this test will further investigate the twins' performance on items which occur in both language tests. Additionally, their language knowledge might be domain-specific, with Polish solely being reserved to the home domain, whereas English is their language of education and everyday interaction outside the family, which might lead to it covering a wider range of vocabulary. This issue will further be addressed as part of the qualitative analysis of the English and Polish naming tasks. As active vocabulary is not the only requirement for successful communication, passive vocabulary has further been examined as part of this study. The results obtained from this investigation are the main concern of the following section.

### 6.3. Perceptive Lexical Tasks – BPVS-3 and OTS-R

Table 3: BPVS-3 and OTS-R – Results

|     | BPVS-3  |           |                    |                |      |
|-----|---------|-----------|--------------------|----------------|------|
|     | Ceiling | Errors    | Standardised Score | Age Equivalent | %ile |
| TDB | 108     | 32        | 111                | 5;0/5;4        | 77   |
| LIB | 72      | 20        | 91                 | 3;9            | 28   |
|     | OTS-R   |           |                    |                |      |
|     | Form A  |           | Form B             |                |      |
|     | Errors  | % correct | Errors             | % correct      |      |
| TDB | 9       | 82,7%     | 20                 | 73,4%          |      |
| LIB | 18      | 70%       | 22                 | 67%            |      |

Due to technical reasons, the subjects were, unfortunately, only tested once at the age of 4;8 with both perceptive vocabulary tests. Nevertheless their results will be presented as they provide further insight in the brother's differing linguistic abilities. Quite similarly to the active vocabulary test, the affected twin scored lower than the unaffected twin on both language versions of the perceptive lexical test. In contrast to the productive vocabulary test, the subjects' ceiling items differed significantly in the BPVS-3 with the unaffected twin answering three more sets (with twelve items each) than his brother. It is hence not surprising that the LIB reached a raw score of only 49, which corresponds to an age-equivalent of 3;9 years, as opposed to his brother's raw score of 72 and an age-equivalent of 5;0 years. These age

equivalents correspond to standardised scores of 91 for the impaired subject and 111 for the typically developing twin.

What is particularly striking in this regard, is that both children score lower on the BPVS-3 than on the EVT-2. That is, the typically developing twin does still score slightly above his age but only four months, rather than nearly one year above his chronological age. It hence seems safe to say that the unaffected child's performance on the receptive vocabulary test did not quite meet his performance on the active lexical test. Bearing in mind, however, that he still reached a level four months above his age, this difference in performance should not be considered worrisome. Similarly, the impaired twin scored higher on the productive than the perceptive test, where he fell into the 28 percentile, as opposed to the 34 percentile in the EVT-2. Despite this lower performance on the passive lexical test, his standard score of 91 still places him just within 1SD below the mean.

The affected child's slightly but nevertheless lower score on the perceptive vocabulary task puts the speech and language therapist's diagnosis of expressive language disorder, which suggests an age-appropriate perception of language, into question. Bearing in mind that this differentiation has been questioned in the SLI literature for quite some time now (see chapter 3 for a review), it should not come as a surprise that both the perceptive and the productive vocabulary of the language impaired twin seem to be affected by the *Specific Language Impairment*.

When looking at his Polish test results, however, this equal effect on perceptive and productive vocabulary knowledge does not seem so evident anymore. The affected twin's test results in his dominant language at the time of testing, show a clear discrepancy between his productive and his perceptive language skills. While he only scored correctly on 26% of the items in the Polish active vocabulary test (OTS), he chose the right out of four items in an average of 68% of the cases in the Polish receptive lexical test (OTS-R). This is, if the average result of both forms is calculated. This amounts to approximately 2.5 times as many accurate items in the perceptive than the productive lexical task, pointing toward a wider range of his passive vocabulary and at the same time, seemingly confirming the speech and language therapist's diagnosis of *expressive language disorder*. Saying so, it should be taken into account that the unimpaired

child's perceptive and productive vocabulary knowledge in Polish also seems to differ significantly as the percentage of correct items for each test differs by slightly less than 30%, with a noticeably lower score for the active than the passive vocabulary.

Even if for both boys the same procedure as for the active vocabulary test (OTS) is assumed, which means ignoring all items after five consecutive wrong answers rather than taking all fifty items of the test into account, the percentage of correct items in both the active and the passive Polish vocabulary tests diverges significantly more than in their English counterparts.

This discrepancy between productive and perceptive vocabulary knowledge in the Polish test, with an opposite tendency than in the English measurement, might hence also be a result of the testing format and its standardisation on a Polish monolingual norm. The latter fact might then result in a naming test of particular difficulty for bilingual children, especially if it contains words from domains outside the home and the family. This hypothesis can, of course, only be confirmed on a larger bilingual sample but the qualitative analysis of both perceptive vocabulary tests will already provide some further insight on this issue.

An interesting observation can be made from a direct comparison between the subjects' percentile ranks in the BPVS-2 and the OTS-R. While the affected child falls into a higher percentile rank on the Polish perceptive vocabulary task (32 percentile in PL as opposed to 28 percentile in EN), the typically developing bilingual falls into the fifty percentile in the OTS-R, as opposed to the 77 percentile in the English test. This affected child's slightly higher score on the Polish perceptive vocabulary test as opposed to his brother's opposite results, seems to confirm the mother's indication at the first round of testing, when indicated Polish as the LIB's dominant language. For the unimpaired twin, she hesitated with her decision but finally marked English as his dominant language, which is supported by a comparison between the subjects' Polish and English passive vocabulary test results.

## 6. 4 Sentence Repetition Tasks – EN & PL

As the theoretical overview on SLI already suggested, auditory processing seems to play a crucial role in this neurodevelopmental disorder. This is why it has been decided to test both children using sentence repetition tasks as these allow for insights on their capacity to process longer units of language and thus are likely to show a difference between the affected and the typically developing bilingual. The advantage of this test is that it merely requires test takers to listen to, process and repeat the auditory stimulus without the strain of producing linguistic output of their own. It can thus provide essential information on test takers' phonological working memory and therefore explain certain difficulties in their speech production and perception.

Table 4: Sentence Repetition Tasks – Results

|            | Sentence Repetition Task - English |     |           |      |
|------------|------------------------------------|-----|-----------|------|
|            | 4;8 years                          |     | 5;6 years |      |
|            | correct                            |     | % correct |      |
| <b>TDB</b> | 6                                  | 10% | 15        | 25%  |
| <b>LIB</b> | NA                                 | NA  | 1         | 1,6% |
|            | Sentence Repetition Task - Polish  |     |           |      |
|            | 5;6 years                          |     |           |      |
|            | Correct                            |     | % correct |      |
| <b>TDB</b> | 23                                 |     | 34,5%     |      |
| <b>LIB</b> | 3                                  |     | 4,5%      |      |

Similar to both lexical tests, the twin pair also showed a strikingly differing performance on both language versions of the sentence repetition task. What they had in common, however, was their higher score on the Polish version of the test as opposed to its English counterpart. While the affected twin repeated three sentences correctly in the Polish version and only one in English, his unaffected brother reproduced twenty more items in a correct manner in the Polish test in contrast to 15 sentences in its English counterpart. In other words, the affected twin only duplicated 4.5% of the 67 Polish sentences correctly, whereas the typically developing child reproduced 34.3% of the items accurately. In the English language version these raw scores correspond to a percentage of 1.6% precisely repeated sentences for the impaired twin as opposed to 25% for his unaffected brother.

A comparison between the language impaired child's English score at the second round of testing, when he was 5;6 years old, and his typically developing brother's result at the age of 4;8 shows that the affected twin scores even far below the typically developing child when he is measured against his twin brother's results from nine months earlier. More precisely, the LIB only repeated one item correctly at the age of 5;6, which clearly diverges from the six accurately reproduced sentences by his unaffected twin brother at the age of 4;8.

Such a diverging result also supports the diagnosis of a language disorder rather than a delay. In other words, if the younger twin's language was delayed rather than impaired, he could be expected to approach his brother's language level after nine months. Unfortunately, no results from the first round of testing are available for the affected child as the experiment had to be broken off due to his irresponsiveness. It would, undoubtedly, be interesting to do another follow-up study on the sentence repetition task in order to see in how far the brothers' results have maybe approached each other. While such a study is not possible as yet, the current results can still be interpreted as supportive of the speech and language therapist's diagnosis which classified the affected boy's language profile as a disorder rather than a delay.

Similarly to the perceptive vocabulary test, it might also be argued that the results from the sentence repetition tasks favour a definition of SLI, which does not differentiate between expressive and perceptive language skills. Despite the common definition of the *sentence repetition task* as a tool to test children's morphosyntactic knowledge and their understanding of relations between objects within a syntactic unit (e.g.: Otwinowska et al. 2012: 12), I would argue that it further tests phonological processing. This is the case because children do not only have to repeat exactly what they have heard but before doing so, they have to listen attentively to a recording, process its phonological input and then replicate it. Hence it is not only their productive language ability that is tested but also their perceptive skills, which are required in order to solve the task accordingly. Bearing in mind that children with SLI have been found to require longer pauses between different auditory input or a slower playback time, it should not come as a surprise that the language impaired child in this study also scored significantly lower than



his unaffected brother. It might hence be interesting to repeat this experiment with a slower playback time and/or longer pauses between the recorded sentences, in order to find out more about the underlying processing problem. As such a study is currently unavailable, the qualitative analysis of the sentence repetition tasks will aim at shedding some more light on this question, by comparing the errors made by the two subjects. Before doing so, though, a quantitative investigation of their scores on the receptive grammar test (TROG) will be presented in the ensuing part of this study.

### **6.5 Test of Reception of Grammar – TROG – EN & PL**

Similar to the sentence repetition task, the actual goal of the TROG is to investigate children's morphosyntactic knowledge but this test focuses solely on their comprehensive skills and requires them to discriminate between linguistically very similar sentences. Once more I would argue that the TROG also tests auditory perception skills as the choice of the appropriate picture requires the accurate perception of the recorded sentence in the first place. This is also the reason why the test of reception of grammar was included in this study as it does not only provide insights on the twins' morphosyntactic knowledge but also rounds up the information obtained about their phonological working memories.

Table 5: TROG Results

|            | <b>TROG - English</b> |                  |
|------------|-----------------------|------------------|
|            | <i>5;6 years</i>      |                  |
|            | <i>Errors</i>         | <i>% correct</i> |
| <b>TDB</b> | 19                    | 76,25%           |
| <b>LIB</b> | 41                    | 48,75%           |
|            | <b>TROG - Polish</b>  |                  |
|            | <i>5;6 years</i>      |                  |
|            | <i>Errors</i>         | <i>% correct</i> |
| <b>TDB</b> | 12                    | 85%              |
| <b>LIB</b> | 32                    | 60%              |

Quite like on to the sentence repetition task, the subjects also scored higher on the Polish adaptation of the test than on its English version and both of them also scored considerably higher than on the productive repetition test. In contrast to the

English version of the TROG, where the affected child only chose the right out of four items in 49% of the cases, he found the correct answer to 60% of the Polish questions. A similar difference in performance between the two languages could also be observed in the unaffected subject. While he scored an average of 25% higher than the language impaired child in both version of the test, his Polish score also lay approximately 10% above his English result.

Again, this difference in performance between the two children puts the diagnosis of a merely expressive language disorder in question as this task exclusively required the subjects to listen to an auditory input and to choose the according picture out of four possibilities. Thus, this receptive grammar task does not require test takers to produce any sort of linguistic output but only to listen and to point and it should hence not pose a particular difficulty to somebody with solely an expressive language disorder. The significant difference of approximately 25% between the siblings does paint a picture, though, where once more productive and expressive language abilities seem not to be entirely independent skills.

Now that the subjects' results on a number of linguistic tasks, each testing different language skills separately, have been presented, the results from two tasks which required a combination of their linguistic capacities will be put forward in the following section. Again, a quantitative account of the subjects' storytelling and –retelling abilities will be given for both languages, which will then be compared to each other and across their languages in order to contextualise their results.

## 6.6 Narrative Tasks – Narration/Re-Narration in EN & PL

Results from the telling and retelling tasks are available from both rounds of testing (at 4;8, 4;10 and 5;6 years of age) and in both languages.

Table 6: Narration Tasks – Results

|            | <b>Narrative Task - English</b> |                  |                  |                  |
|------------|---------------------------------|------------------|------------------|------------------|
|            | <i>Narration</i>                |                  |                  |                  |
|            | <i>4;8 years</i>                |                  | <i>5;6 years</i> |                  |
| <b>TDB</b> | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
|            | 40sec.                          | 54               | 62sec.           | 96               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 25                              | 8.6              | 43               | 13.3             |
| <b>LIB</b> | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
|            | 20sec.                          | 24               | 30sec.           | 43               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 16                              | 5.4              | 22               | 6                |
|            | <i>Re-Narration</i>             |                  |                  |                  |
|            | <i>4;8 years</i>                |                  | <i>5;6 years</i> |                  |
|            | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
| <b>TDB</b> | 70sec.                          | 85               | 60sec.           | 100              |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 32                              | 9.8              | 37               | 12.7             |
|            | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
| <b>LIB</b> | 41sec.                          | 55               | 50sec.           | 61               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 23                              | 8.6              | 28               | 6                |
|            | <b>Narrative Task - Polish</b>  |                  |                  |                  |
|            | <i>Narration</i>                |                  |                  |                  |
|            | <i>4;10 years</i>               |                  | <i>5;6 years</i> |                  |
| <b>TDB</b> | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
|            | 50sec.                          | 63               | 88sec.           | 78               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 30                              | 7.2              | 36               | 5.2              |
| <b>LIB</b> | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
|            | 50                              | 53               | 34sec.           | 29               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 24                              | 6.1              | 15               | 3.7              |
|            | <i>Re-Narration</i>             |                  |                  |                  |
|            | <i>4;10 years</i>               |                  | <i>5;6 years</i> |                  |
|            | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
| <b>TDB</b> | 79sec.                          | 101              | 74sec.           | 94               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 33                              | 4.6              | 44               | 9                |
|            | <i>length</i>                   | <i>no./words</i> | <i>length</i>    | <i>no./words</i> |
| <b>LIB</b> | 32sec.                          | 45               | 48sec.           | 39               |
|            | <i>NDW</i>                      | <i>MLU</i>       | <i>NDW</i>       | <i>MLU</i>       |
|            | 25                              | 5.1              | 23               | 5.2              |

Once more it becomes clear that the LIB's linguistic capacities are more limited than his brother's. This difference in linguistic ability manifests itself across all ages, both languages and the telling as well as the retelling tasks. Before these differences in their storytelling abilities will be discussed in more detail, their similarities shall be investigated. From both the actual length of their stories as well as the number of total words, it becomes apparent that both the LIB'S as well as the TD's re-narrations are longer than their narrations. This is the case for all stories across all ages and both languages, apart from the affected twin's Polish narrative at the age of 4;10, where the total number of words in his spontaneous story exceeds that of his re-narration by 8 words (53 as opposed to 45). This total number of words was calculated by simply counting all the words in the children's stories, including all repetitions and reformulations.

It can further be said that both boys' English stories increased in length over the course of time. While the affected child's English free narrative was only 20 seconds and 24 words long, with a mean length of utterance (MLU) of 5.4, his spontaneous story nine months later was already 10 seconds longer, contained 19 more words and its MLU had increased to 6. A similar observation can be made for the unaffected twin, whose first English story at the age of 4;8 was 40 seconds long, contained 54 words in total and had an MLU of 8.6. His narrative nine months later was 20 seconds longer, amounting to a total duration of 72 seconds, was made up of 96 words and an MLU of 13.3. Parallel to the spontaneous stories, the length of the English retold narratives also increased over time. More precisely, the impaired twin's re-narration increased similarly to his free story, by 10 seconds from 41 seconds and a total of 55 words during the first round of testing to 50 seconds and a total of 61 words in the follow-up study. Interestingly, the mean length of utterance decreased from 8.6 to 6 for the re-told story over the same period of time. This decrease in MLU stands in direct opposition to the stark increase in MLU, from 9.8 at the age of 4;8 to 12.7 at the age of 5;8, in the unimpaired subject's retold story. Likewise, the total number of words augmented from 85 to 100 in his English re-narration.

Quite interestingly, the same increase in story length, total number of words and mean length of utterance could be observed in the Polish narrative of the

unimpaired twin, while his re-narration decreased slightly in regard to its total number of words (from 101 to 94) and minimally in length (from 1.19 minutes to 1.14 minutes). The same decrease in story length and total number of words was noticed in the affected child's Polish retold story but in his case, the length of his free story in Polish decreased as well. While the LIB's free narrative was 50 seconds and 59 words long when he was tested at the age of 4;10, his story only amounted to 34 seconds and 29 words at the age of 5;6.

At this point it seems crucial to mention that the affected child only told this story, after the experimenter had prompted one of the animal's labels, which might have influenced the following storytelling in one way or the other. This was only done after two long pauses and the suggestion to label the animal with any term, if it was made-up or real. Only after this failed as well and the child already showed signs of wanting to pack up the story, the experimenter suggested to provide the missing term in order to facilitate storytelling. Even though this move might have influenced the outcome of the story, it is not unlikely that a similar decrease in story length and total number of words for the Polish stories in the affected child would have also been observed without this prompt. This might be the case as not only the spontaneous but also the guided story decreased in total number of words. That is, the total number of words in the child's Polish retold story decreased from 45 to 39 words, also affecting the number of different words (NDW), which diminished from 25 to 23 over a period of nine months. This admittedly slight change in story length seems, nevertheless, noteworthy as it reflects the shift from Polish as the child's dominant language at the age of 4;8 to English at the age of 5;6. A shift that was indicated by the mother and which might have been influenced by the increased time the child had spent in an English-speaking environment and in one-on-one English language therapy by the time the follow-up study was carried out.

The same can certainly not be said for the typically developing child, who, judging from his results on the narrative task, seems to be a fairly balanced bilingual. This conclusion is drawn from the fact that his Polish stories were longer than the English at the second sitting (1.28 minutes and 1.14 minutes, as opposed to 1.02 minutes and 1 minute). Interestingly, his English stories contained more

words (96 and 100, in contrast to 78 and 94) and had a longer MLU (13.3 and 12.7 in comparison to only 5.2 and 9 in Polish). Finally, the number of different words used was fairly balanced in both languages, as it was higher for English in the narration and for Polish in the re-narration.

Apart from all previously mentioned measurements, such as story length and mean length of utterance, the number of different words (NDW) seems to be a clear marker for the difference between a language impaired child and a typically developing bilingual. In this study, the NDW in all narratives and across both languages provides a clear distinction between the TDB and his language impaired twin. During the first round of testing, the difference in NDW is visible but not yet as striking as it would become nine months later. However, the gap also becomes more apparent in the English stories than in the Polish counter parts. While the children's narratives diverged by 6 different words for the Polish narrative and 7 for the re-telling in the same language during the first round, the difference for the English language amounted to 9 for both tasks. This gap had clearly widened at the follow-up study, when the NDW in their Polish narration stories differed by 21 and by 19 in the English ones. Saying so, it needs to be borne in mind that the children's stories also differed significantly in length, which is why they could, technically, never reach the same NDW, but together with the total number of words and the mean length of utterance, this measurement seems to fulfil its role of differentiating between the two types of language learners.

## **6.7. Summary of Results**

Recapitulating the insights obtained from the quantitative analyses it seems safe to say that a clear difference between the subjects' linguistic capacities could be observed. Furthermore, the direct comparison between the children's results on the vocabulary tasks yielded more meaningful results than a measurement against a monolingual norm. This comparison indicated worse expressive skills in Polish than in English for both subjects and a clear difference between their perceptive and productive skills in their first language. It remains unsure, however, whether this is actually an accurate measurement of their capacities or whether this

difference is due to the tests having been standardised on a Polish monolingual norm.

It also seems noteworthy that the affected child's score on the English passive lexical task adds support to a definition of SLI which does not differentiate between perceptive and productive language knowledge. The results from the sentence repetition and the grammar recognition tasks provide further evidence against a separation of perceptive and productive skills in SLI and the narrative tasks emphasise a clear separation between the dominant and the non-dominant language in the LIB during the follow-up study. In addition, the twins' results on the OTS-R, the Polish perceptive vocabulary task, seem to confirm Polish as the dominant language for the impaired child. A similar observation could, however, not be made for the unaffected child, whose results from the narrative task clearly favour his classification as a balanced bilingual.

While all of these results have in common that they show a clear distinction between the subjects' linguistic abilities, they still fail to indicate in how far their language differs – crucial information in order to better understand their needs and to develop scoring systems which account for their linguistic peculiarities. A step toward such a goal will be taken with the qualitative analysis of the underlying data, which is the focus of the following chapter.

## 7. A Qualitative Analysis

### 7.1 Lexical Tasks

The qualitative analysis of the productive lexical tasks revealed a number of differences but also some similarities in the two language learners' linguistic output.

Table 7: Examples from the Productive Lexical Tasks

| EVT-2 & OTS                           |                |                              |                                   |                                           |                        |
|---------------------------------------|----------------|------------------------------|-----------------------------------|-------------------------------------------|------------------------|
| 4;8 years                             |                |                              | 5;6 years                         |                                           |                        |
| Target                                | Answer         |                              | Target                            | Answer                                    |                        |
|                                       | TDB            | LIB                          |                                   | TDB                                       | LIB                    |
| Synonyms                              |                |                              |                                   |                                           |                        |
| syn. <i>printing</i>                  | stomp          | /p/                          | syn. <i>printing</i>              | writing                                   | writing                |
| syn. <i>finished</i>                  | wait at table  | DK                           | syn. <i>finished</i>              | ready                                     | fin                    |
| syn. <i>begin</i>                     | ready          | DK                           | syn. <i>begin</i>                 | DK                                        | start                  |
| syn. <i>scared</i>                    | pop            | because of monsters          | syn. <i>difficult</i>             | happy                                     | N/A                    |
| syn. <i>big</i>                       | truck          | big truck                    | syn. <i>big</i>                   | ginormous                                 | heavy                  |
| Domain-Specific Language Knowledge    |                |                              |                                   |                                           |                        |
| <i>Target</i>                         | <i>TDB</i>     | <i>LIB</i>                   | <i>Target</i>                     | <i>TDB</i>                                | <i>LIB</i>             |
| <i>couch</i>                          | DK             | /t/ - L1?                    | <i>couch</i>                      | DK                                        | fotel                  |
| <i>helmet</i>                         | hat            | riding the bike              | <i>chain</i>                      | DK                                        | wee wee                |
| <i>kask</i> (helmet)                  | kask           | maska                        | <i>łańcuch</i> (chain)            | łańcuch                                   | DK                     |
| <i>bread</i>                          | bread          | kanabka (sandwich)           | <i>sanki</i> (sleigh)             | snowboard                                 | snow                   |
| Language Transfer                     |                |                              |                                   |                                           |                        |
| EVT-2                                 |                |                              | OTS                               |                                           |                        |
| Target                                | TDB            | LIB                          | Target                            | TDB                                       | LIB                    |
| <i>tomato</i>                         | tomato         | pomidor                      | <i>aparat</i> (camera)            | camera                                    | DK                     |
| <i>judge</i>                          | DK             | pani                         | <i>wodospad</i> (waterfall)       | waterfall                                 | woda                   |
| <i>helmet</i>                         | hat            | kask                         | <i>malować</i> (to paint)         | malować                                   | painting               |
| Theory of Mind/Strategic Competence   |                |                              |                                   |                                           |                        |
| Target                                | TDB            | LIB                          | Target                            | TDB                                       | LIB                    |
| <i>padlock</i>                        | locking things | wee wee said the naughty boy | <i>śluchawki</i> (headphones)     | kabelek do usze/uszu (cable for the ears) | tata ma takie do pracy |
| Repetition of Initial Phonemes by LIB |                |                              |                                   |                                           |                        |
| Target                                | LIB            | Target                       | <i>LIB</i>                        | Target                                    | LIB                    |
| syn. <i>father</i>                    | /f/            | jacket                       | /dʒ/                              | syn. Shut                                 | /tʃ/                   |
| Morphosyntax LIB                      |                |                              |                                   |                                           |                        |
| syn. <i>cat</i>                       | cats           | syn. <i>twig</i>             | twiggy                            | wylewać                                   | wyleje                 |
| <i>podlewać</i>                       | podleje        | <i>buda</i>                  | pies dom (instead of <i>psa</i> ) | <i>palec</i> (finger)                     | palce (pl.)            |



When investigating their results from the EVT-2 it quickly becomes clear that both subjects had some difficulties with items that required them to provide synonyms. This is, during the first round of testing, neither of them could provide an alternative label for *printing* as, for example, *writing* would be. Nor could they think of a different way of saying *she is finished*, *he will begin the race*, *the boy is scared* or provide an alternative word for *big*. Bearing in mind that the subjects of this study are bilingual, this should not come as much of a surprise. In opposition to their monolingual peers, they already had to acquire two labels from two different languages for the same item, not leaving much room or time to learn a third and a fourth alternative term in the same period of time. In other words, it seems like the fact that both children struggled particularly with the provision of synonyms, provides more evidence for the crucial role of exposure in language acquisition (cf. Hui 2010).

This assumption is confirmed by the fact that both twins could indicate more synonyms at the follow-up study than during the initial round of testing. When compared to the first sitting, the affected child could provide three more alternative labels (five instead of two) and his unaffected sibling two more (nine instead of seven). Despite the difference in the total number of correct synonyms, which again illustrates a clear divergence in their language abilities, their shared difficulty in this sub-category of the English naming test suggests that the provision of alternative terms might not be the best way of distinguishing language impaired and typically developing bilingual children. Unfortunately, the Polish productive vocabulary test does not contain any questions on synonyms, which is why the findings from the EVT-2 could not be confirmed with the results from this test. An addition of such items to the OTS could thus be considered, in order to find out whether both languages are influenced equally by the relative lack of exposure to each lexical system.

Apart from their shared struggle to provide alternative labels for items, both twins further showed instances of domain-specific language use in the naming test. In the English version, for example, neither of them could come up with the appropriate label for *couch* and in the OTS they both had problems to think of the Polish word for sleigh (*sanki*). Quite interestingly, both of them opted for L2-

transfer (from English) in the Polish naming task, calling the sleigh either *snow* in the case of the affected twin or *snowboard* in his brother's case. The same strategy was used three more times by the typically developing twin during this task and five more times by his sibling.

In contrast to the EVT-2, where not a single instance of code-switching could be found in the unaffected child's answers. Rather than to provide the Polish term during the English naming task, the TDB stated that he did not know the appropriate answer in five cases during the first testing and in eight cases during the second sitting. The LIB, on the other hand, provided answers to every single question up until his ceiling item during the second round of testing and only gave four nil responses during the first sitting. Some of these answers, five in total to be exact, were direct transfers from Polish. Coming back to the example from the beginning of this paragraph, the affected child called the target item *couch*, *fotel*, which is the Polish term for it, whereas his typically developing brother stated not to know the word. The language impaired child further indicated Polish terms for *bread*, *tomato*, *judge* and *helmet* during the EVT-2.

This thought-provoking finding suggests that the affected twin might not be as capable of keeping his two linguistic systems apart, as his typically developing brother. Saying so, the question as to why the TDB only switched between his two systems during the Polish test and not its English counterpart, still needs to be answered. One possible explanation might be the major – minor division between these two languages. That is, in a language combination like the one investigated in this paper, where one language is mostly reserved to the home and the family context, while the other one is the majority language of the speakers' country of residence, code-switching might only be a successful communicative strategy when employed in the context of the minority language. Thus, the unimpaired twin might have understood that the use of English terms during a Polish conversation (with his family) could facilitate the conversation, whereas the opposite would be the case for the introduction of Polish words during a conversation with monolingual English speakers.

Such an abstract understanding of communicative situations requires an elevated level of *Theory of Mind*, which might have not been reached yet by the

language impaired child. This speculation is further supported by the affected child's provision of item descriptions, which would require a very high level of shared knowledge between himself and the examiner. While the TDB gives accounts, which either describe the form or the function of an object (e.g.: *kabelek do \*usze/uszu* 'wire/cable for ears' for *sluchawki* 'headphones'), the LIB provides definitions, which are linked to his own experience, such as e.g.: *tata ma do pracy* 'daddy has for work' (for *headphones*) and which do not necessarily facilitate communication. As *Theory of Mind* describes exactly this process of understanding somebody else's emotions, ideas, point of view, etc. and reacting accordingly to this knowledge, it could be argued that this mechanism does not seem to be developed to the same extent in the affected bilingual as in his unaffected brother. Bearing in mind that bilinguals have been found to perform particularly well on *Theory of Mind* tasks (Bialystok 2005: 424), the differing levels of competence in this area between a typically developing and a linguistically impaired bilingual, seem, once again, to favour a definition of SLI, which also takes the performance on non-linguistic tasks into account.

As the examples from the lexical tasks are, quite obviously, fairly limited the hypothesis of differing strategic competences as a result of varying levels of abilities in the *Theory of Mind* will be pursued further during the qualitative analyses of the remaining linguistic tests. Regarding the error analysis of the lexical tasks, it further seems noteworthy that the difference in the subjects' strategic competence would not have become apparent from a quantitative interpretation of the data, as all answers, if nil responses, code-switching and any sort of paraphrasing, are equally counted as mistakes and simply subtracted from the final score.

This contrast in strategic competence was, however, not the only interesting fact that became apparent from this qualitative analysis. Quite interestingly, the affected child repeated the initial phonemes of prompts in five cases during the first round of testing. That is, he provided the single phoneme /f/ when asked for a synonym for *father*, or /p/ when asked for an alternative term for *printing*. The same goes for the prompts *jacket* and *shut*, for which he provided the single-phoneme responses /dʒ/ and /ʃ/. This might be an indication of his processing the

auditory input at a slower rate than a typically developing child and thus requiring the repetition of some prompts in order to understand them. This hypothesis would further be sustained by Alt and Suddarth's (2011) theory, which assigns superior initial phoneme processing capacities to children with SLI as a result of a compensation strategy that allows them to distinguish words through their initial sounds alone due to their incapacity to process whole lexical units at the same rate as typically developing children. Auditory processing thus might play a crucial role in the distinction of language impaired and typically developing bilingual children (cf. chapter 3).

Apart from code-switching and phonological working memory, the findings in this study also provide some further evidence for morphosyntax as a clinical marker for SLI. In the English version of the productive vocabulary test this becomes particularly apparent in those cases where the affected twin provides a derived version of a prompt when asked for a synonym. This could either be the plural of a word, as is the case for *cats*, when asked for another word for *cat*, or a diminutive, as in *twigg*y, which he provides as an alternative term for *twig*. Bearing the highly inflectional nature of the Polish language in mind, it does not come as a surprise that morphosyntactic errors occurred even more frequently in the affected twin's Polish answers. These mistakes include plural for singular replacements, case errors and the inaccurate conjunction of verbs. For example, he indicated the future form, rather than the present for *wylewać* 'to pour', and *podlewać* 'to water' (*wyleje* instead of *wylewa* and *podleje* instead of *podlewa*) and he did not put *pies* 'dog' in the required genitive, when describing a doghouse as he could not provide the appropriate term – *buda* (*pies dom* instead of *dom psa* or *psa dom*). Interestingly, his brother chose the same communicative strategy and also described the place a dog lives in. However, he inflected the word *pies* in the right case even if not in the correct (irregular) form *psa* but as *piesa* – an overgeneralised genitive. Another lack of inflection in the LIB's output, could be observed in his description for a henhouse, which he called *kura z dom* (instead of *kura z domem* – a hen with a house), not putting the house in the required instrumental, the fifth case.

Finally, the affected bilingual also used the singular and the plural form interchangeably at least once, in the case of the plural form *palce* 'fingers', where the singular *palec* 'finger' would have been required. In one case, both subjects inflected the verb *plakać* 'to cry', incorrectly (*plaka* instead of *placze*) and it would require the test results of other mono- and bilingual peers in order to find out whether this is an age-appropriate mistake across all groups, or whether it is a mistake unique to language impaired and typically developing bilingual children.

Based on these findings, it can be assumed that overgeneralised inflection of verbs in does not necessarily seem to be the most reliable marker of distinction between the two bilingual groups. The lack of inflection in affected children as opposed to overgeneralised inflection in typically bilingual peers, on the other hand, might indeed be a more accurate measurement of atypical language development.

In contrast to the productive vocabulary tasks, the perceptive lexical tests did not reveal any striking differences between the subjects. In the Polish naming task their errors were approximately equally spread out over the three pre-determined error categories; semantic, thematic and phonetic and in the BPVS-3 they chose the same distractor for five of the items. Amongst others these included *boxing* for *tearing* and *boss* for *chef*. The first of these two mistakes could be explained by a phonological misunderstanding, which might have made the test takers interpret the target word as *training*, instead of *tearing*, which might also be a word they are more familiar with as it occurs in both English and Polish. The second error, on the other hand, is clearly due to the false friends *chef* (EN: cook) - *szef* (PL: boss) in the subjects' two languages.

The qualitative analysis of the perceptive vocabulary tasks hence provided some further detail on the test takers' results but it did not reveal any information, which did not already become apparent from the quantitative analysis and the qualitative interpretation of the productive vocabulary tasks. The affected twin scored significantly lower than his unaffected brother but both of them made mistakes, which would not necessarily allow for a distinction between the two of them. In other words, it looks like error analysis is by far more relevant in the

productive than the perceptive vocabulary tests; a notion which will be pursued in the subsequent qualitative analysis of the sentence repetition tasks.

## ***7.2 Sentence Repetition Tasks***

A profound investigation of the subjects' errors in the sentence repetition tasks provided further evidence for the insights gained from the previous quantitative analysis of the data. The twins did not only differ in the number of errors they made on this task but also in the types of mistakes. While for the quantitative analysis all sentences, which were not exact replicas of the target items were scored as incorrect, this qualitative analysis took exactly these utterances into account.

The first question in this regard was concerned with the grammaticality of these sentences and in how far the children's utterances differed in their syntactic structure. This investigation revealed that 24 of the English utterances produced by the TDB, which had to be scored as incorrect in the test, were actually grammatically correct, as opposed to only 4 of the LIB's utterances. In total, this amounts to 39 (out of 60) grammatically correct sentences for the TDB as opposed to only 8 in the affected child's test. These numbers are higher for both children in the Polish version, where an additional 11 sentences are actually grammatically correct in the utterances produced by both children. This adds up to a total number of 44 grammatically correct sentences produced by the unaffected child, in contrast to only 18 by the LIB.

In other words, the majority of the unaffected child's utterances in both sentence repetition tasks followed a correct syntactic structure but a large number of them had to be scored as incorrect as they did not correspond to the target items. In order to make this clearer it needs to be added here that children's utterances in the sentence repetition task can only be scored as correct if they are exact repetitions of the target sentences. As soon as the child uses a different tense or changes the semantics of a sentence, the sentence needs to be scored as incorrect; even if the child's sentence follows a standard grammatical structure.

To a large extent, this divergence between the sentences produced by the typically developing child and the recorded utterances, was due to the child

choosing a different tense than required by the target item. Such instances included, for example, the child's use of *present progressive* instead of *past perfect progressive* or *present perfect simple* instead of *past perfect progressive*. In other words, the unaffected child altered the tense of some sentences but still followed grammatical conventions. It seems particularly interesting in this regard that all sentences changed by the unaffected child, contained tenses which required fewer auxiliary verbs and hence were less complex than the target sentences. This indicates that some of the required tenses might not have been mastered (or encountered) yet by the unaffected child at the time of testing, which led to their being replaced by familiar items. Interestingly, no such instance of tense-replacement could be observed for the affected child.

The most common errors in his case were concerned with morphosyntax in both languages, an issue that clearly differentiates the affected and the typically developing child. In the English version of the sentence repetition task, the affected child's most common error was the lack of 3<sup>rd</sup> person present –s, a finding which provides support for previous studies (cf. section 3.3. of this paper for a review) that suggested this bound morpheme to be one of the most difficult for children with SLI to acquire. It has further been suggested that typically developing bilingual children also struggle with the acquisition of this grammatical structure (cf. section 2.4 of this paper). This finding, on the other hand, could not be confirmed with the data from this task, as not a single instance of a lacking 3<sup>rd</sup> person present –s could be found in the utterances produced by the typically developing twin. In this regard the long and intense exposure of the children in this study to English needs to be borne in mind as exposure to the target language has been shown to have the strongest influence on the acquisition of this morpheme. It hence seems like the findings from this test confirm the hypothesis that correct use of 3<sup>rd</sup> person present –s differentiates between typically developing and language impaired bilinguals but only from a certain age (length of exposure) onwards, which complicates early intervention.

The 3<sup>rd</sup> person present –s was, however, not the only morphosyntactic difficulty discovered in the affected child's utterances. Similar to some instances in the productive naming task, his Polish utterances in the sentence repetition tasks

also revealed a lack in noun inflection. While the affected child made significantly more omission than commission errors, the inverse could be observed in his brother. This points toward a lack in metalinguistic awareness in the affected twin, as he apparently has not yet understood the role of noun inflection and, therefore, was not aware of the mistakes he made. The typically developing twin, on the other hand, showed clear signs of metalinguistic awareness, which became particularly apparent in cases, where he actively corrected himself and provided an alternative ending for the noun in question. While neither the first nor the corrected inflection he provided were necessarily the right choices, this self-correction still points toward a certain grammatical awareness, which could not be observed in his brother.

Apart from this number of differences, the subjects of this study further showed one striking similarity in their English syntactic organisation, namely the omission of determiners in certain contexts. Quite interestingly, such instances of lacking determiners could only be found in the unaffected twin's utterances from the first round of testing, when he was 4;8 years old. The affected twin, on the other hand, still produced them during the follow-up study. These lacking determiners, undoubtedly, result from their language combination, as Slavic languages use determiners only in very rare cases and usually to emphasise the noun the determiner refers to. Even though this finding can probably not be transferred to other language combinations, it nevertheless seems noteworthy as it adds to the list of linguistic peculiarities that bilingual children (with one Slavic language) and children with SLI might share. Moreover, it seems like a language feature which disappears with an increase of exposure in typically developing children, whereas it persists for a longer period of time in children with SLI.

In order to further illustrate the different types of mistakes, which have been discussed so far, a couple of examples are given below.



Table 8: Differences in Sentence Repetition Tasks between TDB and LIB

| TARGET                                                  | TDB                                                                                   | LIB                                              |
|---------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>Tense Errors</b>                                     |                                                                                       |                                                  |
| 21. They have been riding the goat around the garden.   | *TDB: they're <b>riding</b> the goat around the garden.                               | *LIB: the(y) can see goose in the river.         |
| 33. We shouldn't have been picking the flowers.         | *TDB: we shouldn't <b>have picked</b> the flowers.                                    | *LIB: xxx the flowers.                           |
| <b>3<sup>rd</sup> person present –s</b>                 |                                                                                       |                                                  |
| 13. She wants to eat a large sandwich.                  | *TDB: she wants to eat a large sandwich.                                              | *LIB: he <b>want</b> to eat a [lɑ:ʒ] sandwich.   |
| 14. His sister ran and his father walked.               | *TDB: His sister ran and the father walked.                                           | *LIB: his (.) sister <b>run</b> his father walk. |
| 49. The feeling of losing his friend made George angry. | *TDB: George (.) Peter losing his friend made George angry.                           | *LIB: this feeling <b>make</b> George angry.     |
| <b>Metalinguistic Awareness</b>                         |                                                                                       |                                                  |
| 20. On nie będzie jadł obiadu w szkole.                 | *TDB: on nie będzie=będzie jadł obiadu w szkole.                                      | *LIB: on nie będzie jadł w szkole <b>obiad</b> . |
| 56. Ona widzi drzewo przy którym stoi rower.            | *TDB: on widzi rower który jest psy=przy <b>drzewu drzewo</b> .                       | *LIB: no response                                |
| 34. Marta nie będzie chciała powiedzieć wiersz.         | *TDB: Marta nie będzie=będzie chciała=chciała powiedzieć <b>wierszyk</b> (diminutive) | *LIB: Marta nie ce=chce <b>bajka</b> .           |
| <b>Determiners</b>                                      |                                                                                       |                                                  |
| 13. She wants to eat a large sandwich.                  | *TDB (4;8): he wanted to eat ___ large sandwich.                                      | no data available                                |
| 39. The policeman has been looking at us.               | *TDB (4;8): ___ policeman was licking=looking at us.                                  | *LIB (5;6): ___ policeman was looking at us.     |
| 52. The builder had the idea to dig a hole.             | *TDB (4;8) the builder had ___ idea to big dig the hole.                              | *LIB (5;6): the builder had ___ idea of digger   |

Apart from these differences in the subjects' morphosyntactic knowledge and their metalinguistic awareness, one further striking thing became apparent from the results obtained in the sentence repetition tasks. When looking at the affected twin's responses in both English and Polish, a fairly regular pattern manifests itself. The language impaired bilingual repeats final word(s) in a large number of sentences (30 in English and 23 in Polish) entirely accurately, while the beginnings are either unintelligible or incomplete. This fact prominently indicates a problem in the affected twin's phonological working memory, why else would he solely be able to replicate the endings (and not the beginnings) of sentences with such accuracy. As the transcripts are only an abstraction of the spoken word, the audio taped files were consulted once more, after this intriguing finding had been made. The

following analysis of these recordings provided further evidence for impaired phonological processing in the affected bilingual as he stresses the final word(s) of the sentences in question very prominently, as if to show that he was entirely sure of them. This stands in stark contrast with the beginnings, which are often blurred or pronounced rather rapidly. One might, of course, argue that this is not a matter of perception but rather of production but the qualitative analysis of further language samples produced by this child (e.g.: his narrative) do not indicate any particular difficulties with his speech production in sentence initial positions.

Once more, this finding provides the evidence to question a definition of SLI which separates productive and perceptive language skills. It would, furthermore, seem extremely relevant to further investigate the occurrence of similar patterns in other children with SLI in order to find out, whether they are specific to this case or whether they should become a clinical marker for this neurodevelopmental disorder. The data obtained from this study would suggest a difference in phonological processing between bilingual and language impaired children, which manifests itself particularly prominently in the sentence repetition task.

As a last step of this qualitative analysis, the strategic competence in both subjects was investigated as the results from the lexical tasks indicated that these might differ significantly. It has already been said that the typically developing bilingual changed (complex) tenses in numerous sentences in order to facilitate repetition – a problem-solving strategy which could not be observed in his language impaired brother. In other cases he seems to have changed or invented content words deliberately in order not to allow for a breakdown in communication, which in this case is the task. One of such instances is sentence number 49 of the English sentence repetition task, which is also given in the table above. In this sentence it becomes quite clear that the child paused after a false start and then added a personae in order to make the information that the sentence should convey more plausible.

The same pattern can be observed in another sentence of the same task, where he paused again for two seconds, before he invented the word *drinkman* to replace the word *milkman*, which the target sentence actually contained. A similar instance can also be found in the unaffected child's Polish utterances, where he

paused, for example, before the word *przed* 'in front of', which he used to replace the actual preposition *za* 'behind'. If it was not for the pauses, which precede these altered content words in numerous cases, one might argue that these are merely misunderstandings but the hesitations appear to indicate a conscious choice of a communicative strategy. On this note it seems of particular interest that such instances could not be made out in the affected child's speech, which could again point toward their employment of different communicative strategies – a hypothesis which yet needs to be researched more profoundly.

### **7.3 Test of Recognition of Grammar – TROG**

An analysis of the subjects' error patterns in the various syntactic categories yielded the result that neither simple positive nor simple negative sentences posed much of a problem to the two subjects. In both cases they responded accurately to the target items in all four questions and in both languages. It can hence be assumed that these sentence structures have been mastered by both test takers by the age of 5;6. Similarly, the meaning of the English prepositions *in* and *on* seem to have been understood by both subjects, which can not necessarily be confirmed for their Polish translations. In this language, the wrong distractors were chosen in half of the questions by the affected child. Quite interestingly, he seems to have mastered the Polish preposition *na* (on) but not *w* (in) as he interchanged the content words in both cases in such a way that they stood in an exact opposite relation to each other. That is, instead of choosing the picture which showed a cup in a box, he opted for the distractor which portrayed a box in a cup and similarly for the second item in this category. It thus seems like the affected child is less capable to transfer his knowledge from one language to the other, which is particularly striking in this case as the syntax in these sentences is identical for Polish and English. A further pair of prepositions, which seems to have posed a challenge to both twins in both their languages, were *above* and *below*. Unsurprisingly, this is the case more so for the affected child than for his unaffected brother but both of them showed certain difficulties with these items.

While simple negative sentences have not been found to pose a difficulty to the test subjects in any of their languages, double negative sentences containing the correlative conjunction *neither ... nor* seem to represent a remarkably bigger challenge for them. This can, however, only be said for their English results as their Polish scores indicate that this syntactic structure had already been mastered in this language at the time of testing.

Moreover, the results from both languages indicate that simple sentences with one noun phrase and two semantically independent verb phrases (e.g.: *The woman is looking at the elephant and is running*) pose a particular challenge to both children. Some of the distractors chosen by the subjects portray at least one of the subordinate clauses correctly, while others entirely mix up the information obtained from the sentence, assigning the characteristics described in one subordinate clause to the other, rather than the noun phrase. This total confusion in regard to the syntactic organisation of these complex sentences clearly points toward their insufficient acquisition by both subjects at the age of 5;6. This puts Gathercole's (2010) hypothesis on only language impaired children struggling to transfer their metalinguistic knowledge on complex sentences in question as this, apparently, can also be the case for unaffected bilingual children.

Apart from such complex sentences, syntactic structures which required the children to distinguish between plural and singular nouns also represented a certain level of difficulty to both twins. It seems noteworthy that the unaffected child scored higher on the Polish than the English version of the test, whereas the language impaired bilingual showed a similar performance for both languages. While the affected twin's score on these sentences follows the pattern observed in the other linguistic tasks, the typically developing child's rather low result stands in opposition to other findings previously presented in this paper. Taking into account that these sentences are located very close to the end of the test, one might argue that his rather low score is a result of diminishing concentration. Even though this explanation is plausible, it is also possible that the plural –s had been acquired to a very large extent but not yet entirely by the typically developing bilingual.

In addition to these similarities between the two subjects, three major differences between the affected and the unaffected child's responses could be

observed. Firstly, the language impaired twin scored significantly lower on English sentences requiring the declension of personal pronouns than on the Polish counterparts. This result might be explained by the different syntactic structure these constructions follow in the two languages. While, in English, the object stands at the sentence final position, it immediately follows the subject in Polish. This different syntactic structure has a significant effect on the strains the sentences put on the working memories of the speakers. While in English, the child needs to hold on to the subject in his working memory throughout the whole course of the sentence before he finally finds out more about its object, the two agents of a syntactic unit are revealed immediately and right next to each other in Polish. Undoubtedly, such a difference in syntactic structure only plays a minor role in the language processing of typically developing children but it may have a major impact on the processing capacity of an impaired child.

The remaining two differences between the twins on this test provide further evidence for a limited working memory capacity in the affected child. Aside from English sentences containing personal pronouns in a subject-object relationship, the affected twin was further outperformed by his brother on sentences containing complement phrases and relative clauses. Both these syntactic structures might put a strain on working memories with a lower capacity either due to their length (in the case of complement sentences) or due to their complexity (in case of relative clauses). It can thus be concluded that syntactic structures which require a higher degree of working memory capacity, distinguish more reliably between the two subjects in this study than sentences with correlative conjunctions and those which require a distinction between singular and plural nouns.

#### ***7.4 Narrative Task***

As could already be derived from the difference in mean length of utterance (MLU) and number of different words (NDW), the twins' stories did not only differ on a quantitative but also on a qualitative level. Before their dissimilarities in syntactic structure and narrative organisation will be investigated, though, their diverging answers to the introductory questions shall be discussed as their opposing performance in this regard also seems of great relevance. In order to make it

easier to follow the subsequent discussion, the questions, which were considered most relevant for this analysis, are given below.

Table 8: Introductory questions for narrative task

| Ice-breaker Questions                                                       | Questions on Metalinguistic Knowledge                |
|-----------------------------------------------------------------------------|------------------------------------------------------|
| 1. Do you like listening to stories/fairy tales?                            | 3. Do you know what a story/tale always begins with? |
| 2. Do you know what a story/tale is?                                        | 4. And how does it always end?                       |
| 5. Can you tell me about something? It can be a fairy tale or a true story. |                                                      |

These ice-breaker questions did not only serve the purpose to ease the children into the test-taking situation but also to find out more about their reading habits and their metalinguistic knowledge on narrative organisation and they were answered quite differently by the two boys. While they both responded positively to the first question in both their languages and during both rounds of testing, their answers to the remaining questions diverged significantly, especially during the second round of testing. At this sitting, the unaffected twin provided positive replies and examples for questions number 2, 3 and 4 and was happy to tell an extensive story (about the animated film *Cars*) from the top of his head. The language impaired bilingual, on the other hand, did not provide any examples for the metalinguistic questions and only gave a single-sentence account of his daily activities at the day of testing, following a prompt by the examiner. Only after a second prompt, during which the tester asked him to tell a fairytale, did he provide a brief description of the tooth fairy. This choice of story might indicate that the name *fairytale* misled the affected child to think that such stories need to be about fairies, which might have made it harder for him to recall a fitting tale. Bearing in mind, however, that his account of daily activities was also much shorter than his brother's free story, that an example of a fairytale (*Little Red Riding Hood*) was provided and that he did not tell a free story in Polish either, where the term for fairytale has no similarities whatsoever with fairies, it is more likely that storytelling poses a significant difficulty to the affected child, especially when asked to do so from the top of his head. This interpretation is further confirmed by the fact that the

impaired child did not tell a free story in either language during the first round of testing, whereas the unaffected twin provided a summary of *Goldilocks* in English. In this regard it is also remarkable that neither child told a free story in Polish in any of the sittings despite their parents' indication of reading stories in both languages to them. Their knowledge of such stories and fairytales is also supported by the fact that the unaffected child provided the correct narrative devices usually employed at beginnings and endings in Polish stories but, nevertheless, neither of them was ready to tell a free tale in this language. Whatever the reason for this refusal to tell a story in their home language, it emphasises the fact that the testing of bilingual children in only one of their languages can never account for their whole language profile.

Now that the differences in the twins' responses to the introductory questions of the narrative tasks have been presented a detailed account of their storytelling abilities shall be given. The qualitative analysis of their narratives is based on a framework provided by Cleave and colleagues (2010), who investigated the differences in the narratives of monolingual and bilingual children with SLI. From the narrative measures used by these researchers (517), the following have been chosen for the analysis in this study; *story structure, syntactic complexity, grammaticality, accuracy of tensed verbs, the number of adverbs and adjectives and conjunctions* (excluding *and*). Apart from these purely linguistic measurements, the children's descriptions of six pre-defined main events (one per picture) for the narrations and 12 (excluding three direct quotations) for the re-narrations have been investigated. As the latter point is mainly a quantitative measurement and hence takes shorter to discuss, the findings in this area will be presented first, before room will be given to a more profound syntactic analysis.

When investigating the children's description of the pre-defined main events in their stories, a clear pattern manifests itself. Apart from the affected child's English narrative in the second sitting, they always described a larger number of main story elements in their re-narrations than in their narrations. This is, of course, not much of a surprise as the subjects could rely on a model in this task, which was not the case for the free narratives, where they had to invent the stories on their own. A diachronic investigation of their narratives further led to the

conclusion that the number of events described increased between the two sittings and for both languages. In addition to these similarities, one difference could be observed between the two test takers. As the divergence in their story lengths and total number of words already predicts, the affected twin described significantly fewer events in his narratives than his brother. Interestingly, the gap between the two brothers in this measurement is consistent throughout the whole testing phase and for both languages and amounts to approximately three key events.

Recalling the fairly large gap in the children's MLU, it should not be further surprising that their stories also differed significantly in their narrative and syntactic complexity. First of all, narrative devices such as typical fairytale beginnings and endings (i.e.: *Once upon a time ...*, *And they lived happily ever after*) could only be observed in the unaffected twin's narratives and only during the second sitting. Interestingly, he only used the fairytale beginning of *once upon a time* in his English free narrative but not in his re-narration, whereas he employed the Polish *kiedys* 'once' as an introduction to both stories. In this regard the lack of narrative endings also seems particularly remarkable.

Apart from the affected twin's English re-narration at the age of 5;6, which ends with an exclamation of *finished!* and the typically developing Polish narration at the same age, which he ended by saying *to wszystko* 'that's it', neither of the two subjects ever marked the end of their stories. It can thus be concluded that the unaffected twin's metalinguistic knowledge about story endings and beginnings, which clearly became apparent from the analysis of the ice-breaker questions, did only manifest itself in the introductions of the stories he told but not in their endings. The affected twin, on the other hand, performed according to his answers to the metalinguistic questions and was not able to apply any of the examples provided by the testers as part of the warm-up conversation to his stories. This divergence in metalinguistic awareness is further visible in one instance in the typically developing bilingual's Polish narrative, where he corrects himself in order to then use an expression, which is more common in the literary genre than the one he had used before. This shows a certain level of genre-awareness that has not yet been reached by the unaffected twin at the time of testing.



Extract 1: TDB showing genre-awareness in his Polish narrative

\*TDB: a potem ona widziała lisa **mówi się pojawił się lis**.  
and then she saw a fox it's called a fox appeared.

Apart from their apparent differences in regard to narrative organisation and thus metalinguistic awareness, the subjects' performance also digressed in matters of grammaticality, which was measured by calculating the proportion of all complete and intelligible utterances that were grammatically correct in the whole narrative. Wherever self-correction occurred, this was also counted as a grammatically correct utterance. The results obtained from this measurement indicate higher levels of grammaticality for the unaffected twin, which again corresponds to previously analysed scores. The most common mistake observed in the narratives of the language impaired twin was the omission of 3<sup>rd</sup> person present –s (e.g.: *he like it, he catch the mouse, the bird eat his tail*), which is also in line with previous findings. It is, however, noteworthy that this grammatical morpheme was not always missing. This indicates that its function has not yet been fully acquired by the affected child at the time of testing.

Similar to his result on the sentence repetition task, not a single 3<sup>rd</sup> person present –s mistake could be observed in the typically developing child's narrative, which once more points toward the fact that this morpheme had already been mastered by the unaffected child at the time of testing. Once more, commission errors occurred more frequently in his case and they manifested themselves in the form of overgeneralised past tense forms (e.g.: *the bird bited his tail*) or present instead of past tense forms where the latter would have been required in the syntactic context (e.g.: *he tried to get it but he can't*). In Polish, on the other hand, these commission errors were most evident for noun-verb accordance in regard to gender (e.g.: *tata pomogła jej żeby wyjść* – 'dad helped her to get out'). These results thus confirm once more that the morphosyntactic errors committed by typically developing and language impaired children differ and might hence function as an indicator for atypical language development.

Besides morphosyntactic accuracy, the twins' narratives showed one further considerable deviation, namely the use of tenses. The typically developing twin told all his narratives in the past tense, whether it was only *past simple* for his

English narratives at the age of 4;8 or *past simple* and *past progressive* during the second round of testing. The language impaired bilingual, on the other hand, employed a mix of tenses within and across his narratives. His first English narration is mostly told in *present progressive*, apart from the first sentence which stands in the *simple past tense*. A similar mix of tenses can also be observed for his English re-narration from the same age, where *present progressive* and *past simple are mixed* throughout the whole story. Nine months later the affected child mixed *present simple* and *past simple* in both his English narratives and *present* and *past tense* in his Polish stories. This uncertainty in regard to tense usage clearly indicates a lack in metalinguistic knowledge about these structures and their functions, which is why he uses them more or less interchangeably. In regard to the distinction of typically developing and linguistically impaired bilinguals this error pattern means that the inappropriate use of tense in narratives might serve to distinguish the two groups of language learners.

The final point under investigation in the children's narratives was the syntactic complexity of their utterances. As previously mentioned, their substantial gap in MLU already foreshadows a divergence in the complexity of their sentences. During the first round of testing, the children's narratives contained mostly simple sentences but their structure already differed between the twins. While the majority of the affected child's utterances in the free story follow a simple SVO structure, the typically developing subject's sentences also contain prepositional phrases (examples below) and a larger number of conjunctions (four as opposed to one). The type of conjunction employed by the two children is similar, however. Both children showed a preference for the connector *and then*.

Extract 2: Syntactic Structure in Narratives of LIB and TDB

- \*TDB:               **and then** the owl got **on his tail**.
- \*LIB:               the cat is chasing the bird.

Parallel to the length of the stories, their syntactic complexity also increased in the re-narration. While the children's narratives only contained simple sentences in the first sitting, their re-narrations also encompassed compound and complex structures. In this case it is particularly remarkable that the affected child's

narrative contains two sentences with the subordinate conjunction *because*, whereas the unaffected only produced compound sentences. In this regard it seems noteworthy, however, that neither of the affected child's complex sentences are grammatically correct as the second verb in the first sentence misses the past tense inflection and *present* and *past tense* are mixed in his second compound construction. Furthermore, the syntactic organisation of the first sentence is not quite accurate as the third noun phrase *the mouse*, would need to stand before the conjunction *because*, rather than at the end of the utterance in order for this sentence to follow grammatical conventions. Apart from the ungrammaticality of his sentences, the second one further does not seem to represent a semantic connection. This is, it is not clear in what relation the second clause stands with the other two. In the unaffected twin's sentences, in comparison, the semantic connection between the clauses is easily apparent.

Extract 3: LIB's & TDB's compound & complex sentences in re-narration at age 4;8

\*LIB: he **wanted** to catch because he **like** it the mouse.

\*LIB: and then he **is catching** the balloon **because** the boy **looked** at the shopping and he **wants** to catch it.

\*TDB: he (...) tried to catch it **but** he can't **and** the cat wanted to have the fish.

\*TDB: the cat got the fish and the boy got his ball.

These examples from the children's first English re-narrations thus seem to indicate that it is neither a measure of grammaticality nor of syntactic complexity alone that allows for a differentiation between the two language learners but rather a combination of the two. This contention is further supported by sentences the children produced during their English narrative in the follow-up study. Once more, the affected child's narrative contained one complex sentence, whereas the unaffected child's stories were made up of simple and compound sentences only. But, again, a closer look at the syntactic structures reveals that the affected twin's complex sentence is grammatically incorrect. Also, the typically developing child's sentences are longer and more complex as they contain more independent phrases as well as inserts, adjectives, grading adverbs and complement phrases.

Extract 4: Examples of syntactic structures in LIB's and TDB's narratives at age 5;8

\*TDB: **and then** the boy was **very surprised and** the ball fell in the water **and** the boy forgot about the bucket.

\*TDB: the boy was pulling the ball out **and** the cat **at the same time** was eating the **delicious** fish.

\*LIB: can't **to** stop and **hurt** himself **because** he **fall** off.

These sentences clearly show a wider variety of words in the unaffected twin's utterances, a finding which was already indicated by the higher number of different words in his stories and which is also confirmed in his Polish narratives. In addition, his narration in this language also contains one complex sentence, a structure, which did not occur in the affected child's Polish stories.

Apart from this lack of complex sentences in the language impaired child's Polish narratives, the twins' stories differ even more significantly in regard to their complexity in their home language than in English. This becomes particularly apparent from the fact that only one compound sentence could be found in the affected child's Polish narrative and, despite the use of simpler structures, the proportion of grammatically correct sentences was lower in this language than in English.

Extract 5: Comparison TDB's and LIB's sentences from Polish narrative task at age 5;6

\*TDB: były trzy owiecki=owieczki i **kiedyś jak najmniejsza piła to** ona niestety spadła do wody.

There were three goats and once, when the smallest was drinking, she fell into the water.

\*LIB: mała koza chciała wejść na wodę

the little goat wanted to go on the water.

Interestingly, this gap in regard to syntactic complexity is not as apparent from the narratives which were recorded during the first round of testing and this might be a result of the child's incapacity to label the main protagonists (see above), which was not a problem during the first sitting, when he had to tell a story about baby birds. This asymmetry might be due to the difference in frequency of the two target words. According to the *PWN Online Corpus of Polish*, which was compiled on the basis of 40 million spoken and written words, the term *ptak* 'bird' occurs four times as frequently in the Polish language as the word 'koza' goat. Of course, it needs to be borne in mind that corpora do not contain children's language but they do contain parts of the lexical input they might be exposed to. Even if the corpus is left aside, a quick search around the internet regarding the currently most popular TV

shows and films for children in English and Polish also reveals that goats are not featured as often as dogs, cats or birds. In addition, the subjects of this study, like the majority of children in Europe, grow up in an urban setting where they are more likely to encounter dogs and cats as pets and birds in surrounding parks than goats which are rather farm animals.

Hence, the likelihood of the affected child having come across the more frequent word (bird) is significantly higher than with the second term (goat), which might result in his difficulty to recall this word. This assumption is sustained by the fact that his unaffected brother also had trouble to think of the Polish term for *goat*, however only during the first round of testing. Therefore the way both children dealt with this lexical shortcoming is of particular interest.

While the typically developing twin used the English word *lamb* and inflected it according to the Polish case system in order to fit the syntactic structure of his narrative, the language impaired child stated not to be able to tell the story and only did so once the tester provided the according term. This divergence in their strategic competence is particularly striking if one bears in mind that the examiner encouraged the child to think of an alternative name (with the intention to either elicit a code-switch or a broader label for the animal) and once more points toward the possibly differentiating nature of this discourse competence.

This qualitative narrative analysis thus comes to the following conclusions concerning the nature of the narratives provided by the typically developing and by the linguistically impaired child. Firstly, they seem to differ significantly in regard to their metalinguistic competence, which was not only reflected in their answers to the introductory questions to this task (or the lack thereof) but also in their employment of narrative devices as introductions to their stories (or, again, lack thereof). Secondly, the number of pre-defined main events, which were described in their stories further illustrated a gap in their narrative ability, with the shorter stories of the affected bilingual also containing fewer main events. Thirdly, it could be established that neither syntactic complexity nor grammaticality alone is a reliable indicator of the children's narrative abilities; this should hence always be investigated in combination.

The same is true for their two languages, as their storytelling capacities did not necessarily overlap in English and Polish. In regard to grammaticality and the accuracy of tensed verbs, an asymmetry similar to the other linguistic tests could be observed. While over-regularisation of past tense forms was most common in the unaffected twin, omissions of the 3<sup>rd</sup> person past tense –s was the mistake with the highest frequency in the narratives of the affected child. It could further be shown that the typically developing child's stories contained a wider variety of words with adjectives only occurring in his utterances. Finally, this narrative analysis led once more to the conclusion that strategic competence might differ enough between typically developing children and children with SLI in order for it to work as a differentiating category in language assessment.

## **8. Conclusion and Possible Implications**

Overall, the results presented in this paper correspond to a large extent to previous findings in the research areas of bilingualism and *Specific Language Impairment*. The typically developing twin outperformed his brother on all linguistic and also on the single non-linguistic measurement that were carried out as part of this study. The affected child's lower score on the *Raven Coloured Matrices Test* when compared to his brother, clearly favours a definition of SLI which does not differentiate between linguistic and non-linguistic skills. That is, the findings from this study make a *domain-specific approach* to language development seem less plausible than a *domain-general approach*. A comparison of results obtained by the affected twin on those tasks requiring *crystallised intelligence* (e.g.: lexical tasks) and those testing *fluid intelligence* (e.g.: sentence repetition tasks) further shows his significantly lower performance on the latter measurements, which provides evidence for Bialystok's and Peets' (2010) *integrative model* of language development.

This finding could further be confirmed by the profound error analyses presented in the qualitative investigation of the data. A close inspection of the affected twin's responses indicates a particular weakness in phonological processing and in phonological working memory capacity. This does not only

become apparent in the sentence repetition tasks, where he repeated the final word(s) of sentences very clearly, while he blurred the beginnings but also from his responses in the active vocabulary tasks. In the English productive lexical task, the linguistically impaired child repeated the initial sounds of prompts during the first round of testing, which points toward his processing the auditory input at a slower rate than his typically developing brother.

More evidence for this hypothesis became apparent from a comparison between his results from the grammar recognition task in both languages. While sentences which required the inflection of personal pronouns did not seem to pose a particular problem to the affected child in Polish, they were an area of substantial difficulty in his English test. It has been argued that these differing results are due to the diverging syntactic structures in the two languages with the Polish sentences requiring smaller working memory capacities and hence facilitating performance for the child with SLI. This notion was further confirmed by the fact that the unaffected twin performed better on syntactic structures containing complement or relative clauses, both of which require higher capacities of working memory. Phonological processing thus seems to be a major differentiating factor between typical bilingual language development and language impairment and should hence be investigated further, in order to include it in future language measurements.

Apart from phonological processing, the twins' performance also differed significantly in regard to their morphosyntactic errors. The data obtained in this study confirms previous findings which suggested more commission than omission errors for typically developing bilingual children. While the affected child's morphosyntactic errors subsumed the lack of 3<sup>rd</sup> person present –s, inaccurate conjunctions or missing case inflections, plural for singular and derived forms of prompts as synonyms (e.g.: *twiggy* as a synonym for *twig*) the typically developing child's errors were mostly over-regularisations of irregular past tense forms in English and mistakes in case inflection in Polish. Over-generalised Polish verb forms, on the other hand, have been found in the utterances of both children. It thus seems valid to infer from these results that omission errors are rather typical of impaired language, whereas over-regularised linguistic output falls within the

bilingual norm and should hence not be considered as atypical. Regarding this differentiation it needs to be added that over-generalised forms might also occur in SLI speech but to a smaller extent. This divergence in error patterns can thus also be considered as a (fairly) reliable indicator for the difference between impaired and typically developing bilingual speech.

The same can be said for the length (in minutes and number of total words) and the complexity of narratives (in NDW and MLU), which have been found to differ significantly between the two brothers, with the unaffected twin, again, outperforming the affected child. Interestingly, sentence types have not been found to play a differentiating role between the two types of language learners. Complex sentences have, for example, been found in the earlier narratives produced by the linguistically impaired twin but not in those produced by his brother. A closer investigation of this striking finding revealed differing levels of grammaticality between the brothers. While the unaffected twin's sentences might have been simpler regarding their syntactic structure, the vast majority of them was grammatically correct. The same could, however, not be observed for the affected twin who produced a large number of grammatically incorrect sentences during the narrative tasks. Additionally, the unaffected twin produced a wider variety of syntactic structures, such as complement and relative clauses. It was thus concluded that only a combination of the two measurements of sentence type and grammaticality could yield reliable results.

The twins' performance on the narrative tasks also showed a number of similarities. Both children's re-narrations were longer than their narrations, they contained more key events and (apart from one exception) they increased over time, which can also be said for their number of different words. Apart from the typically developing child's stories being longer, they were also the only ones containing narrative devices but, interestingly, only at the beginnings of stories, rather than at their endings and only during the second round of testing. This lack of narrative devices in the stories told by the affected child clearly indicates a difference in the twins' metalinguistic knowledge. This was also confirmed by their answers (or lack thereof) to the ice-breaker questions at the beginning of the narrative task.



This difference in metalinguistic awareness could further be observed in a couple of instances of self-correction by the unaffected twin, when he either changed the wording of his narrative in order to suit the literary genre, or when he altered a noun inflection from one case to another. In the affected twin's utterances, in comparison, no such instances of self-correction or alterations could be found which further emphasises a lower level of metalinguistic knowledge in the linguistically impaired child. Concluding from this, it can be said that metalinguistic awareness is one more factor which seems to distinguish between typically developing and impaired bilingual speech.

Apart from the narrative tasks, grammaticality was also a key issue in the twins' performance on the sentence repetition tasks, where a large number of the unaffected twin's sentences, which had to be scored as incorrect, were actually grammatically correct but no exact replicas of the target sentence. His most common mistake in this regard was tense-replacement, which altered the meanings of the target sentences but did not make them grammatically incorrect. These instances of tense alteration have thus been interpreted as occurrences of strategic competence as they prevented a breakdown in communication. The form of communicative strategies was one further point which was found to distinguish between typically developing and impaired bilingual speech.

It was first observed during the lexical tasks, where the affected twin showed instances of code-switching, while his brother gave nil responses instead. This differing performance points once again toward a divergence in their metalinguistic awareness and their control processes as the unaffected twin seemed to be rather able to keep his two linguistic systems apart and to ignore unwanted input from the language that was not the focus of the test. This difference would suggest that the cognitive advantages which are assigned to early bilinguals might not be developed to the same extent in bilingual children with a language impairment.

A further difference in regard to strategic competence could be observed in the sentence repetition tasks, where the unaffected twin altered or added items in order to produce a semantically or grammatically coherent sentence. Similar instances of conscious alterations (marked by a preceding pause) could not be

observed in the younger twin's utterances. In addition, the previously mentioned change in tenses by the unaffected twin in order to facilitate the repetition of the target items in the sentence repetition tasks, can also be interpreted as a form of communicative strategy and hence adds to the list of different strategic devices in the twins' speech. During the research for this project, no study with a focus on strategic competences in the two groups of language learners could be found, which would make a follow-up study with exactly this point of interest and a larger group of subjects all the more interesting. This case study can so far only indicate a possible difference in the communicative strategies of typically developing and language impaired bilinguals but the answer as to whether these are case-specific or applicable to a wider group of subjects, will need to be postponed to a date, when more data will have been collected and analysed under this angle.

On a more general note, it seems crucial to emphasise once more that the subjects' differing results on all linguistic tasks could only be obtained from profound errors analyses. While the preceding quantitative investigations indicated some general tendencies in their linguistic profiles, they could not distinguish between the two language learners to such an extent as the following qualitative analyses did. It thus seems valid to say that only a combination of the two forms of investigation can yield comprehensive results. The same is true for the twins' two languages; their differing scores in their two languages, depending on the testing date and the task itself, clearly emphasises the necessity to examine bilinguals in both their languages, in order to obtain a more complete picture of their linguistic profiles. Once more, this study showed that bilingualism cannot solely be described in terms of dominance, exposure and age of acquisition. That it is not a question of 'either or' but rather of 'and'. Most importantly, this study illustrated once again that a measurement of bilingual children against a monolingual norm leads to inaccurate results and that profound analyses are needed in order to distinguish between typically developing and language impaired bilinguals.

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## Appendices

### *Appendix 1: Questionnaire on Biological Factors Influencing SLI*

- 1) Are your children monozygotic (identical) or dizygotic (fraternal) twins?  
☐ monozygotic ☐ dizygotic
- 2) Were your children born prematurely (before 37 weeks of gestation)?
  - a. If so, please indicate in which week of your pregnancy  
\_\_\_\_\_
  - b. If any, how much time did they spend in the NICU?  
\_\_\_\_\_
- 3) Please indicate your children's respective birth weights
  - a. Alexander:
  - b. Nathan:
  - c.
- 4) Did you experience any complications during your pregnancy? (e.g.: placental abruption, PROM – premature rupture of membranes)
  - a. If yes, what sort of complications?  
\_\_\_\_\_
- 5) Are you aware of either of your children having suffered from intrauterine infection (i.e. infection of the fetus while still in the womb)?
  - a. If yes, who?  
\_\_\_\_\_
- 6) Please, indicate the birth order of your children.
  - a.
  - b.
- 7) Did you experience any intrapartum (labour and delivery) complications (e.g.: umbilical cord prolapse)?
  - a. If yes, what sort of complications?  
\_\_\_\_\_
- 8) Did any of your children suffer from neonatal hyperbilirubinemia (jaundice)?
  - a. If yes, who?  
\_\_\_\_\_
- 9) Have your children/Have you been given any glucocorticosteroids during your pregnancy or after?
  - a. If so, how often?
- 10) Were you subject to particularly stressful situations during your pregnancy?
  - a. If so, please indicate whether these situations occurred on a regular basis and when they occurred during your pregnancy.  
\_\_\_\_\_
- 11) Has either of your children previously been diagnosed with any linguistic impairment? If so, who?

### **Zusammenfassung**

Heutzutage ist Zweisprachigkeit eher die Norm als die Ausnahme (z.B.: Ellis 2005; Grosjean 2010) und dennoch ist die Vielzahl von sprachlichen Tests an einen monolingualen Standard angepasst. Das führt dazu, dass zweisprachige Kinder mit einer typischen Sprachentwicklung oft als sprachgestört diagnostiziert werden, was einen signifikanten Einfluss auf ihre soziale and intellektuelle Entwicklung haben kann. Es ist deshalb von großer Bedeutung die Unterschiede zwischen normaler bilingualer und gestörter Sprachentwicklung besser zu verstehen wozu diese Arbeit einen Teil beitragen soll. Dazu wurden in einer Zwillingsfallstudie die sprachlichen Unterschiede zwischen einem normal entwickelten und einem sprachgestörten männlichen Englisch-Polnisch zweisprachigen Kind genauer untersucht. Die Buben wurden im Alter von 4;8, 4;10 und 5;6 mit einem nicht-sprachlichen und einer Reihe von sprachlichen Tests getestet. Aus der Analyse ihrer Testergebnisse ging hervor, dass sich die Studienteilnehmer in ihrer phonologischen Verarbeitung, ihrer metalinguistischen Kompetenz, der Grammatikalität und Komplexität ihrer Geschichten, ihrer Morphosyntax und letztlich in ihrer strategischen Kompetenz unterscheiden. Die letztere ist eine neue Erkenntnis und deutet darauf hin, dass Unterschiede in Kommunikationsstrategien relevant für die Unterscheidung von normal entwickelten und sprachgestörten zweisprachigen Kindern sein könnten.

## Appendix 3: CV

### Lisa-Maria Müller

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Phone: +43 676 742 84 02 • E-Mail: [limamue@gmail.com](mailto:limamue@gmail.com)  
Born: 9 May 1989

# [limamü]

#### EXPERIENCE

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##### Assistant to Director of Studies Univ.Prof. Susanne Reichl

current position

University of Vienna, English Department  
[anglistik.univie.ac.at/staff/mueller](http://anglistik.univie.ac.at/staff/mueller)

Academic research in the field of *Young Adult Fiction and Children's Literature*. Proof-reading of articles, support in the course preparation, administrative work such as proof-reading or articles

##### Local Organiser of the Bi-Sli PL research project in London

23/2 – 18/3 2012

Uniwersytet Warszawski, Bi-Sli PL  
[bi-sli.org](http://bi-sli.org)

Set-up of the Bi-Sli PL research project in London, which is part of the European COST Action ISO 804, whose aim it is to resolve methodological and clinical confusion caused by the overlap among the features of bilingual and impaired language, in order to improve language assessment of minority language children. My tasks included the recruitment of test subjects, the establishment of contacts with Polish Saturday schools and local Polish communities as well as the organisation of research facilities at the co-operating City University London.

##### Research Helper for LangUsta and Bi-Sli-PI

March 2011 – present

Uniwersytet Jagielloński, Psychology Department, Krakow  
[langusta.edu.pl](http://langusta.edu.pl)

As part of the LangUsta research team, I am involved in the process of test development and application in the area of bilingualism, multilingualism and SLI (Specific Language Impairment).

##### Research Helper for the Department of Cognitive Sciences

August 2010 - December 2010

Macquarie University, Sydney

Testing pupils of Australian primary schools for reading difficulties and dyslexia using a number of different psychological tests.

##### Intern

Summer 2007 - 2011

VTB Bank, Austria  
Parkring 6, 1010 Vienna

Advisory service to costumers in English-speaking countries. Support of loan preparation and maintenance of the costumer-database.

##### Sailing Instructor

Summer job

Segelschule Mattsee  
Seestraße 23, 5163 Mattsee, Salzburg

Teaching people of different age groups the theory and practical experience of sailing.

## EDUCATION

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### University of Vienna

October 2007 - present

Teaching degree (diploma studies) in English and Russian ("Erster Abschnitt" completed on 12<sup>th</sup> May 2010)

BA in English and American Studies

BA in Slavic Studies

Additional courses in German as a Foreign Language, Psychology and special needs pedagogy.

### Uniwersytet Jagiellonski, Krakow

March 2011 – June 2011

Erasmus Exchange Program.

Studying Russian and Polish Linguistics and Literature.

### Macquarie University, Sydney

July 2010 – January 2011

Joint Study Exchange Program.

Studying English Linguistics and Literature.

### GRG 5, Rainergasse

1999-2007

Secondary school with a focus on modern languages. Passed secondary school-leaving certificate with distinction.

## CONFERENCES

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### ÖSKL 2012

HOW EMOTIONAL IS LANGUAGE LEARNING?

APPRAISAL STRUCTURES IN ELF & CLIL

PRESENTATION

VIENNA, 2013

### COST FINAL CONFERENCE

NARRATIVES & BILINGUALISM

POSTER CO-AUTHORSHIP

KRAKOW, JUNE 2013

### LAB VISIT COGNITIVE SCIENCE

IN THE HUMANITIES

DIFFERENCES IN BILINGUALISM & SLI

POSTER PRESENTATION

VIENNA, JUNE 2013

## SKILLS

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### LANGUAGES:

GERMAN (native)

POLISH (native)

ENGLISH (a score of 8.5 out of 9 in the IELTS exam – C2)

FRENCH (C1)

RUSSIAN (B2)

### INTERESTS:

Bilingualism in a Multilingual Society, language development and impairment, politics with a special interest in EU policies, development and reform of the educational system, traveling, reading (English and Russian Literature, with a special focus on the 19<sup>th</sup> and 20<sup>th</sup> century, as well as contemporary literature), writing, theatre, cinema (preference for independent productions), water sports (sailing, surfing, wakeboarding, swimming, etc.), ballroom dancing.

## **Eidesstattliche Erklärung**

Ich, Lisa-Maria Müller, erkläre hiermit an Eides statt, dass ich die vorliegende Diplomarbeit selbständig verfasst, andere als die angegebenen Quellen und Hilfsmittel nicht benutzt und mich auch sonst keiner unerlaubten Hilfe bedient habe.

Ich versichere, dass diese Diplomarbeit von mir weder im In- noch im Ausland in irgendeiner Form als Prüfungsarbeit vorgelegt wurde.

Wien, im Mai 2013

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Lisa-Maria Müller