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Preface

This thesis is the continuation and expansion of my diploma thesis (Müller, 2013), where some findings from the initial two data collection points (aged 4;8 and 5;6) were presented. Therefore, some parts of the literature review on bilingual development and language impairment presented in my diploma thesis, have been extended in this doctoral thesis.

The first data collection was carried out as part of the *COST Action IS0804*, a European project, which tried to disentangle the overlaps between language impairment and bilingualism. The research presented in my diploma thesis 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). I was granted permission to continue using the tests developed as part of the COST Action IS0804 for the longitudinal assessment in this study.

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1 Introduction

For too long, bilinguals have been considered an exception rather than the substantial, ever growing and politically relevant part of the population they are. The lack of conclusive studies investigating the exact number of bilinguals in and outside Europe should therefore not be surprising and we will need to resort to data on migration flows in Europe to illustrate how many people living there are (potentially) bilingual.

The *Eurostat Migration and Migration Population Statistics* (Eurostat, 2016) show that in 2014 alone, 3.8 million people have immigrated into one of the 28 EU member states from in – and outside the European Union. These numbers add to the 34.3 million foreign residents, that is people with a passport from outside the European Union, who were living in one of the EU member states on 1 January 2014 as well as the 18.5 million people who resided in a different country than the one indicated on their EU passport. It can be assumed that a large part of these people use two languages on an everyday basis.

Combining these numbers with the results from an EU study carried out in 2012, promisingly entitled “Europeans and their Languages” (TNS, 2012) but unfortunately only investigating the foreign language proficiency of European residents and their attitudes toward foreign languages, which states that “98% of Europeans consider mastering other foreign languages as useful for the future of their children“, it can be assumed that a substantial number of these (future) parents will push for their children to become bi – or mutlilingual. This would lead to an even further and constant increase in the bilingual population.

Therefore, bilingualism is indeed reality and „[W]e can no longer afford a monolingual norm“ as Zurer-Pearson (2010) quite rightly stated in her answer to Paradis’ keynote article. In her comment, Zurer-Pearson referred to the lack of bilingual norms in standardised language measurements, which are a reflection of the common misconception that bilinguals are merely two monolinguals in one person – a view previously criticised and rejected by Grosjean (1989).

For language testing and assessment this misconception means that bilinguals are tested with language measurements developed for monolinguals and assessed based on norms, which do not account for the specificities of bilingual language acquisition.

This common approach can lead to the misdiagnosis of typically developing bilinguals as language impaired, which can have devastating effects on their social and academic development. It is therefore of utmost importance to understand the boundaries and overlaps between typical bilingual language development and bilingual language impairment in order to prevent these misdiagnoses in the future and to provide an accurate assessment for bilingual children.

In order to do so, however, we first need to understand what the distinct characteristics of typical bilingual language development and bilingual language impairment are and where the two overlap, which is precisely the aim of this thesis. It builds on the findings from my preceding diploma thesis (Müller, 2013) and investigates the differences and overlaps in the communicative ability of one typically developing English-Polish child and his twin brother with language impairment.

In a first step, definitions of language (chapter 2) are reviewed and discussed, in order to highlight that language is more than the sum of its grammatical features. To this end, grammatical, social, contextual, functional and combinatory theories of language are presented. It is outlined why grammatical theories, such as Chomsky's generative grammar are not deemed appropriate for the description of typical and atypical bilingual development in the context of this thesis. Rather, definitions like Jakobson's approach, which define language as a social and functional meaning-meaking tool should be given preference as they are more successful in accounting for deviations from the norm resulting from a bilingual status or language impairment.

Based on this argumentation, section three presents a review of models of communicative competence. This concept was first proposed by Hymes as a reponse to Chomsky's generative grammar, in an attempt to define language

as more than the sum of its grammatical rules. Chapter three therefore discusses the evolution of Hymes' concept, which has been adapted and extended over time in order to describe the skills speakers need to become successful communicators. Even though most of these models are rooted in the field of language teaching, they seem very relevant in the context of clinical linguistics, which has focused increasingly on specific morphemes or grammatical constructions as the key to disentangling language impairment from typical development. This is precisely where this thesis wants to add a more holistic perspective, describing a wider range of language skills.

The review of models of communicative competence revealed that these models have become increasingly complex over time, covering more and more sub-skills. It became clear that models change with regard to the precise component they centre their remaining skills around but all of them suggest a hierarchical relationship where one component is central to the communicative act.

This is where chapter four of this thesis comes into play. In this section, a new dynamic model of communicative ability is proposed. Based on the models discussed in chapter three, this model consists of six components, linguistic, discourse, sociocultural, interactional, strategic and monitoring ability. However, the crucial difference between this new model and its predecessors is that the components of the dynamic model of communicative ability are described as parts of a dynamic system, which stand in constant interaction with each other. To this end, dynamic systems theory is reviewed in the context of bilingualism and language impairment and the potential of this new model for the description of typical and atypical bilingual development is highlighted. It is also described why the term ability is given preference over terms such as competence, capability or capacity, in the context of this thesis.

Based on the dynamic model of communicative ability, literature on typical bilingual development is reviewed in section five. Studies on the phonological, morphological and syntactic development of bilingual children speaking different languages is analysed, before an overview of their discourse

development is provided, followed by a summary of studies investigating bilingual turn-taking and conversational behaviour, their sociocultural abilities and their use of conversational strategies and finally, their cognitive development. In addition, common definitions and classificiations of bilingualism are discussed at the outset of the chapter.

In parallel to the chapter on bilingual development, chapter six provides a discussion of the recent nomenclature debate surrounding the neurodevelopmental disorder (Specific) Language Impairment. As part of this discussion, it is argued that language impairment should be given preference as a label for this condition as it does the heterogeneity of profiles, which are subsumsed under this umbrella term, more justice. Furthermore, it is more in line with the model of dynamic communicative ability, which underlies this thesis. Following this commented summary of the nomenclature debate, literature on the linguistic, discourse, interactional, sociocultural, strategic and cognitive development of children with language impairment is analysed. From this overview it becomes clear that the vast majority of studies across various languages and language-combinations, have mainly focused on children's phonological, morphological and syntactic development. This has led to the widespread assumption that these are the main causes for concern in children with (specific) language impairment. However, the literature summarised in this thesis clearly indicates that the issues of atypically developing children go beyond the domain of grammar and phonology and also affect other aspects of communication.

In order to shed more light on the precise differences between typically developing bilingual children and their peers with language impairment, a systematic review summarising 44 articles published on the crossroads of bilingualism and language impairment, is presented in chapter seven. The aim of this review was to summarise the extensive body of research on this topic and to determine whether cross-linguistic markers of bilingual language impairment exist. This review revealed that less language-dependent features might potentially be more globally reliable in the distinction between typically and atypically developing bilingual children. Implications for the development

of diagnostic tools are discussed.

The insights obtained from this extensive literature review are in line with the dynamic model of communicative abilitiy presented in chapter four of this thesis, as it is shown that different levels of language skills are intertwined and that indeed children with (specific) language impairment face difficulties that reach beyond phonology, morphology and syntax.

Therefore, the twin case study comparing one typically developing English-Polish bilingual to his twin brother with language impairment, should shed more light on the precise similarities and difficulties of their language development. To this end, the two children were studied over the course of four years with a combination of tests, assessing their declarative knowledge, and spontaneous speech data, measuring their procedural skills. The results of this investigation are presented in chapter nine of this thesis. In this section, detailed analyses of typical and atypical bilingual development are provided in all areas of the dynamic model of communicative ability in order to help understand which features may be used to differentiate between the two groups. The advantage of this twin-case study is that it can provide a holistic and in-depth description of typical and atypical English-Polish development, which is supported by an extensive literature review of the two phenomena. The parallels and differences between the case study presented here and previous literature on this topic are discussed in chapter ten of this thesis. This discussion serves as the basis for the prototype of a bilingual assessment grid, which is presented in the final chapter of this thesis.

As with every case study, the results discussed here will need to be verified on a larger cohort before they could potentially be extended to English-Polish bilinguals with and without language impairment. Therefore, the aim of the discussion and analysis provided here is to discuss potential new pathways for research on the crossroads of bilingualism and language impairment and to give a more holistic account of both typical and atypical bilingual development.

2 Definitions of Language

Language has been a topic of fascination and investigation for a long time and it thus should not come as a surprise that numerous definitions of what it means to know a language or to be a competent speaker exist. However, not all studies take the time to define which approach and definition they favour in their analyses. Does knowing a language refer to an abstract system in one's mind or is it the ability to communicate successfully? Can a certain theory of language account for all languages past and present? Can one only ever be a native speaker in one language? And what is an ideal native speaker? Does somebody know a language if they have perfect grammatical knowledge or does it suffice to be able to achieve one's communicative goals? Should we focus on linguistic knowledge or actual language production and is the latter always (or ever?) an accurate representation of a speaker's theoretical understanding.

This last question is particularly relevant in child language research and is perfectly illustrated by Dressler and Laaha (2012) in their example of a three-year-old Hungarian speaker, who used the typical child overregularisation *lo-k* (pl. horses) instead of the correct *lov-ak* during everyday conversations. However, when asked specifically about the correct form, she was able to produce it. This example shows a mismatch between knowledge and production. A similar mismatch was observed in a number of studies investigating the difference between children's test performance and their spontaneous speech samples (Korecky-Kröll et al. 2012; Laaha, Ravid, Korecky-Kröll, Laaha & Dressler, 2006). They found three-year-old German monolingual children to only make very few mistakes in their plural production during spontaneous speech, while even older children still produced erroneous plural forms during language tests. These examples therefore illustrate that performance is not necessarily a reliable reflection of knowledge and provide evidence for the variation in language production, even within the same individuals.

The questions outlined above are a frequent issue in the literature on second language acquisition and learning (e.g.: Cook, 1999; Davies, 1991,

2011; Hodgson, 2014; Mack, 1997; Ortega, 2014; Paikeday, 1985) but have not yet been widely addressed in the field of language impairment. Research in the field of clinical linguistics often appears to be based on an implicit generativist approach to language, which defines language competence as the perfect knowledge of an abstract linguistic system. In consequence, impairment has to be defined as an imperfect representation of this system.

Bearing in mind that impairment implies a “deterioration in the functioning of a body part, organ, or system“ (Impairment, 2015) or, in our case language use, the question needs to be addressed how such a deterioration in functioning is represented in impaired language. The implication of this definition for the definition of language impairment is still unclear. Is language impaired if it deviates from the native speaker norm? Where do we draw the line between difference and impairment? Is it a question of quantity or quality of mistakes or is language impaired when communication is impeded? In order to answer these questions, this section gives an overview of definitions of language, which are divided into grammatical, social, contextual and combinatory theories. These categories are not to be understood as clear-cut boundaries but rather as an attempt to categorise the theories in order to illustrate the relationship between them. Where theories could be placed in more than one overarching category, it was attempted to choose the term that best reflects its major notion.

2.1 Grammatical Theories of Language

The most prominent grammatical theory of language in the last decades has been Chomsky's generative grammar in its various stages (where I cannot discuss the many variations introduced by his followers). Chomsky (1965) rejects the interactive and functional aspect of language in his definition of a generative grammar and states that linguistics is (and should be) concerned with the ideal speaker-listener with perfect linguistic knowledge that is supposed to be unaffected by cognitive and situational factors during actual linguistic performance.

Chomsky distinguishes between "competence" and "performance", where competence stands for the knowledge and understanding of an abstract rule-system while performance is concerned with its application in the actual speech situation. According to Chomsky, only in an idealised scenario as proposed by him, performance is an actual reflection of competence whereas this could never be the case in an actual speech situation, which is governed by false starts, hesitations and mistakes. The task of the linguist should therefore be to focus on the discovery of an underlying system rather than the mere description of language use. In other words, language analysis is means to an end for Chomsky rather than a goal in its own right.

In this regard Chomsky agrees with Saussure (1916) who also advocated for linguistics to concentrate on *langue (*and *langage)*, the abstract system, rather than *parole*, the individual speaker's output. In addition, Saussure's concept of *langage* and Chomsky's Universal Grammar largely overlap as they both refer to the human ability to acquire language. However, Chomsky's understanding of an internal language system differs from Saussure's in that he regards it as a "system of generative processes" as opposed to a "systematic inventory of items" (p. 4).

It seems crucial at this point to emphasise that Chomsky's definition of language and his understanding of its acquisition is a theoretical and abstract construct and I would argue that it was never intended for use in applied linguistics. Chomsky's explicit focus on perfect language knowledge and an implicit restriction to monolingual speakers makes his approach unsuitable for

the analysis of typical and atypical bilingualism. In addition, the focus of this thesis lies on the description of actual linguistic output – an approach which Chomsky explicitly rejects. Why is it then that Chomsky's syntactic theory has been applied so rigorously to the study of language impairment (cf. Clahsen, 2008 for a review)?

(Specific) Language Impairment is traditionally defined as an impairment of the language system in the absence of any cognitive or neurological reason (cf. chapter 6 for overview). Chomsky's modular approach to language clearly lends itself to such a definition of language impairment. However, in light of recent research, emphasising the blurred lines between cognitive and language impairments (e.g.: Adams, Lockton, Gaile, Earl, & Freed, 2012; Chiat & Roy, 2013; Gina Conti-Ramsden, Simkin, & Botting, 2006), Chomsky's modular approach appears to be less suitable for the description and analysis of language impairment. It can therefore be concluded that purely grammatical accounts of language such as Chomsky's generative grammar are unsuitable for the description of typical and impaired bilingual language development in the context of this thesis. This is why concepts addressing language as an act of communication and social interaction will be given preference to form the theoretical base of this study.

2.2 Social Theories of Language

The language theories presented in this section, all agree on one major aspect namely their focus on language as a communicative act as it is shared (at least to a large extent) by two or more people.

Aristotle was one of the first scholars to systematically study language and its effect on one's audience in his *rhetorics*. Aristotle's understanding of language and the inclusion of the effect it has on one's interlocutor is probably due to the fact that citizens of Ancient Greece had to defend themselves in court instead of hiring a lawyer, or speak in parliament and therefore an understanding of how to achieve one's communicative goals was essential to achieve a favourable outcome. It can therefore be argued that Aristotle's view

of language is social and dialogic in that he did not interpret language to exist in a vacuum but took both speakers and listeners into account.

Aristotle's definition of language also includes individual variation among speakers, which he formulated as follows: "[n]ow spoken sounds are symbols of affections in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men, neither are spoken sounds. But what these are in the first place signs of – affections of the souls – are the same for all; and what these affections are likenesses of – actual things – are also the same". (*De Interpretatione*, translation by Ackrill, 1963: 43). The task of the philosopher of language, or linguist, thus is "to acknowledge the plasticity of natural language (the variety of languages, the many functions of utterances, etc.) while making sense of the use of words to express the unchanging truths of art and science" (Modrak, 2009: 20 from De Interpretatione 17a 1-8).

It could therefore be argued that according to Aristotle, individual variation is inherent to language and therefore needs to be accounted for in theories about language. This is highly relevant for the bilingual context of this thesis as it implies that variation that occurs as a result of the exposure and use of two or more languages is not merely a deviation from the norm but part of inherently variable language.

Ferdinand de Saussure's famous distinction between *langue, langage* and *parole* as it is described in his *Cours de linguistique générale* (Saussure, 1916), allows for this individual variation on the levels of *langage*, which is the individual's understanding of the underlying abstract system (langue) and *parole*, which is the actual realisation of this understanding in interaction. This becomes clear in the following statement: "tous reproduiront, – non exactément sans doute, mais approximativement – les mêmes signes unis aux mêmes concepts" (everyone reproduces, - not exactly but approximately, without doubt – the same signs united in the same concepts; my translation).

Langue, on the other hand, is by definition homogenous and can only ever exist when shared among a larger group of people, or *la masse (p.30)*, as Saussure puts it. In other words, *langue* is necessarily social but there is

nothing social about *parole* as it is only concerned with the individual realisation of *langage*. While Saussure's theory encompasses individual variation, he argues that linguistics should not focus on this variation but rather on the underlying system, *langue*. In the context of bilingualism this underlying system brings up the question whether the *langue* of bilingual speakers encompasses both their languages in one system or whether they have two *langues*, one for each language. It is also questionable whether such (a) bilingual langue(s) would indeed be as homogenous as Saussure proposes for the monolingual speaker.

Corseriu (1952) added the third level of *norms* between potential *langue* and actual *parole*. According to him, there are implicit patterns according to which members of certain groups realise *parole*. Such norms could potentially differ more between monolingual and bilingual speakers of the same language than their *langue*. The lack of this additional level and acceptance of variation is another drawback of most generative accounts.

Similar to Aristotle and Saussure, Wittgenstein's theory of language as he describes it in his *Philosophical Investigations* (1953), is also a social one because it is rooted in pragmatics. In fact, according to Wittgenstein language cannot exist within a single person as such an understanding of language would interfere with his definition, which sees it as rule-governed and therefore only able to exist in a community of language users (Kellerwessel, 2009). Note that this corresponds to Saussure's understanding of *langue*, which can only exist when shared by a larger group of people (see above).

There is, however, a crucial aspect differentiating Wittgenstein's and Saussure's theories. Wittgenstein's rules are not so much concerned with the grammatical accuracy of a language but rather with societal rules that govern communication and without which conversation and mutual understanding would be impossible. Wittgenstein also rejects the idea of language only having one specific role, such as the depiction of the world or the exchange of ideas (*Philosophical Investigations* §23) and emphasises that language has bountiful functions. Based on Wittgenstein's philosophy of language, a competent language user must understand the manifold functions of language

and apply this knowledge in concurrence with societal rules. When applied to a bilingual speaker, this means that a competent user of two languages would need to comprehend the functions of both their languages as well as the differing societal regulations of communication inherent to the (norms guiding the) uses of the two linguistic codes.

Bakhtin's understanding of language is also social but in a more abstract sense. Coining the term *dialogism* in *The Dialogic Imaginations* (1981), Bakhtin describes language as constant dialogue between what has and will be said, an endless exchange and subsequent comment on ideas. According to Bakhtin, language cannot exist without the ceaseless reference to previously stated arguments. This is to say that everything anyone ever says needs to exist in retrospect to what has been said by a previous speaker and in anticipation of what will be said next. Language and hence dialogue therefore exist in order to constantly re-negotiate meanings about the world, which logically can only occur in collaboration with one's interlocutor. It can therefore be concluded that Bakhtin's description of language is yet another highly social and interactive one, requiring the referencing and anticipating of previous and subsequent discourse for communication. His approach therefore does not only include speech production and reception but also the planning aspect of communication, which had not been included in previous theories of language.

To sum up, all theories presented in this section focus on language as an exchange, which occurs between two or more people and which can be understood in its literal, or a more abstract sense. In addition, Aristotle, Saussure, Wittgenstein and Bakhtin share the definition of language as a social process that cannot be owned by one person alone but occurs in relation to interlocutors and their statements. Aristotle, Saussure and Wittgenstein further agree on individual variation as an important aspect of language even if Saussure clearly argues that this variation should not be the object of linguistic enquiry.

For bilingualism research the acceptance of variation as inherent to language implies that the proficient bilingual should not be regarded as less

competent than a monolingual speaker but merely as one of many different manifestation of language knowledge. In other words, the theories presented in this section define language as inherently variational and social. The importance of the social context in which language occurs for successful communication is discussed in the following section.

2.3 Contextual Theories of Language

Chomsky (1965) refers to Descartes' concept of innate ideas to describe his notion of linguistic innateness and bases his language faculty on Descartes' faculty of thinking. While Chomsky and Descartes appear to agree on the innateness of certain aspects of human thinking and language, the two scholars differ substantially in other aspects of their linguistic theories.

Descartes does not directly take interlocutors or audiences into account in his theory about language but emphasises the role of contextual appropriateness. According to Percival (1972) Descartes' notion of appropriateness means that what we say is always related to the subject matter, which includes more than the particular sentence being uttered. It could therefore be argued that Descartes' understanding of language is functional and contextual in that its purpose is to convey meaning and it always exists in context of a speech situation. A competent speaker in Cartesian terms hence does not only need to convey meaning but also relate it to a given speech situation. Turning to bilingual language users, the latter aspect of language use is particularly interesting because bilinguals do not only need to learn how to encode meaning but also adapt their communication patterns to given socio-cultural contexts. This emphasises once more that language does not exist in a vacuum but as a tool for social interaction.

Campbell and Wales (1970) also emphasise the importance of context for language development and use in their contribution to *New Horizons in Linguistics*, which was published in 1970 and sums up the major approaches to language in general, language acquisition and linguistics at the time. Campbell and Wales' contribution focuses mainly on language acquisition,

which they define as “the process whereby children achieve a fluent control of their native language“ (p. 242). The use of the singular over the plural of language in their definition clearly implies a monolingual focus. Campbell and Wales further discuss Chomsky’s theory of language acquisition, which was presented in section 2.1., in relation to traditional research, such as Leopold's (1939-1949) and Sterns’ (1907) diary studies. They are particularly concerned with the focus on syntactic structures prevalent in language acquisition research at the time. According to Campbell and Wales, this concentration on syntax led to the sacrifice of the previously prevalent holistic approach, which attempted to link overall to language development. They regard the distinction between competence and performance as eminently honourable in a sense where competence stands for ability and performance for the (imperfect) reflection of underlying competence but propose that Chomsky’s definition be revised in the following way.

Campbell and Wales distinguish between stronger and weaker linguistic competence, calling them competence$_1$ and competence$_2$, whereby the latter describes human behaviour that is specific to language. They also point out that Chomsky’s and other generative grammarians’ focus has been on competence$_3$, a more restrictive and purely grammatical understanding of competence (p. 247) which has omitted the most important aspect of language, namely understanding and producing utterances that are appropriate in a given social and verbal context, or competence$_1$. They hence also advocate for a definition of language that takes into account the verbal and social context language occurs in and argue that this context provides crucial clues for language comprehension and production.

Despite their profound disagreement with Chomsky’s focus on syntax and exclusion of context, Campbell and Wales do agree with Chomsky regarding a certain innateness of language processing and thus reject behaviourism. They argue, however, that language development requires the interaction of innate abilities and environmental variables and even go as far as to suggest that these external factors should be made the primary goal of language acquisition research. In other words, they advocate for the inclusion of

language input in the analysis of language development, in order to determine whether the lack of given grammatical structures in a child's output should be interpreted as lack of knowledge or whether it can be explained by a lack of input. Recently, the role of parental input for language development has gained increased attention in language acquisition research (e.g.: Czinglar, Kröll, Sharma, & Dressler, 2015; Annick De Houwer, 2007; Hoff & Core, 2013)

As the social context plays such a crucial role in their model of language acquisition, Campbell and Wales also emphasise that the occurrence of certain grammatical features is restricted to specific communicative contexts. Therefore, an accurate description of language development needs to cover a wide variety of conversational contexts.

They also state that claims about universalities in language acquisition must be seen in the context of interaction, arguing that similarities may be traced back to similarities in environments and upbringing rather than a universal innate system (p. 257). This is not to say that they in any way reject the idea of an innate system but they repeatedly argue for a close interaction between the environment and such a system. As the environment and therefore the social context represent such crucial aspects of their theory, it is not surprising that Campbell and Wales stress that "the most important linguistic ability is that of being able to produce or understand utterances which are not so much *grammatical* but, more important, *appropriate to the context in which they are made"* (p. 247 their emphasis). According to Carpenter, Nagell and Tomasello (1998), typically developing children grasp social acceptability particularly well, which is closely linked to joint attention ability.

In relation to language impairment and bilingualism (and their respective competence), this means that impairment or incompetence would rather be reflected by inappropriate utterances that are not connected to what has been said so far, than the mere ungrammaticality of a statement. It needs to be noted that grammatical errors differ in their social acceptability by interlocutors, which was illustrated by Kilani-Schoch and collagues (Kilani-Schoch, Balciunienie, Korecky-Kröll, Laaha, & Dressler, 2009) in their study of

parent-child interactions. They show that, for example, bare infinitives tend to be socially accepted by mothers in their children's output and therefore lead to fewer corrections and interruptions of the conversational flow than other incorrect forms.

From this section it can therefore be concluded that the social context is essential for successful language use as it does not only carry significant cues that help in the production and perception of language but also restricts the speaker in regard to what is and is not acceptable to say in a particular conversational situation. Language can hence not be seen as independent of the context it occurs in and situational appropriacy must be accounted for in theories of both monolingual and bilingual language use.

Competent language users therefore do not only need to produce grammatically correct utterances in isolation, as they are predicted by Chomskyan grammatical competence, exchange with interlocutors or an audience, as suggested by the social theories of language presented in the previous section, but also need to formulate their utterances in a socially acceptable way. The latter is particularly relevant in the bilingual context as rules of social acceptability are strongly culturally co-noted and hence may not overlap in all languages a bi – or multilingual speaker knows. In addition to grammaticality and contextual appropriateness, linguistic functions are also crucial for a successful communicative outcome, at least according to the theories presented in the next section.

2.4 Functional Theories of Language

In the early 19th century, Hegel described the role of language as a tool to test our own understanding of the world against those of our conversation partners. In his understanding, language is an inter-subjective medium to verify if our intuitive experience is universal (Vernon, 2007). Language therefore appears to be seen as a means to a purpose, rather than an endpoint. Notice that apart from Chomsky's generative grammar, none of the language theories so far addressed grammatical perfection as a crucial

aspect of language knowledge but rather the functions it entails.

Using Hegel's metaphor of language as a tool, one might argue that, for example, hammers come in various shapes, colours and forms; they might be shining and brand-new, or previous jobs may have left their trace on them, their handles can have different forms, they come in different sizes, their heads can either only serve the purpose to hammer nails into a wall or also to remove them again, even the material they are made of can range from metal, to wood and even plastic and yet, they all share the one, overarching purpose of hammering nails into various objects. This is not to say, of course, that all hammers can be applied to all materials or nail-sizes and one needs to know when to choose which particular tool – similarly to choosing the right language or register in a given speech situation. I would therefore argue that any definition interpreting language as a tool automatically relativises perfection or homogeneity and includes variation and heterogeneity across speakers and speech communities.

This is also the case in Halliday's *functional grammar* or systemic functional linguistics, which focuses particularly on the functions of language and has its roots in Jakobson's theory, which will be discussed in the following section. According to Halliday's theory, language is organised in order to fulfil certain functions. In his contribution to *New Horizons in Linguistics*, Halliday (1970) explained his functional understanding of language by differentiating between the surface structure of languages, which differs from one language to another and the underlying functions, which according to him are universal. In other words, what speakers want or can achieve with language is similar across cultures but how they encode it is language-specific. This corresponds to Habermas (1970) who also argues for universal functions of language that are expressed differently from one language to another.

Halliday also criticises the dichotomy of "competence" and "performance" and argues that such a distinction is unnecessary and can be misleading. Unnecessary if it is only another way to name what linguists have already described in grammars and what they have not been able to describe yet and misleading in any other interpretation (p. 145). He stresses that there is no

need to argue for one structure being deeper than another (referring to Chomsky's deep structure vs. surface structure), or more or less important. According to Halliday, they simply fulfil different functions. A speech act is a complex behaviour pattern, combining ideational and interpersonal functions, which then relate to creative and repetitive language use (p. 165).

In his introduction to systemic functional linguistics, Halliday (2014) explains the three metafunctions of language in more detail. The *ideational metafunction* is concerned with the construction of human experience, the *interpersonal metafunction* with the interaction between two or more speakers and the *textual metafunction* relates to the organisation of a text, where text can be spoken or written. In other words, Halliday's understanding is clearly functional and therefore dialogic as the constant underlying question is what purpose a certain utterance serves and how it is used to portray or exchange meaning. As was already mentioned, Halliday argues that these functions are universal while their surface structure differs from one language to the other.

For a bilingual context this would imply that bilingual language users should be able to transfer their metalinguistic knowledge about language functions from one language to the other but explicitly learn the linguistic structures to convey these functions. In regard to language disorders, Halliday (2005) himself suggested the following reasons as beneficial for the use of systemic functional linguistics in clinical linguistics: the fact that language is presented as a meaning-making resource that is governed by tendencies rather than rules and that it focuses on what speakers and language can do, as opposed to what they cannot do. It would therefore allow for some variety and heterogeneity within the same diagnosis of language impairment – an issue that many other linguistic theories have difficulties accounting for. An issue that is not addressed by Halliday himself, but that comes to mind when defining language according to its functions, is the question as to how language impairment would be defined within such a framework.

According to Dressler (2002) in his work on functional linguistics and language impairment, the latter can lead to dysfunctions but can also merely lead to structural deficits, which have close to no effect on functionality. This

already became apparent from the previous sections, in which variation was discussed as inherent to language and therefore, difference can not automatically equal an impairment.

So far, the theories presented in this section on definitions of language, have focused on either the grammatical, social, contextual or functional level of language. The following section presents Jakobson's theory of language, which describes language more holistically and in doing so is a precursor of the subsequent section covering theories of communicative competence.

2.5 Combinatory Theories of Language

In Jakobson's definition of language (1960), a *sender* (Sender) sends a *message* (Mitteilung) to a *receiver* (Empfänger). This message must be related to a *context* (Kontext) and encoded in a *code* (Kode) that is fully or partially known to both sender and receiver. In order for this encoded message to be sent and received, sender and receiver must be in some form of psychological or physical *contact* (Kontakt).

Jakobson further depicts six major functions of language. Following Bühler's Organon model (1934 qtd. Jakobson, 1960), he includes the *referential, konative* and *emotive* functions and in addition, the *poetic, phatic* and *metalinguistic* functions. The referential function describes the reference to a context, the emotive function depicts a speaker's attitude and the konative function is concerned with the receiver of a message because it requires a following action. The metalinguistic function is concerned with the sender's overt checking that their receiver correctly understood their message, the phatic function becomes apparent in the exchange of communicative formulas and the poetic function encompasses the actual wording of an utterance.

Jakobson's definition of language can therefore be regarded as social because it involves both a sender and a receiver, contextual because it requires a context the conversational exchange occurs in and functional as it describes six functions language can convey. Interestingly, from the viewpoint

of bilingualism research, Jakobson explicitly states that in order for two people to communicate, they need to share a code fully or *at least partially* ('oder zumindest teilweise'; my translation, p. 88). Although Jakobson does not specify how much of a code must be mutually accessible in order for a conversation to be feasible, this statement clearly indicates that in his understanding of language, the perfect knowledge of an abstract linguistic system is not a prerequisite for successful communication.

This aspect is particularly relevant in the context of bilingualism as bilingual speakers may not necessarily have access to the full range of linguistic features in both their languages and yet be competent communicators in various speech situations. While crucial for the field of bilingualism, Jakobson's understanding of language also raises important issues for the definition of language impairment. If, according to Jakobson's theory, successful communication is possible, despite two people only partially sharing the same code, the line between language difference and language impairment needs to be drawn where communication is no longer possible or at least very tedious, rather than at a deviation from the norm.

2.6 Summary

This section gave an overview of grammatical, social and contextual theories of language which either focused on linguistic accuracy, interaction, situational appropriateness or a combination. Section 2. 1. described Chomsky's generative grammar and illustrated that this theory is unsuitable for the description of typical and atypical language development due to its focus on language as an abstract and idealised concept, rather than its actual realisation. As this thesis also describes language as it occurs in actual conversational situations, it was argued that preference needed to be given to social language theories.

Section 2. 2 therefore covered theories that focused on the social aspect of language and it was shown that according to Aristotle, Saussure and Wittgenstein variation is inherent to language. The social aspect of language

was described in more depth in the subsequent section, which focused on situational appropriateness and emphasised the importance of context for language production and comprehension.

This section emphasised how complex the concept of situational appropriateness can be in the context of bilingualism as highly culturally co-noted concepts like politeness may differ substantially between the two or more languages a speaker knows. It has been argued that the concept of appropriateness relates to the functions language can convey in that the underlying concept is shared among all languages but its realisation varies from one linguistic code to the next.

Theories describing language as a tool carrying out a multitude of functions where therefore described in section 2. 4. and it was illustrated that functional theories of language have to allow for variation across language users as the focus does not lie on grammatical accuracy but rather on the conveying of meaning, which can be realised in various ways.

Finally, the last section of language theories described Jakobson's holistic definition of language, which defines language as a social and functional meaning-making tool and explicitly states that successful communication can take place, despite only partial accessibility of a shared code. By taking an integrated approach to language, combining linguistic, social, contextual and functional features Jakobson's theory can be regarded as a precursor for subsequently developed theories of communicative competence, which will be presented in the following section of this thesis.

3 Communicative Competence

Language is more than the sum of its grammatical rules and therefore competent speakers need to be aware of more than the phonological, morphological and syntactic restrictions of a language in order to communicate successfully. The importance of sociolinguistic rules, conversational context and the understanding of language functions and how they relate to the context of typical and atypical bilingual language development was illustrated in the preceding section.

It was argued that due to these factors influencing language use, a theoretical notion like Chomsky's generative grammar, which focuses on language as a theoretical construct as opposed to actual linguistic performance, was unsuitable for the description of bilingual language use. This is in line with Hymes (1972) who developed his concept of communicative competence in reaction to Chomsky's generative grammar and clearly emphasised the significance of sociocultural constraints in communication. The substantial difference between Hymes and the scholars presented in the previous section is his concern with language as it exists in the real world instead of ideal speaker-listeners and homogenous speech situations. In his article introducing the concept of communicative competence, Hymes illustrates the heterogeneity of speech communities with examples from ethnographic and ethnolinguistic literature, which clearly show the variety of language profiles within the same speech community. One such example are the varying linguistic repertoires of Mnemoni men and women (p. 273-274) or the different roles assigned to each language in a multilingual speech community (p. 275).

By proposing a theory that reflects the variation in actual linguistic output Hymes re-defined the competence term developed by Chomsky and by doing so, created the basis for research on communicative competence, which will be the subject of this section. Before an overview of communicative competence models will be presented, the term competence will be re-visited in order to illustrate how it is defined and adapted in the different models.

3.1 Competence, Capacity, Capability or Ability?

This section will outline the discussions around the competence term which has been re-visited by scholars from fields as diverse as theoretical linguistics, psychology and second language teaching. Two groups emerge from the summary presented here. One group of scholars follows Chomsky's definition of competence as theoretical knowledge of an abstract system, while another focuses on the ability to apply such an understanding in actual speech situations. This summary will start with the first group.

As was outlined above, Chomsky's definition of competence refers to the abstract knowledge of an underlying grammatical system as it is inherent to monolingual native speakers. This theoretical knowledge stands in opposition to actual language use, or performance, as Chomsky refers to it and which according to him should not be the focus of grammarians' work.

Canale and Swain (1980) largely agree with Chomsky's terminology but they further add the social aspect in communication to their definition of competence and therefore broaden Chomsky's competence term. Canale and Swain are hesitant to include ability to use into the concept of competence and state that its inclusion may logically allow for linguistic deficits or communicative deficits, such as inadequate language competence, which can result in social class difference. Therefore, psychological factors, such as memory should not be treated as part of competence but rather as part of performance, as suggested by Campbell and Wales (1970) and in line with Chomsky's understanding of language competence.

Opponents of a clear separation between competence and performance include Campbell and Wales (1970) who state that "our knowledge of language acquisition has not been advanced by the recent spate of empirical work" (p. 245), referring to the exclusive focus on competence, rather than performance. They argued for a revision of the competence-performance opposition proposed by Chomsky and suggested to broaden the competence term by adding two further competences to Chomsky's grammatical competence. Their competences$_{1,2,3}$ therefore go beyond the knowledge of an abstract grammatical rule system (competence$_3$) and further encompass

social communication skills (competence$_1$) as well as the human ability to learn and produce language (competence$_2$) which have already been described in more detail in the preceding section. In other words, Campbell and Wales keep the terminology proposed by Chomsky but merge it with his performance term and broaden it to also encompass social communication skills.

Hymes' (1972) takes a similar stance in his definition of communicative competence, which clearly focuses on the interactive and social aspects of language and argues for pragmatics to be taken into account when referring to competence. It is crucial to emphasise that Hymes' definition of competence is the first to explicitly include the ability to apply abstract grammatical and sociolinguistic rules in an actual speech situation. Hymes explains the addition of applied aspects to his definition of communicative competence by stressing that theoretical and practical problems are intertwined and that they need to inform each other.

This practical aspect of communication as a crucial part of competence was taken up by Munby, to whom "[I]t seems clear that communicative competence includes the ability to use linguistic forms to perform communicative acts and to understand the communicative functions of sentences and their relationship to other sentences" (Munby, 1978: 26). Munby's definition is clearly functionally oriented and adds a discourse element to the concept of communicative competence.

Widdowson (1983), on the other hand, criticises Hymes' competence term for implying conformity to either a pre-defined linguistic code or social rules. Widdoson therefore suggests the term *capacity*, which stands for the "ability to exploit the resources for meaning in a language which have only partially been codified as competence and are only partially describable, therefore, in grammars" (p. 25-26). In later publications, Widdowson proposes the term *capability* to describe this knowledge of how meaning can be realised as a communicative act (e.g.: Widdowson, 2003). Such an understanding of language ability leaves considerably more room for variation as the way speakers access, combine and apply knowledge may vary from one individual

to another.

Taking a similar approach to Widdowson, in that they do not attempt to re-define *competence* but coin a new term, Bachman and Palmer (1982) suggest the term *communicative proficiency.* According to them, this emphasises the importance of being able to apply abstract knowledge to achieve successful communication. In a follow-up publication Bachman (1990) proposes the term *Communicative Language Ability* (CLA), which "can be described as consisting of both knowledge, or competence, and the capacity for implementing, or executing that competence in appropriate contextualized communicative language use" (p. 84).

Llurda (2000) agrees with Bachman's definition of *Communicative Language Ability* and argues that it should be used to describe a speaker's ability to use language. The term *competence,* on the other hand, should be used in its Chomskyan definition of "knowledge". He further argues that this language ability should be divided into language proficiency and communicative proficiency. Llurda defends his standpoint by accurately pointing out that initially competence was used to describe monolingual native speakers' language knowledge but has since been strongly connoted with second language learning, particularly after Canale and Swain (1980). As a result Llurda makes a crucial addition to the traditional competence term by arguing that it should be used to describe a static and permanent state present in all human beings, regardless of whether they use their first or their second language. Communicative language ability, on the other hand, should refer to a speaker's ability to use a given language.

This corresponds to Spitzberg and Cupbach's (1984) definition of communicative competence as a state, rather than a trait, which depends on the requirements of a given conversational setting and context. They argue that communicative competence should be defined as a state rather than a trait based on the assumption that an abstract understanding of language and its functions is a prerequisite for successful language use across situations and domains.

This last notion is especially important in the context of typically and

atypically developing bilingualism for two reasons. Firstly, the definition of communicative competence as the ability to communicate successfully *across contexts* is problematic when speaking about bilingual language users as their language knowledge and use is not necessarily equally distributed across all domains. A definition of communicative competence as global rather than situation-bound would imply that bilingual speakers are less competent language users because their skills in each language may be restricted to specific domains. This is unless we combine their abilities in each language into one overarching understanding of communicative competence. However, the issue with a global definition of communicative competence does not end with bilinguals but can equally apply to monolingual speakers. This is the case due to the vast number of possible speech situations that speakers of any language need to first encounter and then master.

Therefore, mono – and bilingual speakers alike might display stronger communicative abilities in some situations than in others, which would favour a definition of communicative competence as a state because such an understanding allows for variation across domains and contexts. Such a definition would also correspond to Wilson and Sabee who accurately point out that “most people display incompetence in at least a few situations, and a smaller number are judged incompetent across many situations“ (2003, p. 3-4). The latter are probably likely to be a group with language difficulties. For this group, the definition of communicative competence as knowledge or performance has significant repercussions because it raises the question whether their language difficulties are due to problems in representation or access.

To sum up, controversy remains as to whether competence should be defined as originally suggested by Chomsky and therefore as knowledge or rather as Hymes first proposed, the ability to apply knowledge in context. It becomes clear that more recently (Bachman, 1990; Llurda, 2000) the debate has shifted from a dichotomic view, where competence and performance sit at opposite ends, to interactive approaches, where the two inform each other to make conversation possible. A similar trend can be observed in the models of

communicative competence/ability/capacity/capability, which will be presented in the following section.

3.2 Models of Communicative Competence

Overall the models presented in this section can be divided into *combinatory*, *dialogic* and *interactive* models, which will be discussed in turn throughout the rest of this section. A diachronic reading of the frameworks presented here showed a clear development from combinatory approaches, where sub-competences are not presented as interacting with each other, to more interactive models, where the relationship between the separate competences is discussed. The alternative dialogic models take a different approach to combinatory and interactive models, in that they define communicative competence as the successful interaction between two interlocutors, rather than ability inherent to one speaker. This overview will start by presenting combinatory models, such as Hymes', then move on to dialogic models and conclude with a summary of the interactive models developed more recently.

3.2.1 Combinatory Models of Communicative Competence

As was outlined in the introduction to this section, Hymes' (1972) concept of communicative competence was developed in response to Chomsky's proposition of a generative grammar. It could be argued that Hymes returns to the origins of language philosophy and theory by emphasising the social aspect of language. He strongly emphasises the pragmatic aspects of language as crucial for successful communication and even goes as far as to suggest that "there are rules of use without which rules of language would be useless" (Hymes 1972, p. 278). Hymes thereby rejects Chomsky's understanding of competence as merely tacit knowledge and adds the ability to apply this knowledge in a given speech situation to his definition of competence. More precisely, a competent speaker in Hymes' terms needs to understand:

1. Whether (and to what degree) something is formally *possible*;
2. Whether (and to what degree) something is *feasible* in virtue of the means of implementation available;
3. Whether (and to what degree) something is *appropriate* (adequate, happy, successful) in relation to a context in which it is used and evaluated;
4. Whether (and to what degree) something is in fact done, actually *performed*, and what its doing entails (Hymes 1972: 281, his emphasis).

Hymes therefore regards communicative competence to consist of grammatical, sociolinguistic, sociocultural and probabilistic knowledge, whereby all of these are equally important for the successful outcome of speech events. Hymes repeatedly uses this term when describing his theory in order to draw attention to the social aspects of communication and the fact that social appropriateness is at least as important as grammatical correctness in the achievement of one's communicative goals. As Hymes' concept was developed with language learners in mind, it appears to be more suitable to describe bilingual language knowledge and use than Chomsky's generative grammar.

His notion of social appropriateness is particularly relevant for both typically developing bilingual children and their peers with language impairment. This is the case because conversational and social rules may not overlap in a bilingual child's two languages, in which case these children do not only need to switch between their two linguistic codes but also adapt to varying cultural expectations in order to be perceived as competent language users. In light of research questioning the existence of pragmatic language impairment as a distinct sub-type of language impairment (Bishop, 2000) and more recent studies emphasising the social communication problems of children with language impairment (Adams, Lockton, Gaile, Earl, & Freed, 2012; Chiat & Roy, 2013; Conti-Ramsden, Simkin, & Botting, 2006), it becomes clear that the pragmatic aspects of language knowledge and use should not be overlooked.

Munby's (1978) framework is in line with Hymes', Halliday's and Campbell and Wales' definitions of language and communicative competence as it also has a strong social orientation with the communicative purpose at its centre. This becomes apparent from the three major constituents of his framework,

socio-cultural orientation, socio-semantic basis and discourse level. Similar to Hymes' framework, there is no hierarchy between the three levels in Munby's model.

Munby disagrees with the concept of homogenous speech communities, stresses the importance of contextual appropriacy, as outlined by Hymes and emphasises the importance of considering communicative needs as a driver of what a speaker needs to know to communicate successfully. In a bilingual context, the needs could be related to domains a speaker is using his or her languages for. These may or may not be overlapping and thus the lexical and grammatical knowledge may not necessarily have equivalents in both or all languages.

Munby's model further has a very strong sociosemantic orientation, as he emphasises that meaning is created by context and therefore language should not be considered without the social environment it occurs in. Finally, he covers the understanding of rhetorical rules and communicative contexts and a speaker's ability to adapt their discourse accordingly.

Despite their disagreement regarding the accurate definition of competence (see section 3. 1.), Canale and Swain's (1980) model is comparable to Hymes' in that the sub-competences also do not appear to stand in a hierarchical relationship to each other. They stress that there is no strong "theoretical or empirical motivation for the view that grammatical competence is any more or less crucial to successful communication than sociolinguistic competence or strategic competence" (p. 27). Their framework therefore covers three levels, namely grammatical, sociolinguistic and strategic competence. *Grammatical competence* comprises the knowledge of an abstract rule-system that governs every language. S*ociolinguistic competence* covers sociocultural rules of use and rules of discourse and *strategic competence* refers to the capacity to avoid a breakdown in communication caused by a lack in either grammatical or sociolinguistic competence.

In addition to their agreement on the definition of competence (see section 3. 1), Canale and Swain also use the same baselines as Chomsky for their

model of communicative competence, namely the monolingual native speaker. This becomes particularly clear in the following statement "[k]nowledge of what a native speaker is likely to say in a given context is to us a crucial component of second language learners' competence to understand second language communication and to express themselves in a *native like-way*" (p. 16 my emphasis). Therefore, it can be concluded that for Canale and Swain, the ultimate attainment is to speak like a monolingual native speaker despite the fact that their model was developed for the foreign language classroom.

Similar to Munby, Canale (1983) further adds discourse competence to his model. He bases his definition of discourse on Widdowson (1978 qt. in Canale, 1983) and his understanding of coherence and cohesion in written and spoken discourse. According to Widdowson, utterances do not necessarily have to be cohesive to be coherent but context provides crucial information about the references in a conversational setting.

In relation to bilingual speakers with and without language impairment, Canale and Swain's (1980) definition of communicative competence is problematic, on the one hand, because it is based on an ideal native speaker as a reference point but beneficial because it includes the notion of strategic competence, which appears to be particularly relevant in the context of both typically developing bilingualism and bilingual language impairment. This is due to the very nature of bilingual language knowledge, which tends to be domain-specific. Therefore the necessity to exchange about a particular topic in the other language, brings to light limited grammatical or sociolinguistic competence in this area, which needs to be amended. In the case of language impairment, the notion of strategic competence and its importance for successful communication is even more obvious. Due to limited language knowledge, children with language impairment are obliged to circumvent possible communicative breakdowns on a regularly basis. However, up to date the differences in the strategic competence of bilingual children with and without language impairment have not yet been studied. It is therefore unclear whether the two groups of language learners differ in this aspect.

The question whether children with language impairment exhibit differences in their strategic competence is also relevant in regard to Canale's follow-up publication (1983) in which he extends the definition of strategic competence to also include the rhetorical effects of language. It therefore also covers the conscious manipulation of discourse to influence one's interlocutor. Strategic competence has hence developed from solely a compensatory mechanism to an essential tool in the achievement of one's communicative goals.

Such an understanding of strategic competence requires a high level of abstract understanding, not only of the communicative situation itself but also of language functions. It could therefore be argued that Canale's revised definition of strategic competence corresponds loosely to the communicative functions proposed by Halliday as they are also partly concerned with the reaction a speaker wants to elicit from her/his communication partner. It seems important at this point to emphasise once more that both Canale and Swain (1980) and Canale (1983) define communicative competence as underlying knowledge and skills rather than actual language use.

In contrast, Bachman and Palmer's (1982) definition of communicative proficiency includes the ability to use abstract knowledge in an actual speech situation. However, apart from their different definition of competence, Bachman and Palmer share the basic notions of Canale and Swain's (1980) concept, in that they also argue that the ability to interact successfully is determined by speakers' grammatical, pragmatic and sociolinguistic competence. Similar to Hymes, Munby and Canale and Swain, Bachman and Palmer (1982) do not specifically address the relationship between the various components of their frameworks. Only in a later publication does Bachman propose an interconnected model, which will be presented in the section on interactive models of communicative competence. However, before moving on to these more recent models, Grice's (1975) and Gumperz' (1982) dialogic frameworks of communicative competence will be discussed in the following section.

3.2.2 Dialogic Models of Communicative Competence

Grice (1975) and Gumperz (1982) put the communicative act at the centre of their models. Grice makes the focus of his model evident by coining the term *cooperative principle* to describe the mutual efforts required from both interlocutors to ensure the positive outcome of an interaction.

According to Grice, conversation partners need to respect the maxims of quantity, quality, relation and manner in order to make their contributions appropriate and meaningful. In other words, statements should be informative, depict what one believes to be true, relevant to a particular communicative situation and unambiguous.

For both mono – and bilingual language users Grice's framework implies that successful communication does not only presuppose the understanding and application of grammatical rules but, similar to Hymes' principle, their appropriate application in a communicative setting.

Similar to Grice's cooperative principle, Gumperz also stresses the significance of an exchange of utterances to occur in order to speak of communication and argues that "to create and sustain conversational involvement, we require knowledge and abilities which go considerably beyond the grammatical competence we need to decode short isolated messages" (Gumperz, 1982: 1).

With this statement Gumperz implicitly criticises Chomsky's understanding of language competence and clearly takes an interactive approach in his understanding of communicative competence. Such an exchange of utterances is clearly a social activity, as it requires the presence of two or more people.

In addition to defining communication as a social and therefore dialogic

endeavour, Gumperz also stresses the importance of implicit meaning that a competent speaker of a language needs to understand and relate to. In a way, this corresponds to Widdowson's (1978) understanding of cohesion and coherence, which also emphasises the frequent implicitness of language.

Therefore, speakers do not only need to decode the linguistic structure of a language in order to access explicit meaning but also understand messages

that are less transparent. The ability to do so demands a high level of pragmatic understanding and knowledge of conventional language use or figurative speech.

According to Gumperz, this process of *conversational inference* as he refers to it, is as important as grammatical and lexical knowledge for successful communication. Gumperz also raises the crucial point that inferences we make about a conversational situation are highly socio-culturally connoted which can potentially lead to misunderstandings in a multi-cultural conversation.

Gumperz's theory is particularly relevant in the context of this thesis as he also focuses on bilingual communicative competence (Gumperz, 1972). In this research report Gumperz criticises the prevalent perception of speech communities as monolingual and homogenous. Gumperz advocates for an understanding of bi – or multilingual speech behaviour whereby their language knowledge is described in terms of a linguistic repertoire (Gumperz, 1964). In other words, he rejects the view that languages within a bilingual person or speech community are entirely independent and puts forward a definition where these codes are functionally related. Gumperz then compares the choice of code in a bilingual context to a choice of style or tense in a monolingual context. By doing so he emphasises that code-switching in bilingual speech setting is not arbitrary but governed by strict conversational rules and thereby legitimises the process.

Referring to work on language contact and creolisation, Gumperz also discusses the crucial notion that grammar is not a fixed entity but influenced by language contact and use. In consequence, he makes a strong case for linguists to analyse language as it occurs in actual, real-life communicative events instead of isolated sentences.

To sum up, Gumperz's theory of communication is essential for research on bilingualism and language impairment due to a number of reasons. Firstly, he stresses the importance of exchange in a communicative situation, which clearly emphasises the fact that interaction is not only about the isolated production of utterances but also their relation to the communicative situation,

which in turn requires the accurate understanding and processing of input. For both typically developing bilingualism and bilingual language impairment we therefore need to take speakers' ability to act and react in a communicative situation into account.

Secondly, Gumperz emphasises the necessity to understand implicit meaning in order to succeed in a communicative situation. As mentioned above, *conversational inference* is highly socio-culturally influenced and therefore bi – or multilingual speakers, who use their languages in culturally distinct settings, must be cautious not to over-generalise from one linguistic code to the other. For a clinical population the question arises to what extent these socio-cultural conventions are accessible to them.

Thirdly, he argues for the linguistic codes in bilingual behaviour to be interpreted as interacting rather than independent entities. This directly links to the fourth pivotal point for research on bilingualism and language impairment, namely the acceptance of code-switching as typical and highly rule-governed behaviour in a bi – or multilingual setting. For research in the area of bilingual language impairment this means that the ability to code-switch appropriately in given conversational settings is essential in the context of bilingual communicative competence. It is therefore necessary to investigate in how far this aspect of bilingual language use is affected by language impairment.

The fifth and final point that Gumperz makes in his description of communicative competence is the fact that language contact can and does have an influence on the development of grammar. Even though Gumperz's argument is based on societal language contact, the thought could be spun further in order to argue that the multiple codes within one bi – or multilingual person may also result in distinct linguistic patterns. If this were the case, research in the area of bilingual language impairment would need to account for these potential specificities in bilingual speech before drawing conclusions about the nature of atypical bilingual development.

Gumperz' and Grice's models stress the importance of exchanging utterances as part of successful communication. They emphasise that the

communicative act is highly complex and that a myriad of linguistic, social and communicative constraints need to be taken into account in order to achieve one's communicative goals. However, similar to the models presented in the previous section, the relationship between the multiple competences required during conversation is not addressed in their publications.

The models presented in the following section explicitly address the question how the separate sub-competences might need to interact with each other to achieve the best possible communicative outcome. Propositions range from interconnectedness (van Ek, 1986; Bachman, 1990; Bachman & Palmer, 1996) to more hierarchical models (Celce-Murcia, 1995; 2008), where one sub-competence is central to the framework.

3.2.3 Interactive Models of Communicative Competence

As was indicated above, Bachman and Palmer's (1982) initial proposition of a communicative competence framework did not explicitily address the relationship between the grammatical, pragmatic and sociolinguistic levels of their model. This issue is first discussed in Bachman's (1990) follow-up publication, where he stresses the interconnectedness of all sub-competences described in this revised framework. Bachman assigns strategic competence a core function in his model as he argues that all competences interact with each other and the speech situation through this metacognitive process.

In other words, Bachman views strategic competence as separate from language competence, which is split into *organisational* and *pragmatic* competence. Language competence is in turn only one of three components of *Communicative Language Ability (CLA)*. The remaining two components are *strategic competence* and *psychophysiological mechanisms*.

As mentioned above and as is illustrated in Figure 1, Bachman splits language competence into *organisational competence* and *pragmatic competence*, which each consist of two sub-competences. *Grammatical* and *textual competence* form *organisational competence* while *illocutionary*

competence and *sociolinguistic competence* add up to *pragmatic competence*.

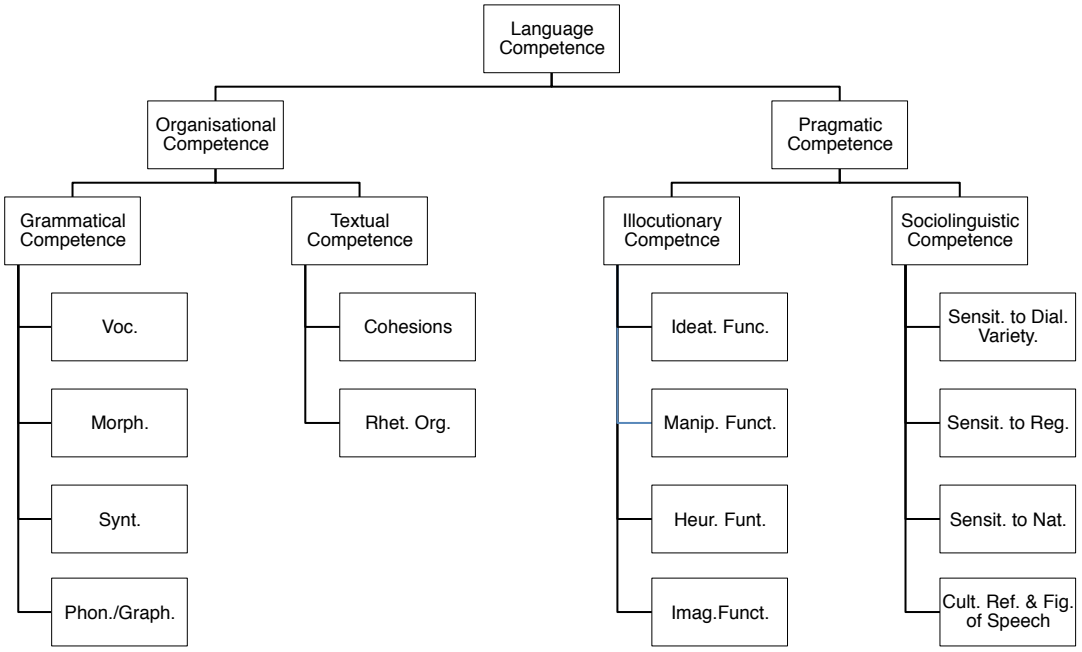


Figure 1 Bachman's model of Language Competence (Bachman, 1990: 87)

It appears necessary at this point to explain the terminology employed by Bachman in more detail and to relate it to previous models, in order to clarify certain terminological and conceptual differences.

In Bachman's model, *organisational competence* comprises what Hymes referred to as *grammatical* and *discourse competence*, namely the knowledge required to understand and produce grammatically accurate structures and their organisation into a cohesive whole. Therein *grammatical competence* refers to what Widdowson (1978) describes as language usage, namely knowledge of vocabulary, morphology, syntax and phonology. Textual competence, on the other hand, stands for organisational abilities on both the sentence and discourse level. Interestingly, Bachman chooses the terms cohesion and rhetorical organisation to describe what is more widely referred to as cohesion and coherence. A possible explanation for this difference may be that Bachman also includes the effect this organisation has on a speaker's audience into the concept of textual competence.

Bachman's definition of pragmatic competence consists of *illocutionary*

and *sociolinguistic competence*. Together they describe the awareness of the functions utterances fulfil and their appropriateness in a given social context. The functions described as part of illocutionary competence correspond to Halliday's speech functions (cf. Halliday, 2014).

Within sociolinguistic competence, *sensitivity to naturalness* appears to be the most relevant and controversial for a bilingual context. Bachman describes this aspect of sociolinguistic competence as the ability to produce and interpret an utterance in a *nativelike way*.

The inherent problem with Bachman's *sensitivity to naturalness* as a component of sociolinguistic competence is firstly that naturalness is a fuzzy concept, particularly in the bilingual context and secondly, bilingual speakers may not be familiar with the entire repertoire of speech conventions and yet be competent language users.

Finally, Bachman's definition of strategic competence will be presented in relation to Canale and Swain's definition (1980; see above) and Canale's revision of the concept. According to Bachman, strategic competence includes three stages; assessment, planning and execution.

This definition of strategic competence neither corresponds to Canale and Swain's understanding nor Canale's revision. While Bachman interprets strategic competence as underlying mechanisms that are constantly activated and which enable communication, strategic competence in Canale and Swain's model only comes into play to avoid a possible communicative breakdown and is extended to include rhetorical functions in Canale's revised version. In contrast, Bachman's model covers these speech functions as part of illocutionary competence, which in turn is part of pragmatic competence.

One could argue that the three models complement each other in this aspect as neither Canale and Swain's nor Canale's model cover psychological processes involved in communication, while Bachman does not explicitly describe a compensatory mechanism that is activated in case of a lack in grammatical or socio-cultural competence.

Similar to Bachman (1990) and Bachman and Palmer (1996) van Ek (1986) also stresses the interconnectedness of the six sub-competences in

his model. The first four competences, namely linguistic, sociolinguistic, discourse and strategic competence that have already been discussed as part of Canale's framework, are also present in this model and van Ek adopts Canale's definition of linguistic, sociolinguistic and discourse competence. With regard to strategic competence, van Ek opts for its traditional definition as a compensatory mechanism as proposed by Canale and Swain (1983).

It is particularly noteworthy in this regard that according to van Ek communicative strategies are not restricted to non-native language use but equally apply to monolingual settings. By doing so, van Ek clearly discards Chomsky's notion of an ideal monolingual native speaker. Interestingly, he also raises the point that bilingual language users are likely to have a larger variety of communicative strategies to their disposal, resulting from their knowledge of two languages.

He further raises an important issue regarding communication strategies in a second language, implying that learners or speakers may be more reluctant to employ them in a foreign language and therefore rather opt for message abandonment, due to an ideal native speaker standard. By doing so van Ek touches upon a substantial aspect of communicative competence and language use in general, namely feelings, motivation to communicate and preconceptions about a language and its speakers.

This is such a core issue in van Ek's understanding of language use that he adds it as an integral part to his framework of communicative competence, calling it *social competence*. Van Ek is the first to include an emotional aspect in a definition of communicative competence, which once more stands in direct opposition to Chomsky's definition of competence. Celce-Murcia and colleagues (1995) follow van Ek but expand his concept to further include personal factors such as age and sex, topical or real-world knowledge.

For typically and atypically developing bilingualism the significance of including emotional aspects into a description of language abilities is twofold. Firstly, emotional attachment to a language may have a substantial influence on their learning and development. Secondly, the establishment of monolingualism as a norm may lead to a feeling of inferiority in bilingual

speakers, which could again affect their language development. Finally, for children with language impairment, the importance of emotional factors for language use and learning, suggests that these may have to be taken into account in both diagnosis and treatment.

The last competence included in van Ek's model is *socio-cultural competence*. The fact that he treats socio-cultural competence independently from sociolinguistic competence shows once more that his framework was developed with language learners in mind. According to van Ek, sociolinguistic competence is concerned with the overall understanding of a speech situation, or what could more traditionally be referred to as pragmatic abilities. Socio-cultural competence, on the other hand, is an understanding of culturally specific patterns and conventions of language use. For example, Slavic languages use fewer politeness markers than English (e.g.: Ogiermann, 2009) and bilingual speakers need to be aware of this difference in order to interpret it as such and not as unfriendliness or lack of respect. The same applies to culture-specific use of eye-contact or gestures.

Celce-Murcia and colleagues (1995) seem to agree with van Ek with regard to the importance of cultural understanding for successful communication as they also prefer the term socio-cultural competence to sociolinguistic competence. However, instead of adding socio-cultural understanding as a separate skill, Celce-Murcia and colleagues argue for a merge of the two.

In relation to atypically developing bilingual children, it has not yet been investigated whether these two competences are equally affected by language impairment. This question appears particularly relevant in the context of studies linking the language abilities of children with language impairment to their understanding of *Theory of Mind* (Farrar et al., 2009; Miller, 2001), a skill required to accurately interpret sociolinguistic and sociocultural constraints.

Despite certain overlapping features in their models, the interaction of sub-components in Celce-Murcia and colleagues' (1995) model differs from van Ek's (1986) and Bachman's (1990) propositions in that it represents a

stronger hierarchical relationship between the individual elements. It also differs from Bachman and Palmer (1996) in regard to the competence that is assigned a core role in their frameworks.

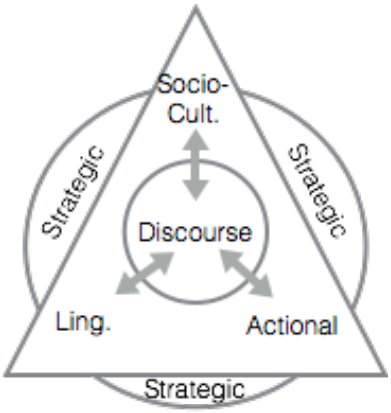


Figure 2 Celce-Murcia et al.'s (1995) Model of Communicative Competence

As becomes clear from figure 2, discourse competence is the core of Celce-Murcia and colleagues' model of communicative competence. Socio-cultural, linguistic and actional competence stand in interaction with discourse competence and strategic competence is a mechanism which is constantly activated and allows speakers to monitor the conversation as well as to compensate for deficiencies.

According to Celce-Murcia and colleagues' understanding of strategic competence, it encompasses avoidance, reduction, achievement, compensatory, stalling, time-gaining, self-monitoring and interactional strategies. This definition suggests that Celce-Murcia and colleagues' strategic competence is a combination of Canale and Swain's compensatory definition and Bachman's (1990) conversation monitoring mechanism.

In contrast to Celce-Murcia and colleagues' framework, Bachman and Palmer (1996) put strategic competence at the centre of their model, suggesting that those metacognitive strategies connect the separate competencies. The competences included in Bachmann and Palmer's (1996) publication largely correspond to Bachman's (1990) framework with some minor terminological changes and the expansion of their definition of strategic

competence.

In Celce-Murcia's (2008) revised model, the triangle from the model developed a decade earlier, has turned into a star (Fig. 3) but discourse competence still remains in the core of the model, while strategic competence is still the ever-present ability to interact meaningfully.

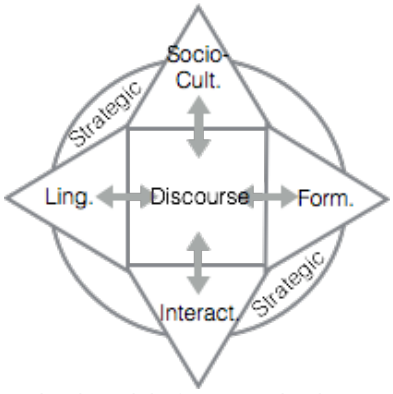


Figure 3 Celce-Murcia's revised model of communicative competence

The sociocultural competence keeps its top-down position from the previous model and the bottom-up counterpart, namely *interactional competence,* was added. This term has been given preference over the previous label *actional competence*, which is now a sub-category of interactional competence. Interactional competence includes the following three sub-categories: actional, which stands for the understanding and production of speech acts, conversational, which subsumes turn-taking abilities and non-verbal/paralinguistic competencies. Celce-Murcia raises the point that interactional rules can differ profoundly between languages and their successful employment goes beyond the mere use of grammatically correct utterances.

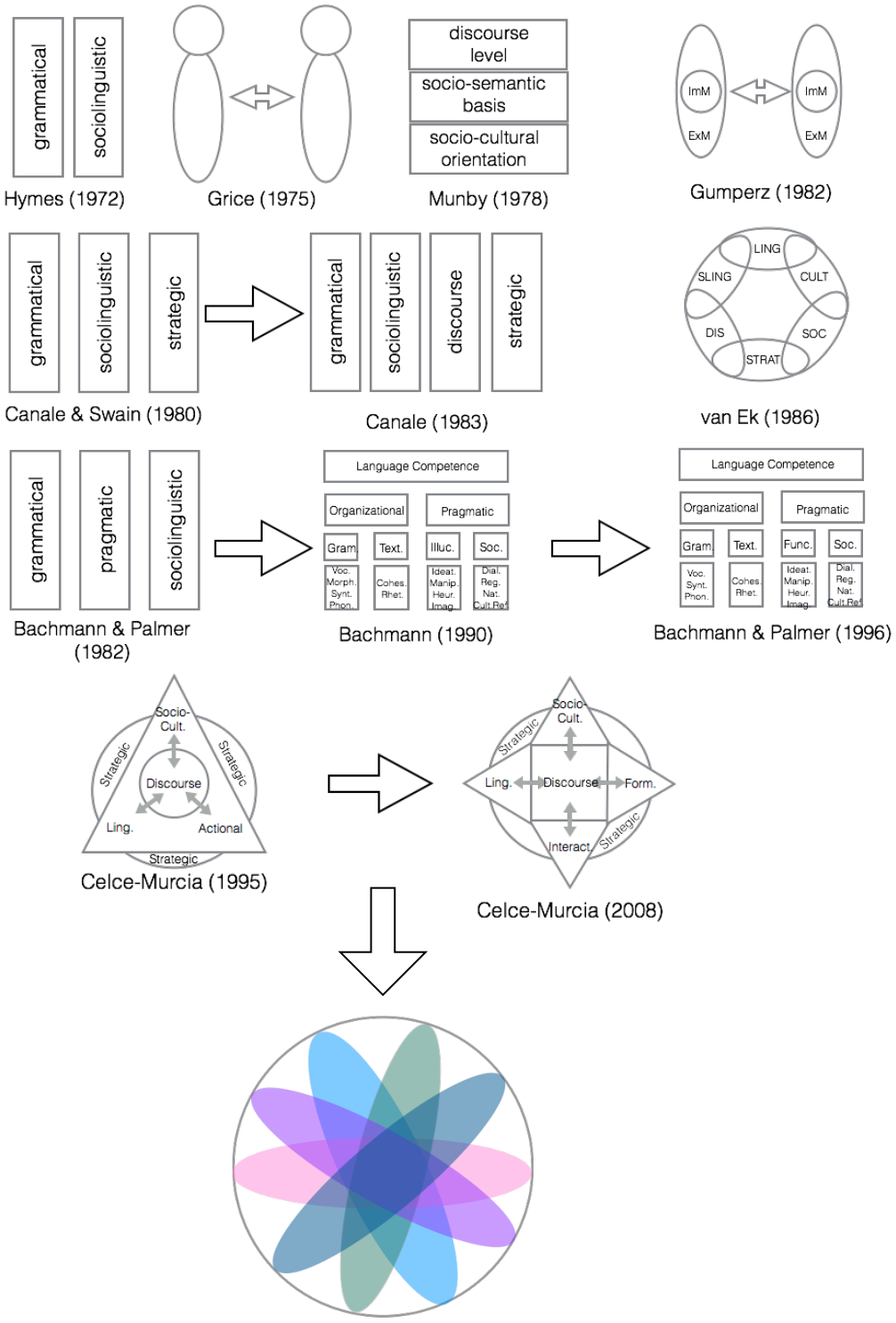
Another addition in this model is the formulaic language, which stands in opposition to linguistic competence. Celce-Murcia argues for an inclusion of this competence into a new model of communicative competence on the basis of recent research (Hunston 2002 qt. in Celce-Murcia 2008), which suggests that competent language speakers use formulaic, prefabricated chunks at least as often if not more frequently than they produce new and creative formulations. This is thus the first model, which explicitly includes formulaic language as a separate competence. While these chunks are undoubtedly a

crucial aspect of quotidian language use, it does not become very clear why they would merit to be regarded as a separate competence, when they could equally be subsumed under linguistic competence.

The strategic competence proposed in this revised model, includes both language learning strategies and communication strategies to avoid a breakdown in communication. While the overall dichotomy between learning and communication strategies seems appropriate, it is unclear why social communication strategies, which are defined by Celce-Murcia as actively seeking situations to use the target language, are included in the communication strategies rather than the learning strategies. Particularly as their purpose is not to avoid a breakdown in communication or to influence one's interlocutor but rather to improve one's language knowledge.

This overview of communicative competence models illustrates that conversation is a highly complex endeavour, during which speakers do not only interact with each other but also with the speech situation and that they are subject to wider socio-cultural constraints. The large number of different models attempting to capture the essential aspects of successful communication further shows the necessity to develop a model that is complex enough to capture the multiple layers of communication, on the one hand, and simple enough to be useful for educational and clinical purposes, on the other. So far, a clear historical tendency from models portraying the underlying skills for successful communication as separate entities to more recent models, where these sub-competencies are portrayed as (partly) interacting, can be observed (see Fig. 4).

However, even in these later models authors attempted to structure communicative competence hierarchically by putting either strategic (Bachman, 1990; Bachman & Palmer, 1996) or discourse competence (Celce-Murcia et al., 1995; Celce-Murcia, 2008) at the core of each model. I would argue, however, that communication is not so much a hierarchical process as a dynamic interaction between the various sub-competences, the speakers and the wider context. This is why the next section presents a new, dynamic model of communicative competence.



Dynamic Model of Communicative Ability

Figure 4 Graphic Overview of Communicative Competence Models

3.3 Summary

This section started with a terminological discussion of the terms competence, capacity and ability. It was shown that competence traditionally stands in opposition to performance and describes the knowledge of an abstract system, which finds its application in performance. Chomsky argued that linguists should focus on competence, rather than performance in their studies. In addition, Chomsky's definition focused purely on grammatical competence, a notion that was heavily criticised by Hymes and following publications. Over the years, additional competences were added to complement grammatical competence. These subsumed sociolinguistic, discourse, (socio)cultural, strategic and interactional abilities, capacities or competences, or any derivation thereof.

In addition to being extended to feature an increasing number of components, models of communicative competence/capacity/capability/ability also became increasingly more interactive. This is to say that researchers started to address the question of relationships between the components and suggested various levels and forms of interaction.

However, the proposed models still suggested various hierarchical relationships between the separate components, usually placing one element at the core. The following section will describe a model that attempts to break with this idea by assigning equal status to all six abilities. The *Dynamic Model of Communicative Ability* is rooted in *Dynamic Systems Theory* and therefore rejects any notion of hierarchy in language and communication. This model will form the core of this thesis around which all remaining chapters are organised.

4 Dynamic Model of Communicative Ability

The overview of communicative competence models showed a clear tendency toward the development of more interactive models but it also showed disagreement as to which competence should be placed at the core of a framework. In this section, a new and entirely interactive model of communicative competence will be presented. By proposing an interactive model of language use and processing, an interactionist approach is adopted, rejecting a modular approach to language processing and use. This decision was based on the myriad of findings relating bilingualism and language impairment to increased and decreased nonverbal cognitive functions respectovely (cf. sections 5 & 6 for details), which suggest that indeed language and cognition are closely related.

In the first section, the terms communicative competence, capacity and ability will be re-visited in relation to this new model and it will be explained why Communicative (Language) Ability was deemed to be the most appropriate term in this context. In the following part, the concept of *dynamic* language ability will be described further in relation to dynamic systems theory. Lastly, the six components underlying communicative language ability will be described and illustrated in more detail.

4.1 Why Ability?

The term *Communicative Ability* was adopted to refer to the concept presented in this thesis. This is a derivation of Bachman's (1990) *Communicative Language Ability* (CLA) which was chosen as a starting point because it describes both, the underlying knowledge of a language as well as the capacity to apply it in a given speech situation. However, the use of 'language' in Bachman's term implies a strong, if not exclusive, focus on the linguistic abilities involved in a communicative act. This is to say that Bachman's definition of CLA neither encompasses cultural nor nonverbal features which are however crucial for communication.

Bachman's newer term was also chosen as the basis of this model instead of the more traditional denomination "competence" because it carries less historical baggage and is therefore less controversial. As was already outlined in section 3. 1., controversy remains as to whether competence should be defined in Chomsky's terms and therefore as the knowledge of an abstract system, or rather in Hymes' terms and hence as the ability to apply this knowledge in context. As a result, two oppositional schools have emerged in the field of communicative competence/ability/capability/capacity which either prefer Chomsky's (e.g.: Canale and Swain, Llurda, Spitzberg and Cupbach) or Hymes' definition of competence (e.g.: Munby, Celce-Murcia, Bachman).

In order to avoid controversy around the concept presented here, a derivation of Bachman's term is given preference as it is perceived to be less misleading. Another alternative would have been to adopt Widdowson's (1983) capacity or capability (e.g.: 2003) terms, which he defines as the ability to exploit semantic resources of a language that have only partially been codified as competence (see section 3.1. for details). The problem with Widdowson's definition of capacity/capability in the context of this model is its strong focus on application and therefore its opposition to competence, which he appears to define in Chomsky's sense. As the *Dynamic Model of Communicative Ability* seeks to combine procedural and declarative knowledge, Widdowson's capacity/capability terms appear to be less suitable than Bachman's ability.

In relation to Spitzberg and Cupbach's (1984) question as to whether communicative ability, or competence, should be defined as a trait or a state, I argue, contrary to their own line of argumentation, that the latter should be the case. As was outlined in section 3. 1., Spitzberg and Cupbach argue that competence should be defined as a state and therefore a constant abstract understanding of language and its functions which can be applied equally proficiently in various contexts.

The problem with such a definition in the context of typically and atypically developing bilingual speech is its domain-specificity. As was emphasised on numerous occasions throughout this thesis, the language skills in bilingual

speakers are not equally developed across all possible speech situations. As a result, language problems in atypically developing bilingual children may not be equally prominent across domains. However, as was previously argued, domain-specific language use is by no means restricted to bilingual language users, which makes the concept of communicative competence as a state even less probable.

Therefore, the *Dynamic Model of Communicative Ability* (DMCA) can only describe a state wthat is flexible and varies across contexts and domains. In other words, this model stresses the variability of language skills depending on the requirements of a particular speech situation. As a result I would argue that communicative ability is by no means static but a dynamic concept that interacts with interlocutors as well as the speech situation and constantly evolves due to further exposure. This dynamic component of DMCA will be explained in more detail in the following section.

4.2 The Dynamic Aspect

In order to understand the dynamic aspect of DCA, it is necessary to briefly describe the principles of *Dynamic Systems Theory* and how they relate to language, which is the aim of this section. *Dynamic Systems Theory* is concerned with the mathematical description and analysis of complex systems and evolves around the following principles, which were listed by Larsen-Freeman (2012) in a plenary speech:

1. Complex systems are open and dynamic.
2. They operate under conditions that are not in equilibrium.
3. Complex systems are systems because they comprise many elements or agents, which interact.
4. Change/dynamism is central. The systems adapt both through interaction with the environment and through internal reorganization/self-organization.
5. The strength of the interactions changes over time. Therefore, multiple routes are often possible between components, mediated in different ways.
6. The complexity of complex systems is emergent. It is not built into any one element or agent, but rather arises from their interaction.
7. Because the systems are open, what arises may be in nonlinear relation to its cause. In other words, an unexpected occurrence may take place at any time.
8. The structure of a complex system is maintained even though its components may change.

9. The environment in which they operate is part of a complex system.

10. Complex systems display behavior over a range of timescales and at different levels of complexity – the latter are nested, one within another.
11. Complex systems sometimes display chaotic variation.
12. Complex systems iterate – they revisit the same territory again and again, which means that the present level of development is critically dependent on what preceded it.

(Larsen-Freeman, 2012: 205-206)

In this panel discussion, Larsen-Freeman addressed principles number four, six and nine in more detail, while the rest had already been covered by her and other colleagues in previous publications. In parallel to one of the major aspects of dynamic systems theory, the principles presented here are all interwoven. However, for easier readability, an attempt was made to address the principles of dynamic systems theory and how they relate to language in ascending order, merging some principles together where such an approach was deemed appropriate.

Let us start with principle #1, which was discussed by Larsen-Freeman (1997) in an earlier publication and which refers to dynamic systems as open and dynamic. In this first publication combining dynamic/complex systems theory and language (acquisition), Larsen-Freeman explained the difference between closed systems, which are left to themselves, developing toward an equilibrium and open systems, which are open for environmental input and therefore change as a result of this influence. This difference between open and closed systems relates to the discussion whether language should and can be seen as independent of environmental influences, which was presented in the previous sections. If language was to be considered a closed system, its development would be predictable and independent of environmental influences. This corresponds to a nativist view of language, where language development and acquisition happens as a result of maturational processes rather than as a response to environmental influences. Note, however, that a dynamic system is not merely the result of external stimuli, which would correspond to a behaviourist model of language acquisition. Rather, language acquisition is the result of complex interactions of a system, its environment and its components.

The second principle corresponds to principle one in that it is a further explanation of the opposition of open and closed systems. While closed systems develop toward an equilibrium, in which all of its components are in equilibria, open systems do not, which is also explained by Larsen-Freeman (1997). This principle can be related to a multilingual speaker's differing knoweldge of his/her two languages, which neither grows nor declines in parallel. This principle is emphasised by Grosjean (1985). Rather, Herdina and Jessner (2002) argue, multilingual speakers keep an overall level of communicative ability, according to the requirements of their communities, which can result in the acquisition, attrition or fossilisation of one language but never in the complete loss of communicative ability. Given the speaker does not suffer from a medical or psychological condition resulting in the overall loss of their ability to communicate (e.g.: stroke, brain injury, etc.).

Principles number three and ten refer to the assumption that complex systems consist of numerous smaller components, which interact with each other and the system's environment, creating a new and ever-changing entity. Concerning the complexity of dynamic systems, Luenberger (1979) writes that the term 'system' refers to the necessity of analysing particular phenomena in their context in order to achieve a meaningful investigation. In other words, dynamic systems are complex because they are made up of smaller parts. Larsen-Freeman (1997) explains how the interaction of smaller units within a larger, complex system can be explained in the context of language learners' interlanguages.

According to Larsen-Freeman, a multitude of individual factors play a key role in the development of an interlanguage in language learners, which she takes as an example of a dynamic system. Larsen-Freeman mentions speakers' native language(s) or the mode and amount of input as some of countless crucial external factors in second language acquisition. In addition, individual factors, such as motivation, aptitude, attitudes toward a target language and cognitive abilities also play a key role. It is needless to say that none of these factors occur in isolation but stand in constant interaction with each other, creating new, unique patterns of language use, which are

constantly changing in an unpredictable and non-linear fashion.

Larsen-Freeman uses the example of overgeneralised regular past tense forms by English language learners to illustrate that even previously acquired grammatical forms can be temporarily replaced by new competitors, creating a transitional state of chaos. By doing so, she raises a crucial point about language in general and learner language in particular, namely that it is in a constant state of change, adapting to internal factors but also to changes in its environment, which leads us to principle number four.

As it became clear from the previous sections, language does not exist in a vacuum but in a social context, which needs to be taken into account when learning and analysing language. It was previously explained why communicative ability should be considered a state, changing according to the requirements of a particular conversational context, rather than a constant trait. This significance of the communicative environment for the use and acquisition of language is reflected in principles number four and nine of Larsen-Freeman's (2012) list. These principles relate to emergentist theories of language acquisition, such as Bates and McWhinney's (1989) competition model, which describes language learning as an interaction between basic cognitive mechanisms and rich linguistic input. The social context is further regarded as an essential aspect of language acquisition in usage-based (e.g.: Tomasello, 2008) and constructivist theories of language acquisition (Vygotsky, 1962). According to Tomasello's usage-based theory, children acquire language through intention-reading (functional dimension) and pattern-finding (grammatical dimension), which they apply to the input they receive. The role of environmental input in language development has also been highlighted in numerous empirical studies investigating precisely this relationship (e. g.: De Houwer, 2007; Dressler, Wolfgang, Korecky-Kröll, Czinglar, & Uzunkaya-Sharma, 2015; Hoff & Core, 2013; Houwer, 2011; Korecky-Kröll, 2015; La Morgia, 2015)

It was demonstrated that language exists in context and therefore, speakers need to act and react within the constraints of a communicative situation and according to their communicative needs. Based on Grosjean

(1985), Herdina and Jessner (2002) argue that such an adaption to communicative needs leads to individual language change, which can result in language attrition, language acquisition or fossilisation. In other words, a multilingual speaker's languages develop according to the social context and the communicative requirements therein. Herdina and Jessner therefore argue that multilingual and monolingual speakers have a "transient command of different language systems" (p. 74).

De Bot and colleagues (2013) also emphasise the constant state of change in dynamic systems, which only stop developing if no additional energy is added. If this aspect is applied to language, it can be concluded that languages only stop changing and evolving once speakers cease to communicate and therefore, to receive input. This hypothesis goes hand in hand with Herdina and Jessner's (2002) theory that languages within a multilingual speaker are constantly subject to change, depending on external influences, such as speakers' communicative needs, the general state of the language (i.e.: is it decaying as a whole) or the degree of variation of a language spoken in a speaker's context. Bearing in mind that language histories and interactions with other speakers are highly personal and heterogeneous, it appears only logical to conclude that language use patterns resulting from the interaction of two or more languages within the same speaker as well the languages of various interlocutors, have to result in individual patterns.

This corresponds to Larsen-Freeman's view of language, even monolingual native language, as constantly changing and stands in opposition to Chomsky's view of language competence as an invariable state.

Principles number five and twelve are explained in more detail by De Bot and colleagues (2007) who emphasise the importance of initial states in dynamic systems, which is often referred to as a butterfly effect (p. 8). This possibly substantial impact of minor influences during the initial stages of a system relates to the non-linear development of such systems, which was already discussed above. Similarly, large disturbance may pass seemingly without impacting the system. It could be argued that such a difference in

impact may be due to varying stability of dynamic systems. As was already discussed in relation to Herdina and Jessner's theory about language loss and maintenance, the stability of multilingual systems depends on whether the society a speaker lives in is multilingual, a speaker's attitude toward a language and her/his communicative need.

If the thought of initial states and their impact on further development is spun further, it could also be hypothesised that language impairment may start out as a small difference and further develop into a communication deficit. This hypothesis would be supported by Stromswold's (2006) study of pre- and perinatal factors influencing the development of language impairment. In this article Stromswold hypothesised that a longer stay in the NICU may lead the brains of premature babies to block inappropriately loud external inputs and subsequently take longer to start processing the full range of human language (cf. section 6). Arguably, premature birth cannot be considered a minor factor in a child's development but it serves to illustrate the crucial point made by De Bot about dynamic systems and the non-linear impact of events on such systems, particularly as premature birth or low birth weight do not lead to language problems in all children.

This unpredictability of the influence initial and subsequently occurring events can have on language acquisition and development are summarised in principle number seven. Larsen-Freeman (1997) argues that some changes may occur as a result of technological innovations or anti-discrimination laws but others may simply result from native speakers' insecurity about certain grammatical features, such as the use of subject and object pronouns in English, which are increasingly replaced by reflexive pronouns. In any case, the occurrence of linguistic changes cannot be predicted but are a result of complex interactions between a language, its speakers and the environment it occurs in. Therefore, the changes are emerging from complex interactions of a system's components in a bottom-up process – the sixth principle of Larsen-Freeman's list, which relates directly to usage-based theories and construction grammar. It needs to be noted, however, that language acquisition also includes top-down processes, such as the processing of

sentences and words through context or co-text or the understanding of words through their parts.

Larsen-Freeman even goes as far as to argue that every time language is used, it changes and therefore constantly re-organises itself in an organic, non-linear, bottom-up way. Based on such a vision of language, Larsen-Freeman argues for a definition of language as a connectionist, rather than a computational model, as in the latter the account of individual variability or exceptions from a rule is more difficult. Regarding exceptions from rules, it is important to differentiate between general exceptions (e.g.: *went* instead of *goed,* which is produced by children) and individual variation.

However, the change of dynamic systems is not arbitrary but governed by 'strange' (Larsen-Freeman, 1997: 146) attractors, creating fractal shapes. A fractal shape refers to the re-organisation and adaptation of a dynamic system within the limits of its attractors and therefore the eighth principle of the list presented above. This allows to predict patterns globally but not locally and to create a shape that allows them to be recognised as part of a larger family or group despite their individual differences. Larsen-Freeman (1997) uses the example of trees to illustrate this last point. Despite their various sizes and shapes, their different number, colour and form of leaves, which are all a result of their adaptation to their environment, trees all belong to the same family of plants.

Larsen-Freeman (1997) illustrates that the fractal aspect of dynamic systems also applies to language as it consists of paradigmatic and syntagmatic units, which are synchronically and diachronically dynamic. In other words, language use is a process as it involves the exchange of utterances at a given point in time and secondly, language grows and changes over time. According to Larsen-Freeman, dynamic systems theory, contrary to static grammars, has the potential to explain the complexity of learners' interlanguages, which are constantly changing and evolving toward a target, which itself is in a state of constant evolution.

Herdina and Jessner (2002) further emphasise a crucial aspect of language, namely its individual variability, which, contrary to behaviourist

theories and in line with Larsen-Freeman's argumentation, results in unique patterns despite similar language learning histories. This is due to the interaction of sub-systems with each other and external factors, which result in individual patterns of language knowledge and use.

This acceptance of individual variation in Herdina and Jessner's (2002) *Dynamic Model of Multilingualism*, directly results from their application of dynamic systems theory in which discontinuity, inhomogeneity and turbulences are regarded as inherent, rather than unwanted noise, which is formulated in principle number nine of Larsen-Freeman's list. They illustrate that in a dynamic system, a result is more than the sum of its individual parts, which stands in direct opposition to reductionist approaches where the whole can directly be assembled from its parts. To illustrate this approach further, Herdina and Jessner refer to Smith and Thelen's (1993 qt. in Herdina & Jessner, 2002) example of thermodynamics, which illustrates the non-linear and complex relationship between external factors, in this case heat, and internal parts, in this case molecules. This is to say that the same change in external factors does not necessarily lead to the same result at all points in time but depends on the interaction between external and internal factors (compare to the example of prenatal birth and low birth weight and its effect on language development given above).

In addition, neither the external, nor the internal factor look like the emerging product, therefore the result is not merely the sum of its parts. Similar to Smith and Thelen, Shanker and King (2002) also reach beyond the study of language to illustrate the nature of dynamic systems by using a dance methaphor. According to them, the initially simple movement of steps acts in a dyad to form complex patterns and ultimately these complex patterns act in accordance with other dancers in a larger group to create a whole.

This clearly indicates that dynamic systems cannot solely be studied by analysing their sub-parts in isolation as this would be similar to studying each dancing partner and his/her moves in isolation, rather than in relation to his/her partner's move and the dancing ensemble as a whole. Therefore,

holistic approaches, which take the entirety of the system into account, are required to study language development and use appropriately. When this conclusion is applied to language and its development, it becomes clear that language measurements studying specific linguistic features in isolation and at a single point in time are unsuitable to illustrate the complexity of language acquisition. This is due to the interdependence of sub-components, which do not only act in relation to external influences but also in reaction to and anticipation of other components' development. This applies to all sub-components of a single language system as well as the interaction between two or more systems, where the development of one may result in a decline of the other.

Based on this hypothesis, Herdina and Jessner (2002) suggest that in a dynamic multilingual system, ultimate, and by ultimate they mean ideal native speaker, attainment is not realistic and that balanced bilingualism can only ever be a transitional state. It is crucial at this point to mention Herdina and Jessner's differentiation between multilingual speakers in multilingual and monolingual societies. According to them, the multilingual system of multilingual speakers in a multilingual society will be more stable than that of multilingual speakers in a monolingual society. They argue that such a difference can be explained within the concept of theoretical monolingualism, which implies that monolingualism is the natural state of speakers in a monolingual society because it minimises a speakers' language maintenance effort. This emphasises once more the significance of external factors for the non-linear development and maintenance of a multilingual language system.

Communicative Ability is hence to be considered a dynamic system as it changes in relation to speakers' internal factors, such as fatigue, stress or working memory capacity but also in response to external factors such as language domains, the formality of a situation or the interlocutor.

Furthermore, language in general, and a multilingual language system in particular is in a constant state of change, adapting to communicative needs and the requirements of a communicative situation. In addition, it has been shown that language and communication is inherently synchronically and

diachronically dynamic, evolving as a result of an interaction between two conversation partners, the sub-systems within each speaker and his/her communicative needs over time. As a result, a dynamic view of language and communication was adopted as a basis for this new model, in order to emphasise the dynamics of communicative competence/ability as a result of communicative needs and the interaction of all components with each other and the communicative situation. In order to better understand this new model of communicative ability, the following section is devoted to the description of all components in more detail.

4.3 The components

The *Dynamic Model of Multilingual Communicative Ability* consists of six components that dynamically interact with each other as well as the speech situation and they evolve with exposure to new conversational contexts. There is no hierarchy in this model and each component is to be considered equally important for a successful communicative outcome. Therefore, the organisation into separate components should merely serve illustrative purposes and must not be understood as a modular approach to language processing. The underlying assumption of this model is that all skills described in this section are constantly interacting with each other and the environment, influencing the communicative act. Due to this constant dynamic interaction between all components and the environment, the assignment of sub-skills to certain abilities, should be read as an attempt to group certain skills together in order to describe the system as a whole, rather than a classification which is set in stone. This is to say that this new dynamic model of multilingual communicative ability is an attempt to describe the necessary knowledge and skills involved in language but these abilities should not be regarded as separate entities but rather as interacting components of a dynamic system.

One crucial aspect to be emphasised at this point is that factors such as (working) memory, emotional state or fatigue are regarded as intertwined with

the communicative act and are therefore expected to have an impact on each of these abilities separately and therefore on a person's communicative ability as a whole. Hence, DMCA is not concerned with an ideal native speaker but with speakers' actual ability to apply their knowledge in context. In other words, not just a speaker's declarative but also their procedural knowledge.

This is not to say, however, that DMCA is arbitrary or accidental. According to DMCA, speakers have an abstract knowledge of one or more languages, which they can access during conversation. It needs to be noted, however, that this communicative code is neither perfect nor does it have to be complete or even accessible in its entirety during a conversation. It may not, or is rather likely not to, cover every possible conversational setting and the sociolinguistic rules they encompass, which makes its flexibility such a crucial feature. This is why it is of utmost importance to combine formal language tests covering all six aspects of communicative competence with assessments of real interaction to describe communicative ability.

To sum up this general overview, the *Dynamic Model of Communicative Ability* is the interaction of abstract knowledge and a speech situation and therefore dynamic and dependent on a speaker's internal capacities and state, such as (working) memory or fatigue as well as external circumstances, such as the demands of a communicative situation. Therefore, any speaker's communicative ability is highly variable across languages and domains.

4.3.1 Linguistic Ability

The first component of the DMCA is Linguistic Ability. Following Celce-Murcia et al. (1995) and Celce-Murcia (2008) the term *linguistic* has been given preference over *grammatical* (Canale, 1983; Canale & Swain, 1980; Hymes, 1972), in order to indicate that is also encompasses lexis. It should not be confounded with Chomsky's (1965) linguistic competence/performance.

The linguistic aspect of DMCA hence covers phonology, morphology, lexis and syntax, which is in line with Celce-Murcia et al.'s (1995) and Celce-

Murcia's (2008) definition. In Munby's (1978) definition grammar is intertwined with discourse and hence covered in the discourse level of his framework but in the model presented here, preference is given to a separation of the two aspects. This is in line with Canale and Swain's (1980) and Canale's (1983) as well as van Ek's (1986) and Celce-Murcia's (1995; 2008) model. Bachman's (1990) and Bachman and Palmer's (1996) models are a compromise between models which regard discourse and linguistic abilities as separate competences and those who group them together as they arrange them under the umbrella term of organisational competence but split them up within the ovararching concept (see Fig. 1 and section 3. 2. 2. for more detail).

As all abilities in DMCA are intertwined, their separation serves mainly illustrative purposes and therefore a definition of linguistic, which combines phonology, lexis, morphology and syntax and discourse, which encompasses language beyond the sentence level, is given preference in this model. Furthermore, the studies on atypical (bilingual) language development presented in sections two and three of this thesis, indicate differences between children's discourse abilities as they manifest themselves for example in narratives, and their morphosyntactic abilities. Concluding from this difference, linguistic ability in DMCA is only concerned with phonology, morphology, syntax and lexis but it is intertwined with the remaining components which are presented below.

4.3.2 Discourse Ability

As the previous section suggested, some controversy remains in the field of communicative competence/capacity/capability/ability regarding the separation of linguistic/grammatical and discourse abilities. In DMCA, discourse ability is separated from grammatical ability firstly, because studies on language impairment indiciate that these two language features might not be equally affected by the impairment (cf. section 6.3. for a review of discourse competence in children with language impairment).

Secondly, this follows the traditional linguistic separation. However, as the

emphasis of DMCA lies on the interactivity of all abilities with each other and the speech situation, the question as to whether they should or should not be separated is only of tangential importance to this model.

In any case, discourse ability in DMCA covers the level of cohesion and coherence and therefore the question whether a speaker's utterances are organised as a connected whole. This directly relates to Munby's (1978) discourse level of communicative competence as well as Canale (1983), Canale and Swain's (1980) and van Ek's (1986) definition of discourse. Bachman (1990) as well as Bachman and Palmer (1996) refer to this component of organisational ability as textual ability. In their model, this ability also covers the rhetorical aspect of conversation, which will be discussed separately in the following section. Discourse Ability in DMCA also differs from Celce-Murcia's discourse competence, which is the core of his model and therefore automatically a much broader concept that encompasses socio-cultural, linguistic, actional and interactional competence.

Therefore, neither Bachman and Palmer's nor Celce-Murcia's definition of discourse competence are suitable for DMCA and preference will be given to a defition of discourse ability as cohesion and coherence of a speaker's own utterances. This corresponds to two of the seven textuality criteria described by de Beaugrande and Dressler (1981), who further add intentionality, acceptability, informativity, situationality and intertextuality to their framework. These remaining criteria will be referred to in more detail in the description of the remaining components of the Dynamic Model of Communicative Ability.

4.3.3 Interactional Ability

Interactional competence was added by Celce-Murcia (2008) to the newest version of his communicative competence model and covers the understanding and production of speech acts, turn-taking abilities and nonverbal competencies. All three of these aspects are also included in the interactional ability of DMCA but additionally, de Beaugrande and Dressler's (1981) intentionality is added. *Intentionality* describes speakers' attitude in

that they want to contribute in a meaningful way by creating a cohesive and coherent text.

Furthermore, Grice's maxims of quanitity, quality and manner are added. This is to say that a person's ability to adapt their utterances to their interlocutor, to formulate them in a manner that is elaborate but concise enough are also covered by the concept of interactional ability in DMCA.

They also relate to de Beaugrande and Dressler's (1981) *informativity*. Informativity describes the extent to which a contribution is new/expected. Grice's maxims also relate to de Beaugrande and Dressler's (1981) *efficiency*, that is the formulation of a text or utterance so that it can be understood by one's interlocutor with the least possible effort.

It appears essential to add de Beaugrande and Dressler's (1981) intentionality and efficiency as well as Grice's maxims to DMCA in general and interactional ability in particular, as recent studies of children with language impairment have indicated a possible impairment of their social communication skills (cf. section 6. 5 for details) and therefore, their ability to adapt their discourse to their interlocutor might differ from typically developing children.

4.3.4 Sociocultural Ability

As DMCA developed out of Hymes' concept of communicative competence and the models developed on the basis of this first proposition, the social aspect is essential. According to DMCA, language does not exist in a vacuum but needs to be adapted ad hoc to the conversational situation and the interlocutor in this context.

Hymes refers to this skill as sociolinguistic abilities and emphasises repeatedly that the ability to produce utterances which are appropriate to a conversational context is as important as the understanding of abstract grammatical rules (see section 3 for more detail). This relates to de Beaugrande and Dressler's (1981) *acceptability*, which describes expectations recipients have based on the social or cultural context. The

importance of sociolinguistics for succesful communication was a crucial aspect of Hymes' critique of Chomsky's generative grammar and it is therefore only logical that it formed an essential part of all subsequent theories of communicative competence. This is also the case for DMCA.

However, as DMCA was developed in relation to bilingual speakers and their competence, the cultural aspect of communication and the importance to understand that conversational rules may differ from one language to the other, is added here. Therefore, it is also referred to as sociocultural competence, as Munby suggested in his model, which also subsumes sociolinguistic and cultural rules. Celce-Murcia chose the same terminology and also combines sociolinguistic and cultural rules.

Bachman and Palmer, however, prefer the umbrella term pragmatics, which is split into functional and social rules. Functional competence refers to Halliday's language functions and an understanding of how they are used in conversation and social competence includes sensitivity to dialect, regional dialect, native speaker and cultural references. As language functions are already covered as part of interactional ability in DMCA, they are redundant in this context.

As to the sensitivities Bachman and Palmer propose, the "sensitivity to native speaker" is particularly problematic as it suggests a homogenous monolingual native speaker standard. It has already been argued in the section on language definitions preceding this section that the idealised native speaker is a theoretical construct, which is unsuitable in applied linguistics and particularly in the field of bilingualism, which is by definition a highly heterogenous phenomenon.

Furthermore, bilingual speakers of minority languages may not necessarily be aware of the dialect or sociolect spoken by their family and the connotations they might have in the country the language originated from. Sensitivity to dialect and sociolects requires an exposure to the whole spectrum of social and regional varieties, which may not be available to bilingual speakers whose language use may be restricted to the home domain. Despite this unawareness, a bilingual speaker can be a highly

competent language user and therefore sensitivity to regional and social dialects is not covered in DMCA.

Similarly, sensitivity to native speaker standard is not included as it implies an orientation toward an idealised monolingual standard, which is counterproductive for the description of bilingual speech. These differences between monolingual and bilingual speakers are further relevant in the context of de Beaugrande and Dressler's (1981) intertextuality. Intertextuality is concerned with the fact that intertextual references can only be meaningful and relevant if interlocutors are aware of preceding references. One can assume that these might depend on cultural settings and therefore bilingual speakers need to be particularly aware how much information they can assume from their interlocutors.

To sum up, sociocultural ability in DMCA refers to pragmatic abilities and hence the awareness of politeness rules, forms of address as well as the use of colloquial language and swear words. For the bilingual setting it encompasees accurate language use in a monolingual setting, i.e.: not using one's minority language in a majority language setting as this is likely to lead to miscommunication. I would argue that this relates to de Beaugrande and Dressler's (1981) *situationality*, according to which the meaning and use of a text is governed by the situation they occur in.

In other words, sociocultural ability in DMCA refers to an awareness of what is socially acceptable in different conversational settings and the ability to act accordingly. In addition, it covers the knowledge that these rules, conventions and cultural references may differ from one language to another and therefore the ability to adapt one's discourse accordingly. These conventions concern verbal as well as nonverbal rules, such as for example the perception of personal space.

4.3.5 Strategic Ability

The ideal native speaker with perfect language knowledge is a myth and as van Ek (1986) pointed out, monolinguals and bilinguals both occasionally struggle for words. Therefore, the ability to circumvent (procedural) a lack of vocabulary or insufficient knowledge of a grammatical structure (declarative) is key to succesful communication. Hence strategic ability forms one of the six components of the *Dynamic Model of Communicative Ability*. Its definition is largely based on Canale and Swain's (1980) traditional description as a compensatory mechanism, which was also adopted by van Ek (1986).

The rhetorical effects and therefore the ability to influence one's interloctur, which were added in Canale's (1983) model, do not form part of strategic competence as it is defined here. Rather, the ability to influence one's interlocutor is comprised in the interactional ability because it requires the accurate use of speech acts, in order to elicit an accurate reaction from one's interloctur.

Celce-Murcia et al. (1995; 2008) also define strategic competence as a repertoire of strategies, which can be employed to avoid a breakdown in communication. However, based on Bachman (1990) and Bachman (1996), who define strategic competence as underlying mechanisms that are constantly activated to enable communication, Celce-Murcia and colleagues add self-monitoring and interactional strategies to their definition. These skills are undoubtedly essential for succesful communication, which is why they are subsumed in two separate abilities in the *Dynamic Model of Communicative Ability*, rather than as a component of strategic abilities.

The reason for this separation is that strategic ability is a skillset that comes into play at all levels of communicative ability. Strategies can encompass circumlocation on the lexical or grammatical level, reformulation of traditional macrostructural elements on the discourse level, avoidance of direct personal pronouns in order not to offend one's interloctur because of a lack of sociocultural ability, or the use of gesture to achieve one's communicative goal on the interactional level. Therefore, the *Dynamic Model of Communicative Ability* aims to separate strategic ability from any other

component, such as monitoring or interactional ability in order to illustrate that it is a mechanism that spans all levels of communication. Despite this separation for theoretical purposes and ease of discussion, it should not be forgotten that the crucial aspect of this new model of communicative ability is the constant interaction between all components.

Due to the dynamic nature of the model proposed here, it is avoided to propose a taxonomy of communication strategies because one essential aspect of dynamc systems is consistent development and change, leading to new and previously unknown features. Based on this, strategic ability should be defined not so much as a fixed skillset that can be accessed and applied but rather as the process of using one's communicative repertoire to avoid a breakdown in communication or offense of one's interloctur as and when these problems arise. In other words, strategic ability as defined in the DMCA, is a creative process that combines all levels of communicative ability in order to make communication happen.

4.3.6 Monitoring Ability

The final aspect of DMCA is called monitoring ability and is concerned with cognitive processes such as working memory or control functions that enable successful communication. This corresponds to Bachman's (1990) strategic competence, which he describes as "the mental capacity for implementing the components of language competence in contextualized communicative language use" (p. 84). It therefore links abstract language knowledge to the requirements of a communicative situation. However, as Bachman's term is misleading in the context of communicative competence because it traditionally refers to the ability to circumvent a possible breakdown in communication or the use of rhetorical functions, the term monitoring ability appears to be more appropriate in the context of this model. The term *monitoring* was borrowed from Levelt's (1983) concept of self-monitoring, one of the four components of his model of speech production.

As the name might already suggest, the role of the monitoring function is

to monitor the communication process, in order to adapt the remaining five abilities accordingly. In other words, the monitoring function represents the link between the communicative situation and a person's linguistic, discourse, interactional, sociocultural and strategic abilities. It is hence responsible for the choice of language in a given conversational context, the decision whether code-switching is an appropriate language choice, what social or cultural constraints apply, how to circumvent a possible breakdown in communication, how to organise one's discourse coherently and how to respond to one's interlocutor.

These choices happen on-line and ad hoc during the communicative act, which also explains why it is argued that communicative ability is a trait rather than a state, which changes according to the demands of a communicative situation (see section 4. 1. for more detail). In other words, monitoring ability coordinates linguistic, discourse, interaction and sociocultural patterns as well as strategic ability in response to the communicative situation. It therefore represents the fluid aspect of communication (Cattell, 1963) in an integrated model of communicative ability, where crystallised and fluid abilities interact to create meaningful interaction.

In the light of a myriad of research on bilingualism showing a clear connection between bilingual exposure and cognitive changes (e.g.: Barac, Bialystok, Castro, & Sanchez, 2014; Bialystok, Craik, & Luk, 2012; Bialystok, 2007; Morales, Calvo, & Bialystok, 2013; section 5. 7.) as well as the debate whether (Specific) Language Impairment is a language specific phenomenon or affects other cognitive processes (e.g.: Archibald & Gathercole, 2006; section 6. 1. for more detail) it seems crucial to include cognitive processes into this new model of communicative ability.

The underlying hypothesis is that in case Language Impairment is domain-specific, only certain aspects of DMCA would be affected such as shown in studies investigating double dissociations in aphasic patients (e.g.: Caramazza, 1986). If, however, the problems of children with language impairment go beyond the language domain, a breakdown in children's monitoring functions would affect their overall ability to communicate. In other

words, domain-specificity would leave the monitoring function unaffected, while domain-generality would manifest itself in an additional breakdown of the monitoring function, which in turn would influence the remaining abilities.

4.4 Summary

Section three of this thesis illustrates that models of communicative competence evolve toward increasing interaction between the separate components, which is why the model proposed in this section is based on dynamic systems theory and therefore the constant interaction between components of such a system and its environment.

It is therefore essential to note that the six components and thus *Dynamic Communicative Ability* as a whole, are synchronically and diachronically dynamic. This is to say that they are constantly interacting with each other, the requirements of a communicative situation and an interlocutors' communicative ability and are continually changing as a result. In addition, it has been noted, that not only the six components of DMCA interact but also the two languages within the same multilingual speaker, as a result of which an individual code emerges. The complete interconnectedness and interaction of all six components of DMCA are illustrated once more in figure 5. From this illustration, which was already presented as part of the historical overview of models of communicative competence, it emerges that all components interact with each other, creating the shape of a speaker's overall ability to communicate.

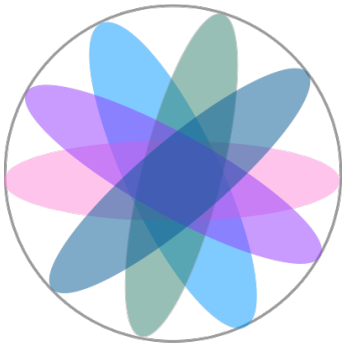


Figure 5 Dynamic Model of Communicative Ability

In addition, figure 6 represents how the two (or more) languages could potentially be represented in this new model. It becomes clear from this illustration that linguistic, discourse, socio-cultural, interactional and strategic competence are only partly overlapping between the two languages, while monitoring competence, the underlying cognitive processes steering the communicative act, are entirely overlapping as they are responsible for a successful ommunicative outcome as a whole. It also becomes apparent that the monitoring competence of a bilingual speaker is represented in form of a thicker line, showing the cognitive advantages of bilingualism (cf. section 5. 7.). In other words, while linguistic, discourse, interactional, strategic and sociocultural competence are only partly overlapping in a bilingual speaker's two languages, it is argued that they are still represented by the same system and regulated by an overall monitoring ability. It surveys the communicative situation and adapts a speaker's communicative ability accordingly, choosing the right language, deciding whether code-switching is an appropriate form of communication and regulates the remaining abilities.

The representation of communicative ability within the same system, where language-specific components partly but not fully overlap would explain the difference in bilingual speakers' competence in language-specific and language-general domains. It will be shown in section two five of this thesis, that bilingual speakers show advantages in language-general cognitive control functions but can exhibit disadvantages in comparison to monolingual speakers, when their language-specific knowledge is tested, particularly if only one of two languages is assessed.

In other words, the *Dynamic Model of Communicative Ability* attempts to portray the overlaps between multilingual speaker's two codes and how they are represented in their overall communicative ability, which is illustrated in fig. 6.

Figure 6 Interaction of Languages in DMCA

It needs to be borne in mind, however, that this illustration is a best case scenario, where a multilingual speaker's two codes are approximately equally developed across all domains but the literature on bilingualism presented in detail in the following section of this thesis as well as Herdina and Jessner's *Dynamic Model of Multilingualism*, showed that an equal distribution across both languages and all domains is a rather unlikely scenario, even in typically developing bilingualism.

Additionally, it was illustrated that individual variation is inherent to dynamic systems and that it should hence be accepted as inherent to human language, instead of considering it as noise in the data. Figure 7 hence shows once more the interaction of the six components of *Dynamic Multilingual Communicative Ability*, the two (or more) codes and the possibility of an unequal distribution of ability across a multilingual speakers' two codes and their competences and how such an uneven distribution could manifest itself within DMCA.

Figure 7 Uneven distribution of abilities across languages

Figure 7 illustrates the possibility of uneven distribution of abilities within one and across both or more languages in a multilingual speaker. This figure is an illustration of Grosjean's definition of multilingual communication skills, which was presented as part of the overview on dynamic systems theory and language. According to Grosjean, multilingual speakers always maintan an overall level of communicative ability, even in case on of their two languages declines or they are unevenly developed. This is also shown by the consistent form of the monitoring ability, which is still better developed than in a system where only one language is present and additionally, maintains its role as a control mechanism.

This illustration further shows that, potentially, some abilities can develop more to compensate for limited knowledge in another competence. In figure 7 this is illustrated by particularly well developed strategic competence, which developed in reaction to a certain lack in other abilities. Dorian (1977) showed for example that semi-speakers of Gaelic could have a better communicative ability than linguistic abilitiy, which is mainly due to their increased strategic ability. This is in line with dynamic systems theory, according to which the components of a system develop in reaction to each other.

This chapter further addressed the question of speakers' environment on their communicative abilities and their language development and it was emphasised that according to the vast majority of linguistic theories, all models of communicative competence and dynamic systems theory the environment plays a crucial role for language development and use. It was already explained that in DMCA, monitoring ability represents the link between a speakers' environment and their own communicative ability but additionally, it needs to link two (or more) interlocutors' communicative abilities, as communication can only occur if two or more people exchange utterances (see section 3. 2. 2. on Gumperz for more detail). Figure 8 illustrates the interaction the of speakers' environments and their interlocutors' communicative abilities, based on Shanker and King's (2002) dance metaphor, which was presented above.

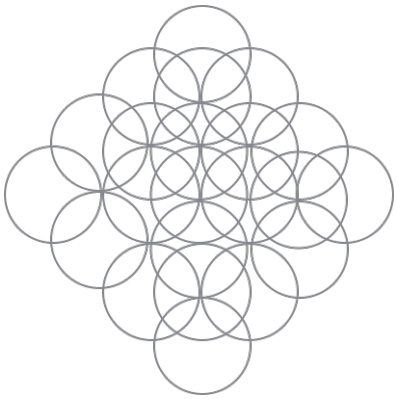


Figure 8 Interaction of individual DCAs

This illustration shows how individual systems of communicative abilities interact with each other, creating a new system, namely a language. The aim of figure 8 is to illustrate that despite individual differences, which are inherent in dynamic systems and therefore in language, the components create a coherent whole – a language. Note the parallels to Saussure's langue-langage-parole described in chapter two of this thesis. The crucial aspect about this system is, however, that the larger system and its components influence each other, so that it is not only an individual's code that is influenced by the larger unit, a language, but also the language that is influenced by individual codes, which was already discussed in relation to Larsen-Freeman's application of dynamic systems theory to language use and development. In addition, this illustration further shows that a change in one sub-component can (but does not have to) result in the change of the larger system, and the other way around, creating new forms and individual varieties.

The question remains, however, how multilingual communicative ability is affected in speakers with atypical language development. The following figures show an attempt to illustrate how different definitions of language impairment would apply to communicative language ability, which will be discussed in detail in section 6.1. Figure 9, illustrates the most traditional definition of language impairment as a specific impairment of children's grammatical abilities.

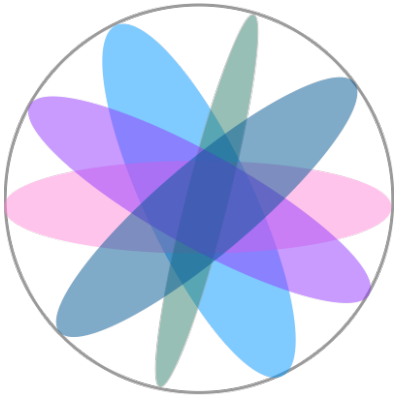


Figure 9 Communicative Ability According to Tradition Definition of (S)LI

According to this definition, only the linguistic ability of children with language impairment should be affected. Bearing in mind that communication consists of more than grammatical ability, it could be hypothesised that within a model of dynamic communicative ability, the other abilities should be able to compensante for a lack in one component, resulting in an overall intact communicative ability. This is not to say that according to a traditional definition of language impairment, children with such a deficiency are equally competent language users as children without language impairment but it is hypothesised that if language impairment only affected one of the six components involved in communication, the other abilities should be able to compensate for this deficit, resulting in a different but ultimately competent use of language.

If, however, the problem in children with language impairment lies in their ability to monitor the communicative situation and to act and react accordingly, it can be hypothesised that a qualitatively different picture would emerge. An attempt to illustrate such a difference is presented in figure 10.

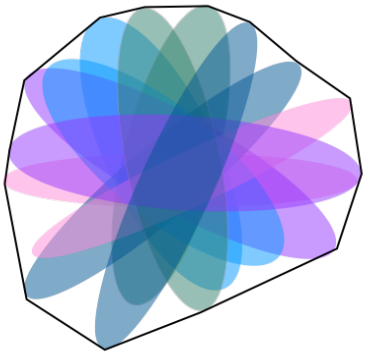


Figure 10 Communicative Ability in Domain-General Theories

If, however, a domain-general deficiency is assumed to be responsible for language impairment, it would affect all domains in communicative ability, including monitoring ability, resulting in a qualitatively different Dynamic Communicative Ability. It can be assumed that a deficit in monitoring ability would result in a less efficient interaction of the remaining abilities with each other and the communicative situation, resulting in problems with the appropriate choice of language or inappropriate use of code switching, pragmatic difficulties, qualitatively different communication strategies, a divergent organisation of speaker's discourse and distinct interactional abilities, such as turn-taking and the interpretation of pauses.

Based on dynamics systems theory, it can further be hypothesised that these differences would manifest themselves both synchronically and diachronically, showing distinct communicative abilities of bilingual children across communicative situations and a distinct development of these abilities over time.

It was therefore the aim of this study to directly compare the communicative abilities of a bilingual child with typical language development and his twin brother with language impairment, in order to find out whether their communicative abilities are qualitatively distinct across all domains, or whether overlaps can be observed in certain components. The results of this investigation will be presented in chapter 10 of this thesis.

5 Bilingualism

The introduction to this thesis (chapter 1) described the prevalence of bilingualism in Europe and across the globe and highlighted the misconception of bilingualism as an exception to a monolingual norm. It further became clear from the sections discussing various definitions of language and communicative competence as well as the new *Dynamic Model of Communicative Ability* (DMCA) that bilingualism is an inherently heterogenous phenomenon, which is influenced by a number of external and internal factors. Different forms of bilingualism are traditionally defined according to these factors and an overview of different forms of bilingualism resulting from varying exposure, organisation, proficiency or societal status of a speaker's two languages, will form the first part of this section. The relevance of this traditional classification will be discussed in relation to dynamic systems theory.

This overview of different forms of bilingualism will be followed by a review of findings regarding the six components of *Dynamic Communicative Ability*, namely linguistic, discourse, sociocultural, interactional, strategic and monitoring abilities of bilingual children. The sections on linguistic and cognitive development are an extension of the review provided in Müller (2013).

Finally, this section will culminate in a discussion of the new concept 'multilect', which is proposed as a term to describe the specificities of bilingual and multilingual speech. Based on a combination of Grosjean's (1989) initial argument about the specificity of bilingualism, insights from neurolinguistic research and dynamic systems theory, it will be illustrated how bilingual exposure must result in specific patterns of language use and knowledge. It will be argued that within a framework of dynamic systems theory, it would not make any sense for a substantial and long-term experience like bilingual exposure not to have any effect on various aspects of communicative ability.

5.1 Traditional Classification of Bilingualism

Hamers and Blanc (Hamers & Blanc, 2000) provide a conclusive table summarising the traditional classification of bilingualism, which will be used as a starting point for the overview presented in this section.

Dimension	Type of Bilingualism*
1. competence in both languages	(a) balanced bilingualism
	(b) dominant bilingualism
2. cognitive organisation	(a) compound bilingualism
	(b) coordinate bilingualism
3. age of aquisition	(a) child bilingualism
	(i) simultaneous
	(ii) consecutive/sequential
	(b) adult bilingualism
4. presence of L_2 community in environment	(a) endogenous bilingualism
	(b) exogenous bilingualism
5. relative status of the two languages	(a) additive bilingualism
	(b) subtractive bilingualism
6. group membership & cultural identity	(a) bicultural bilingualism
	(b) L_1 monocultural bilingualism
	(c) L_2 acculturated bilingualism
	(d) deculturated bilingualism

* Hamers and Blanc (2000) refer to individual bilingualism as 'bilinguality' but here preference will be given to the more traditional and established term bilingualism.

Table 1 Classification of Bilingualism adapted from Hamers & Blanc (2000)

According to Hamers and Blanc's list, language dominance is the first aspect according to which bilingual individuals can be grouped together. Bilinguals can either have a 'balanced' or a 'dominant' proficiency in their two languages. This is to say that they can either know both languages equally well, or know one language better than the other. However, this strict notion of language dominance has repeatedly been criticised in more recent publications for painting a simplistic picture of what is essentially a highly complex issue.

Silva-Corvalán and Treffers-Daller's (2015) book is the most recent addition to this discussion. The contributions to this volume clearly emphasise the complexity of the issue and discuss whether dominance should be defined on the basis of language proficiency (Kupisch & van de Weijer, 2015; Schmeißer et al., 2015; Unsworth, 2013) or extended to include pragmatic and sociolinguistic knowledge (Treffers-Daller, 2015b). Montrul (2015) suggests to add psycholinguistic and sociolinguistic factors, such as

biographical data, information on language use and as well as input to measurements of proficiency, in order to accurately determine a possible dominance in each domain. Treffers-Daller (2015a) concludes that these aspects of bilingual language use have been largely disregarded in the study of bilingual language dominance and therefore require further attention if the concept of bilingual language dominance is to be extended to socio- and psycholinguistic factors. This emphasises the importance of moving beyond grammatical and lexical abilities when describing typically and atypically developing bilingual children.

Based on the contributions to the volume, Treffers-Daller further emphasises that a construct of 'global dominance' does not do justice to the complexity of bilingual language knowledge and use. Therefore, a more nuanced definition, which accounts for language domains and genres in bilingualism, should be embraced.

This is in line with Roumaine (Romaine, 2010), who argues that the notion of balanced bilingualism has its roots in a wrong perception of bilinguals as two monolinguals in one person. This is to say that the concept of balanced bilingualism stems from the implicit expectation that bilingual speakers need to perform like monolingual speakers in both their languages in order to be classified as balanced. If, however, they do not perform like monolingual native speakers in one of their languages, they would be defined as dominant bilinguals. Bearing the inherent domain-specificity of bilingual language knowledge and use in mind (Grosjean, 1985; 1989) such a classification of balanced and dominant bilingualism appears to be counter-productive for the description of bilingual language users.

Hamers and Blanc (2000) therefore stress that dominance profiles are highly individual and dependent on speakers' language use, which is supported by Grosjean's (2015) detailed account of the relationship between language use and the context it occurs in. As a way out of the conundrum of how to account for the complexity of bilingual language dominance, Birdsong (2015) suggests to describe bilingual dominance as a continuum instead of a categorical variable.

However, not all researchers in the field of bilingualism agree on the necessity of accounting for bilingual language dominance. De Houwer (2011), for example, argues that language dominance may not be a useful concept for the description of bilingual language acquisition due to its instability across time. This is a crucial point to note in relation to language as a dynamic system. As has been discussed in detail in section 4.2., dynamic systems are open and therefore inherently unstable. For the concept of language dominance, this implies that it could not be defined as a consistent state but rather subject to constant change depending on communicative environments and requirements. The question therefore arises whether language dominance is a crucial criterion when describing bilingual speakers in general and bilingual children in particular.

The second point of Hamers and Blanc's list is concerned with the organisation of languages within the cognitive system of a speaker. According to the definition provided in their publication, compound bilingualism refers to an organisation where two translation equivalents refer to the same concept, whereas co-ordinate bilingualism describes a state where two words in two languages refer to two difference semantic representations. This differentiation relates to Grosjean's (1989) holistic view of bilingualism, according to which bilinguals are unique speaker-hearers, with a specific linguistic configuration, which is created by the constant interaction of two linguistic systems. This also corresponds to Cook's concept of multicompetence (1991) which she describes as "the compound state of mind with two grammars" (p. 112), arguing that both languages exist within the same speaker and therefore have to interact.

In neurolinguistics, the question whether two languages are stored together or separately has also been widely discussed. On the one hand, findings from multilingual aphasics, who only recover one of their languages after suffering brain damage (Aglioti & Fabbro, 1993; Leemann, Laganaro, Schwitter, & Schnider, 2007) suggest that languages must be stored separately. On the other hand, studies report on pathological language mixing in patients with aphasia (Abutalebi, Miozzo, & Cappa, 2000; Mariën,

Abutalebi, Engelborghs, & De Deyn, 2005), which would suggest simultaneous processing of the two languages.

Other evidence from neurolinguistics suggests differences in the language processing of early and late bilinguals (e.g.: La Heij, 2005; Wattendorf et al., 2012), which implies that early bilinguals may be more efficient in processing input in their two languages. Increased activation of the prefrontal cortex suggested that both languages are active at the same time and bilinguals need to make additional use of their control functions to inhibit the one they are not currently using. This hypothesis has been confirmed repeatedly in psycholinguistic studies investigating the cognitive effects of bilingualism (cf. Adesope, Lavin, Thompson, Ungerleider, 2010; Barac, Bialystok, Castro, & Sanchez, 2014 for reviews).

More proficient language learners have also been found to process their two languages differently and more efficiently from less proficient control groups (Reiterer, Berger, Hemmelmann, & Rappelsberger, 2005; Stein et al., 2009) due to cognates from two different languages stimulating each other, which leads to faster processing. These studies suggest that cognitive plasticity remains into adulthood and therefore, cognitive organisation may change over time. This hypothesis was supported by Schlegel and colleagues who found that the white matter structure of adults changed as they learned a second language (Schlegel, Rudelson, & Tse, 2012).

Based on these insights, two factors appear to play a significant role in the cognitive organisation of languages; age of acquisition and proficiency. In relation to dynamic systems theory it becomes clear that cognitive organisation is yet another aspect of bilingualism that is not static but prone to change and open to external influences. It could therefore be argued that the dichotomy between coordinate and compound bilingualism is not so much an opposition as it is a continuum and bilinguals may find themselves more toward one or the other end of this continuum. Based on recent insights from psycho – and neurolinguistics, it seems unlikely, however, that both languages are stored as completely independent entities. It appears more likely that two systems interact with each other to a varying extent, depending

on age of acquisition on the one hand, and use and therefore proficiency in a foreign or second language, on the other.

This leads directly to the third point on Hamers and Blanc's (2000) list, which is concerned with the classification of bilinguals according to their age of acquisition. While research on "feral" children, such as Genie (Curtiss, Fromkin, Krashen, Rigler, & Rigler, 1974) in psycholinguistics and evidence from neurolinguistics (see above) point toward an existence of a critical period with 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 importance (Birdsong, 2009; DeKeyser & Larson-Hall, 2005).This is due to an ongoing debate regarding the accurate cut-off age between simultaneous and sequential bilingualism, with suggestions ranging from early childhood to adolescence. It is also possible that the cut-off age may not be universal for all language skills but differ for phonological, morphosyntactic and lexical development. This would also be supported by evidence from feral children who were found to acquire lexis quite successfully, even with an age of onset beyond the age of three, but showed substantial difficulties with phonology and grammar (see above).

Hamers and Blanc further split child bilingualism into simultaneous and consecutive bilingualism. The latter is also frequently referred to as *sequential/successive bilinguals* or *second language learners* (Lakshmanan, 2009; J. Paradis, Genesee, & Crago, 2011). Simultaneous bilinguals grow up hearing both their languages at the same time whereas consecutive/ sequential/successive bilinguals learn a second language after their first has already been established.

As mentioned above, 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 cutoff point of age three but disagreeing on the higher limit. This can range from seven years of age to post-puberty. In other words, it has been agreed 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 start to acquire 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.

Foster-Cohen (2001) addresses the problem of establishing a cut-off point between L1 and L2 and points out the drawbacks of such sharp cutoffs. She argues that linguistic development is far too diverse in order to be classified in such strict categories. Foster-Cohen suggests 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 (p. 335-336). In addition, she emphasises the diversity of aspects involved in language acquisition, such as metalinguistic, lexical and theory of mind development, which all peak and slump at various points in a child's development. This makes it difficult to pin down the boundary between L1 and L2 at a certain age. Foster-Cohen therefore proposes 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 view corresponds to findings from psycho- and neurolinguistics, which were presented above and which also suggest that boundaries between L1 and L2 may firstly be fuzzy and secondly, subject to change, depending on speakers' proficiency in each language. Such an interactive and complex view of the relationship between L1 and L2 is in line with principles three, four, ten and eleven of dynamic systems theory as presented by Larsen-Freeman (see section 4. 2. for list and details).

As Foster-Cohen (2001) quite clearly illustrates, a myriad of factors need to be taken into account when differentiating between simultaneous and early sequential bilinguals. A further such factor is the presence of a child's L_2 community in their environment, point number four on Hamers and Blanc's list. Paradis, Genesee and Crago (2011: 5-7) present an elaborate classification of bilinguals based on age of acquisition and ethnolinguistic group membership, which subsumes points four, five and six of Hamer and

Blanc's list:

> 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 form 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 that 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). In addition, even the input they receive from their mothers may differ depending on whether they grow up in a minority or majority language setting. Secondly, minority and majority languages are quite likely to differ in prestige, which may influence the learning outcomes of dual-language learners (compare to point five of Hamer and Blanc's list).

Thirdly, such a distinction might even be an indicator of socio-economic status if assumed that the largest proportion of minority language speakers is part of the migrant population. The *Eurostat Statistical Book on Migrants in Europe* (Eurostat, 2011: 41-136) ascribes a higher unemployment rate, 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 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.

Finally, membership in one or both linguistic communities can result in different forms of cultural identity, as summarised in point six of Hamers and Blanc's list. According to them, bilinguals can be classified as being bicultural if they identify themselves as belonging to both ethnolinguistic groups and are recognised by each group as a member. However, if they only identify with one of the two groups, they either have an L_1-monocultural identity or are L_2-acculturated. In a last scenario, a bilingual might neither identify with their L_1 nor their L_2 ethnolinguistic community and therefore becomes deculturated.

Membership in ethnolinguistic communities is an important aspect of bilingual development. It has been found that biculturalism has a positive impact on adjustment (Nguyen & Benet-Martinez, 2012), is closely linked to language development (Nguyen & Ahmadpanah, 2014) and is positively correlated with lower school drop-out rates (Feliciano, 2001). De Houwer (2015) also stresses the importance of research in the field of harmonious bilingualism, a term referring to conflict-free and therefore more beneficial bilingual development.

By doing so, De Houwer emphasises the necessity of going beyond the language level if we want to understand bilingual development. This is again in line with the principles of dynamic systems theory stating that complex systems are open, that they interact with their environment and that this environment is actually part of complex systems. principle is reflected in the *Dynamic Model of Communicative Ability* presented in section 4 of this thesis.

The following sections will give an overview of research in the areas of bilingual linguistic, discourse, sociocultural, interactional, strategic and monitoring abilities.

5.2 Linguistic Abilities

In this section, studies investigating the phonological, lexical, morphological and syntactic abilities of bilingual children will be presented. The first section will discuss their phonetic and phonological development, followed by a summary of findings regarding their lexical development and finally their acquisition of morphology and syntax will be presented.

5.2.1 Phonological Development

Throughout the course of this thesis, I have argued repeatedly against the comparison of bilinguals to a monolingual norm. This is not to say, however, that a comparison between bilinguals and monolinguals is negative per se. When studying phonological development, for example, it needs to be determined which errors are developmental and which are a product of interferences from children's other languages. Therefore this section will present some insights on differences in the phonological development of monolingual and bilingual children.

It has been shown that monolingual and bilingual speech perception may already differ at birth (cf. Liu, 2013 for a review) with bilingual children showing a similar preference for the two languages they were hearing while still in the womb but monolingual children only recognising English (Byers-Heinlein, Burns, & Werker, 2010). It has further been shown that bilingual children can discriminate between their native language and phonologically similar languages, such as Spanish and Catalan, by the age of 4 months while monolingual children fail to do so (cf. Liu, 2013 for a review). This suggests that bilingual experience already influences phonological discrimination ability within the first year of life.

Quite like monolingual children, bilinguals appear to apply universal preferences when acquiring the phonology of their two native languages. They have been observed to simplify consonant clusters by either omitting one consonants in such a cluster (i.e.: 'say' instead of 'stay') or by inserting a vowel in order to facilitate pronunciation (Morrow, Goldstein, Gilhool, & Paradis, 2014; Tessier, Sorenson Duncan, & Paradis, 2012). Yavas and

Goldstein (2006) even found five – and six-year-old bilingual children to outperform their monolingual peers on word initial two-member consonant clusters.

In addition to these similarities with monolingual phonological acquisition, interferences from one language in the other have also been observed among bilingual children. Anderson (2004) 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. En and colleagues (2014) also observed Mandarin influences on the English of Singaporean bilingual children, which were stronger for Mandarin-dominant children than their English-dominant peers. They therefore suggest employing local dialects as targets in speech and language therapy.

Kehoe's study (2002) study indicates a more complex picture. In her study of vowel acquisition she found German-Spanish bilingual children to acquire the vowel length distinction in German at a slower rate than their monolingual peers but Spanish vowels at the same rate. This suggests that cross-linguistic influences in phonology may vary depending on the complexity of a phonological system. Holm and Dodd (2006 qt. in McLeod, 2010: 62) also found language-specific simplification strategies for the same phonemes (/s/ → /d/ in English but /s/ → /ts/) and solely addition of legal sounds for each language system, in their cohort of English-Cantonese bilinguals.

Holm and Dodd further observed the bilingual English-Cantonese speakers in their study to make more vowel errors than monolinguals and to produce phonemes that 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) reported 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.

Based on the studies presented in this section, it can be concluded that more studies focusing on bilingual phonological development are needed in order to shed light on the question 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.

5.2.2 Lexical Development

One of the very few relatively uncontroversial issues in language development in general and bilingual acquisition in particular, is the crucial role of input for lexical development. As studies on feral children show (e.g.: Curtiss, Fromkin, Krashen, Rigler, & Rigler, 1974; Curtiss, 1977), without input, language cannot develop.

If this thought it spun further, one might arrive at the conclusion that bilingual children get half as much input in each language as monolingual children and therefore their language must develop at a slower rate. However, Hart and Risley (1995) have shown that monolingual language environments are highly variable and therefore such a conclusion appears to be too simple to grasp the entirety of an issue as complex as language development. De Houwer (2015b) presented data from an extensive questionnaire study investigating the vocabulary development of monolingual and bilingual children and its link to input patterns, which showed very high variability in regard to the number of words spoken in both monolingual and bilingual families. The richness of a child's language input correlated with their language development. In other words, there are families who speak more and families who speak less, irrespective of their bilingual status.

Richer language environments, tend to correlate with higher socio-economic background (Nettle, 2003), which is why it is essential to take this aspect of children's family history into account when studying monolingualism and bilingualism alike (Czinglar et al., 2015; Smithson, Paradis, & Nicoladis,

2014). This is necessary if one wants to draw conclusions about the differences and similarities between monolingual and bilingual language development, without falsely assigning discrepancies to children's language status, if indeed they are related to socio-economic differences.

Pérez-Tattam and colleagues (2013) even found differences in socio-economic background in childhood to have a lasting effect on the minority language Spanish, but not the majority language English, of Spanish-English bilinguals despite their similar levels of education in adulthood. This finding emphasises once more the significance of SES in language development.

It appears essential at this point to stress that it is not so much family income or type of parental employment that influences language development but rather parental educational behaviour, such as language richness, feedback tone, symbolic emphasis and parenting style (Rindermann & Baumeister, 2015). Rindermann and Baumeister show that parenting behaviour correlates strongly with parents' level of education.

While monolinguals and bilinguals may not differ as much as previously assumed in regard to their overall language input and output, variation has certainly been observed in relation to the input bilingual children receive in each of their two languages. Hui (2010), for example, found exposure to each language to be linked to vocabulary size in this language in a study of bilingual children in Singapore. This is supported by David and Wei's (David & Wei, 2008) longitudinal group study of French-English bilingual children but they also found gender to play a significant role in vocabulary development and reported an uneven distribution of vocabulary knowledge between the two languages for the majority of their participants.

Rescorla and Okuda (1987) also reported differences between their subjects' L1 and L2 development. The 5-year-old English-Japanese L2 learner in their study showed a different lexical development in her L2 than in her L1 and in comparison to monolingual standards. Rescorla and Okuda found their subject's lexical acquisition to occur much faster than typical L1 acquisition, which they linked to the prior knowledge of another language and the existence of English-Japanese cognates. An additional striking finding

was their participant's extensive use of pronouns, lexical and auxiliary verbs, conjunctions, and prepositions, which are not part of the early stages of L1 development.

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 for 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 could 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 lexcial 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, 2007) providing profound evidence for better metalinguistic understanding of lexical items in bilinguals.

To sum up, this section highlighted the importance of input and exposure for both monolingual and bilingual lexical development. It also emphasised the significance of socio-economic background for language development in general and vocabulary acquisition in particular. It becomes clear from this

section that more studies are needed in the future to disentangle the overlaps between monolingual and bilingual lexical development in relation to exposure and socio-economic background.

The importance of input and family background for vocabulary development also corresponds to principles one, three and nine of *Dynamics Systems Theory* as proposed by Larsen-Freeman (see section 4. 2. for more details). This is to say that findings on lexical development emphasise once again the central role of children's environment for their language development, a core principle to *Dynamic Systems Theory*.

5.2.3 Morphological and Syntactic Development

In contrast to bilingual phonological and lexical acquisition, studies on their morphonsyntactic 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 (cf. Lakshmanan, 2009 for a review). This finding indicates that such categories might be transferred from the speakers' L_1 to their L_2.

Pérez-Tattam and colleagues (2013) looked further into this question in their study of English-Spanish bilinguals and only found strong correlations in children's knowledge of superlatives and universal quanitfiers in both their languages, but not for any other structure. They did, however, observe strong correlations between participants' overall grammatical knowledge in both languages and therefore suggest that the connection between bilingual speakers' two languages may go beyond the grammatical level. In other words, rather than creating connections between parallel grammatical structures, Pérez-Tattam and colleagues suggest that the two languages may be linked on a metalinguistic or metacognitve level. This would correspond to findings assigning higher metalinguistic abilities to bilinguals (Bialystok & Barac, 2012; Bialystok, 2001)

Studies on L_2 output have also repeatedly shown (see Lakashmanan 2009 for a review) irregularities in the use of free and bound morphemes in comparison to monolingual production. While L2 learners tend to acquire the auxiliary and the copular 'be' fairly quickly, they have been reported to have more persistent problems in the acquisition of bound morphemes, such as past tense *-ed* or third person singular *–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). This stands in contrast to Mueller Gathercole's study (2007), who found English-Spanish and English-Welsh bilinguals to go through the same stages as their monolingual peers when acquiring the distinction between mass and count nouns. Additionally, she interpreted the comparable profiles of both bilingual groups as evidence for minimal influence of one language on the other.

According to Paradis and colleagues (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 singular *–s* and past tense *–ed*. They explain this unique pattern of L2 acquisition with the missing surface inflection hypothesis, according to which morphological information is not available to speakers postyntax (cf. Paradis, Rice, Crago & Marquis, 2008). Another explanation comes from the field of *English as a Lingua Franca*, where is has been hypothesised repeatedly that the third person singular –s does not carry any communicative function and is therefore particularly difficult to acquire for English language learners.

The previous section on bilingual lexical development stressed the importance of exposure for vocabulary growth. Thordardottir (2015) made the same observation for bilingual morphosyntactic development. According to her study on three and five-year-old English-French bilinguals, children with equal exposure to both languages score similarly to monolingual peers on MLU and accuracy as well as diversity of morphological use. Children with unequal exposure to their two languages, on the other hand, scored significantly lower than monolingual peers in their non-dominant language.

Mueller Gathercole (2007), explains this difference with a threshold of necessary knowledge that bilingual children need to accumulate to induce morphosyntactic generalisations.

Based on the studies presented in this section, no clear conclusion can be drawn as to the morphosyntactic abilities of bilingual children in contrast to their monolingual peers. Exposure certainly appears to play a crucial role in the ultimate attainment of grammatical properties by bilingual speakers but it remains unclear whether bilingual children acquire both their grammars similarly to each other and to monolingual peers, or whether qualitative differences can be observed in their acquisition processes. Based on the studies presented here, it appears to be likely, however, that the two languages stand in interaction with each other, even though opposing theories persist regarding the question whether grammatical structures are directly transferred from one language to the other, or whether transfer occurs on a deeper, metalinguistic level. Studies reporting increased metalinguistic skills in bilingual children appear to support the latter hypothesis.

Insights on grammatical abilities in bilingual children stress once more the significance of exposure to both languages. This corresponds once more to one of the core principles of dynamic systems theory, namely the interaction of a system with its environment. Furthermore, the observed interaction between the two languages of bilinguals, whether this interaction occurs on a structure-specific or a more general metalinguistic level, is in line with the principle of dynamic systems theory emphasising the interaction of smaller components in a larger, complex system. Additionally, Mueller Gathercole's and Thordadottir's observations regarding the significance of exposure and increased grammatical understanding with increased input, also relate to the tenth principle of Larsen-Freeman's list, namely change over time.

The studies presented in this section were all concerned with the linguistic abilities of bilingual children but as previous sections on definitions of language and communicative competence as well as the new *Dynamic Model of Communicative Ability* illustrated, communication goes beyond the grammatical level. Therefore, the following sections are dedicated to findings

describing bilingual children's discourse, sociocultural, strategic, interactional and monitoring abilities. It will become clear from this overview that the main focus of bilingualism studies have been the linguistic and monitoring (or cognitive) abilities of bilingual children, while findings in the remaining areas are still rather scarce.

5.3 Discourse Abilities in Bilingual Children

Narratives lend themselves to the investigation of children's discourse abilities as they can be analysed based on their microstructure (i.e: lexical diversity, relational and referential devices, morphosyntax) and their macrostructure (i.e.: story grammar categories).

Research on bilingual children's narrative abilities has experienced a substantial increase over the past years and particularly after the publication of Gagarina and colleagues' (2012) narrative assessment tool for bilingual and multilingual children. So much so that an entire special issue of the *Applied Psycholinguistics* journal was dedicated to research on bilingual narrative abilities in early 2016. As this publication covers the most up-to-date accounts of storytelling abilities in bilingual children, this section will be largely based on research published therein as well as Pesco and Kay-Raining Bird's summary (2016). However, as all studies used the LITMUS-MAIN narrative assessment tool developed by Gagarina and colleagues, this overview will be supplemented by research employing different tools, in order to ensure that results are not a test artifact. In addition, the findings presented in this section will be related to the principles of dynamic systems theory presented in section 4. 2. of this thesis.

The studies in this special issue analysed structure and complexity of stories told by children between the ages of three and nine. Most of them focused on the age span between five and seven years of age, which corresponds to the beginning of primary school in most countries.

As a general tendency it became clear that older children outperformed younger children on the LITMUS-MAIN assessment tool (Bohnacker, 2016;

Gagarina, 2016; Mavis, Uge, & Gagarina, 2016; Roch, Florit, & Levorato, 2016), which is supported by Kupersmitt et al.'s (2014) findings. This finding was particularly robust for comparisons between 3-to-6-year-olds and older age groups, and less evident in a comparison between 7 and 9-year-olds (Gagarina, 2016). This is to say that age was a particularly good predictor of narrative abilities when younger groups were compared to older groups but less so when older children were compared to each other. Age was also a predictor of the use of goals in children's stories (Bohnacker, 2016; Gagarina, 2016; Kapalková, Polisenká, Marková, & Fenton, 2016) with only few five-to-six-year-old children describing goals in their stories.

The connection between age as a significant factor in children's storytelling abilities and dynamic systems theory is twofold. Firstly, it stresses the importance of exposure and therefore the environment, which is of course crucial for dynamic systems. Secondly, it relates to the fact that dynamic systems are emergent and therefore children's storytelling abilities are likely to improve over time due to an interaction between increased exposure and improved metalinguistic abilities.

In addition to age as a crucial factor in narrative abilities, all sequential bilingual children performed better in the majority language on micro- and macrostructure (Altman, Armon-Lotem, Fichman, & Walters, 2016; Bohnacker, 2016; Kapalková et al., 2016; Roch et al., 2016). Interestingly, a similar difference between children's performance in minority and majority languages could not be observed for simultaneous bilinguals (Kunnari, Alimaa, & Aivi, 2016) despite the fact that they were schooled only in their majority language and that the language combinations in sequential bilinguals included a variety of high – and low – status languages (i.e.: German – Turkish vs. English – Swedish/English-Italian). A direct comparison of sequential and simultaneous bilinguals in Gagarina's study revealed higher scores for simultaneous bilinguals on story structure in the majority language and complexity measures in both languages.

Finally, the studies included in the special issue discussed here, investigated whether bilingual children could transfer their macrostructural

knowledge from one language to the other. Bohnacker and Kunnari et al. reported on similar results in bilinguals' two languages for complexity and story structure measures, while Altman et al. found a similar performance across languages for complexity measures. These findings relate to Flecken's (Flecken, 2011) study of macrostructure in the stories of older German-Dutch bilinguals, which revealed a mix of patterns which was either balanced in both languages, more similar to the structures of monolingual speakers of either language or even exhibited bilingual-specific structures. Kupersmitt and colleagues also found bilingual-specific acquisition patterns in their study of Hebrew language learners. Gagarina (2016) proposes that certain aspects of macrostructure could rely less on linguistic proficiency, and therefore vary less among different bilinguals but the correlation between exposure and macro-structure attainment requires further investigation. Pesco and Bird (2016) suggest that language exposure and familiarity may explain parallel results across children's languages as well as higher scores of simultaneous bilinguals and majority languages.

Montanari's (2004) study of Spanish-English bilingual children supports the view that lower language proficiency appears to be detrimental for narrative abilities. Based on the finding that the bilinguals in her study perform better in their L1 than their L2 (note the difference to Altman, Armon-Lotem, Fichman, & Walters, 2016; Bohnacker, 2016; Kapalková et al., 2016; Roch et al., 2016, who observed the exact opposite), she concludes that overall narrative abilities are intact in her participants but that they are unable to transfer this knowledge due to a lack of linguistic knowledge. The difference between the studies might, once more, be linked to the crucial role of exposure in language development in general and narrative abilities in particular, as the participants in Montanari's study are younger and had only recently been enrolled in primary school.

To sum up, this section on narrative abilities in bilingual children emphasised the essential role of exposure for bilingual language development, which became apparent from findings on both the micro – and the macrostructure and across various language combinations. It was further

shown that age correlates with language ability, however the age effect appears to decrease over time. It remains unclear as to whether bilinguals are able to transfer their macrostructural knowledge from one language to another and their ability to do so appears to be linked to their overall language proficiency.

5.4 Interactional Abilities

According to the *Dynamic Model of Communicative Ability* presented in this thesis, interactional abilities are the knowledge and skills required for appropriate turn-taking, the use of discourse markers and meaningful question-answer sequences. Overall, research on bilingual interactional abilities is rather sparse, despite the fact that languages have been found to differ in their turn-taking behaviour (Stivers et al., 2009), response strategies and their formulation of questions (Stivers et al., 2010). Based on these insights, the question arises whether bilingual speakers differ from their monolingual peers in their conversational behaviour due to their bilingual exposure.

Du-Babcock (2006) investigated the turn-taking behaviour during business meetings in the Hong Kong bilingual environment and found that the majority of Chinese-English bilinguals adapted their communicative behaviour to the requirements of the interaction. This is to say that they followed Cantonese, or spiral, conversational patterns during monolingual Cantonese meetings but displayed English, or linear, topic management behaviour in English-speaking settings.

Raymond (2015) studied question and response patterns in English-Spanish bilinguals and found that they differed from their monolingual peers mainly in regard to their use of code-switching, which of course was not available as a resource to monolingual speakers. Other than that, Raymond found bilinguals and monolinguals to overlap largely in their Spanish question-answer sequences. Du-Babcock's and Raymond's findings therefore suggest that bilingual speakers are able to adapt to the requirements of monolingual conversational settings.

Heinz (2003) comes to a slightly different conclusion in her study of backchanneling in German-English bilinguals. She found proficient bilinguals to transfer American English backchanneling behaviour to their German conversations. To be more precise, bilingual participants in Heinz's study transferred more frequent backchanneling and overlaps, which are commonly associated with American English, to their monolingual German conversations.

The studies published in a special issue of the *International Journal of Bilingualism* on discourse markers in bilingual speech add yet another perspective to bilingual interactional behaviour. They focus particularly on language alternation during these parts of speech. De Rooij (2000) observed Shaba Swahili-French bilinguals to employ French discourse markers during Shaba Swahili conversations and suggests that this may be a sign of highlighting discourse markers. In other words, de Rooij argues that bilinguals code-switch consciously to increase contrastiveness and therefore maximise saliency. By doing so, they attract their interlocutors' attention.

Based on her longitudinal case study of two English-Hebrew bilinguals Maschler (2000a) suggested that such language alternations at discourse markers become independent of their metalinguistic frame over time, particularly for the heavier code-switcher. Maschler (2000b) also found the frequency of code-switching to vary according to the type of discourse marker. In this corpus, speakers were most likely to switch to Hebrew during interpersonal discourse markers, followed by cognitive and finally textual discourse markers. The numbers of code-switches for cognitive and textual discourse markers increased over time. Goss and Salmons' (2000) study of German-American spoken dialects as represented in written plays, also observed discourse markers to be code-switches in the first instance before they became established borrowings and are finally replaced by English.

Moyer's (2000) study addressed the domain-scpecificity of bilingual language use and interpreted language alternations in her English-Spanish corpus as switches to a more informal domain. In addition, code-switching can be influenced by different lexical knowledge or preference for less complex

grammatical structures. One such example are trilingual citizens of Bratislava (until the mid-20th century), who would start a sentence in German but continue it in Hungarian or Slovak in order to avoid the German sentence-final verb, which is more complex than the second or third position it takes in Slovak or Hungarian (W. Dressler, personal communication, May 10 2016).

Overall, these findings suggest two things. Bilinguals have two systems to their disposal which interact. This interaction becomes apparent in their use of code-switching. This leads to the development of a unique language system due to language contact, which contains subtle nuances that may only be available to other bilingual speakers. Bilingual speakers can therefore employ conscious language alternation to convey these subtleties on a metalinguistic level. This past point leads to another substantial aspect of bilingual speech, namely code-switching during conversation. The studies presented so far suggested that code-switching is normal behaviour for bilingual speakers and that bilinguals alternate between languages in order to get the full spectrum of meaning across.

Auer (2005) has suggested a highly sociologically oriented view of code-switching, according to which language choice is an illustration of speakers' identity and therefore a reflection of society. It has however been argued that this might be a mystified interpretation of code-switching (Gafaranga, 2005) and that language choice must be accepted as an activity in its own right. Wei (2005) argues along the same lines and emphasises that code-switching in bilingual conversation occurs in an orderly fashion and that it serves primarily to achieve coherence in interactions. He does not dispute that it can also serve the social function of identity creation but emphasises that code-switching does not occur in an interactional vacuum and that therefore conversational requirements must also be taken into account. In other words, Wei advertises a dual-level approach in which conversational and social needs are combined to explain instances of code-switching.

Georgalidou et al.'s (2010) findings appear to be in line with Wei's argument. In their analysis of a Turkish-Greek dinner conversation they illustrate that code-switches can be discourse oriented (e.g.: to report direct

speech), result from a negotiation as to which code to use (e.g.: repeated Q & A sequences in two languages until one interlocutor switches to the other's language), can occur within turns, so that no code can be established as the basal code or simply function as instances of repair, so that the base language does not change. Furthermore, Georgalidou et al. found that language alternation can coincide with identity formation even within a family, where younger family members may choose a different code to the older generation. This is confirmed by Williams' (2005) study of a bilingual Chinese American mother-daugther conversation.

This overview of studies on bilingual interactional abilities highlighted a number of crucial issues in relation to *Dynamic Systems Theory*. Firstly, it has become clear from the studies investigating discourse markers in bilingual speech (Goss & Salmons, 2000; Maschler, 2000a; Moyer, 2000; de Rooj, 2000) that these may be subject to language alternation. It has further been illustrated that these code-switches may serve an emphasising function and that they may eventually become grammaticalised in the other language. This relates once more to the principle three of Larsen-Freeman's list (see section 4.2. for more details), which relates to the interaction between numerous components in complex systems. The use of code-switching in discourse markers provides further evidence for an interaction between speakers' two languages, which is further emphasised by Heinz's (2003) finding of American-English backchanneling behaviour in German interactions by German-English bilinguals.

The intertwined relationship between bilinguals' languages is further illustrated in code-switching research, which shows that language alternation is ubiquitous and regulated in bilingual conversations and that it serves both a conversational and a social function. Overall, this section has shown that bilinguals can and do use their two languages in interaction and that characteristics, such as turn-taking behaviour, of one language may influence the use of the other.

5.5 Sociocultural Abilities

Sociocultural abilities in bilinguals subsume the following levels. A bilingual speaker needs to know when to use which of her/his languages or when code-switching is appropriate. S/he must also be aware of cultural conventions and appropropriate genres/registers in both languages.

I would argue that this situation is particularly complex for early sequential or simultaneous bilinguals, who may have a very fluent knowledge of both their languages with close to no phonological interferences from their other language, but who will have grown up in only one of their two cultural settings. Despite their fluency in both languages, certain sociolinguistic conventions in both languages may not be fully accessibly to them, due to the domain-specificity of bilingual language use. This section will therefore present the few existing studies investigating the pragmatic abilities of bilingual children.

An important aspect of pragmatic understanding, are *Theory of Mind* skills. In order to apply sociocultural conventions appropriately, one must firstly be aware of such conventions and secondly, apply rules accordingly. In the bilingual context this would not only refer to sociolinguistic conventions but also the languages as a whole. A bilingual child (and adult, for that matter) must be aware which language s/he can speak to whom and when it is appropriate to code-switch.

Barac et al.'s (2014) review of cognitive skills in dual language learners revealed that bilingual children generally show a more advanced understanding of Theory of Mind, regardless of the languages they speak. According to Barac et al., enhanced *Theory of Mind* skills are linked to better inhibitory processing and higher sociolinguistic awareness, i.e.: the choice of the appropriate code in a conversation.

Tare and Gelman's (2010) study of English-Mahrati speaking pre-school children provides further evidence for the relationship between these metacognitive skills and children's ability to assign the correct code to their interlocutor and the speech situation. Their study further indicates that language differentiation skills are mostly in place by age three.

This coincides with findings from Nicoladis and Genesee's study (Nicoladis

& Genesee, 1996) of 1;7 to 3;0-year-old English-French bilinguals, who did not show differentiated language use until later recordings. Overall, this suggests that typically developing bilingual children should be able to keep their two languages apart by age three. The early overlap of their two languages, as observed by Nicoladis and Genesee suggests once more that the two languages are components of the same complex system rather than two separate entities.

A further aspect that is interesting to investigate in relation to *Theory of Mind*, is children's use of Internal State Terms as the two have been found to be related (Ziatas, Durkin, & Pratt, 1998). Given the superior Theory of Mind skills reported for bilingual children (Barac et al., 2014), it seems interesting to investigate their use of IST in comparison to their monolingual peers.

Altman and colleagues (2016) investigated the use of mental state terms in bilingual children in their contribution. They found a higher ratio of mental state terms in L2 narratives than in L1 narratives but no significant group effect. This difference could possibly be due to shorter L2 narratives. Furthermore, they found more perceptual, mental and motivational terms for both languages and general invariance in the use of mental state terms across languages.

Fusté-Herrmann and colleagues (2006) found that English monolingual children in their study produced the highest number of mental state verbs of all participants, while Spanish monolinguals and English-Spanish bilinguals performed similarly to each other. The authors suggest that this divergence could be attributed to language differences or differences in elicitation procedures. Based on Altman et al.'s and Fusté-Herrmann and colleagues' findings, it can be concluded that bilinguals do not seem to outperform monolinguals in their use of mental state terms, despite their superior Theory of Mind skills.

Two crucial aspects of bilingual sociocultural abilities have been highlighted in this section. Firstly, bilingual children need to learn to keep their two languages apart and to address people in their respective languages. This skill appears to emerge around the age of three in typically developing

children. Secondly, studies to date have not found bilingual children to outperform their monolingual peers on the use of internal state terms despite their superior Theory of Mind skills. More globally speaking this section highlights the connection between bilingual language experience and the development of cognitive skills.

5.6 Strategic Abilities

Georgalidou's study (2010) on code-switching found that code-switching in bilingual conversation can fulfill a strategic function. This is to say that bilingual speakers may use words from one language to support their conversation in another if they cannot think of a word in the main language of a conversation. This instances can be referred to as conversation strategies. Bearing the domain-specificity of bilingualism in mind, it can be assumed that bilingual speakers will regularly face situations in which they do not know the particular word in one language and need to make up for this lack, in order to avoid a breakdown in communication. It is therefore interesting to discuss which communication strategies bilingual speakers employ in monolingual and bilingual situations and in how far they differ in this regard from their monolingual peers.

As van Ek (1986) already pointed out, bilingual speakers might have a wider repertoire of communication strategies due to their bilingual exposure and use (see section 3. 2. for more detail). This was confirmed by Raymond's (2015) finding that bilinguals could use code-switching in their answers, a strategy which was not available to monolingual speakers. Apart from the ability to correct inappropriate choice of language, Comeau et al. (2010) did not find any significant differences in the communication strategies of monolingual and bilingual two to three-year-olds. This confirmed their finding from an earlier study (Comeau, Genesee, & Mendelson, 2007) which showed that bilingual children as young as 2.5 years were able to correct sequences of inappropriate code-switching.

Another possibility to resolve communication difficulties, are gestures. One

can either use gestures to replace a word, or to facilitate word search processes. Nicoladis (2007) investigated the relationship between manual gestures and bilingual proficiency and found that bilinguals do not appear to compensate for lower proficiency by using gestures. They hence do not seem to resolve word-finding difficulties by inserting gestures into their conversation but according to Nicoladis, bilinguals do transfer specific gestures from one language to the other. This indicates once more that bilinguals have a wider verbal and nonverbal repertoire to rely on due to their exposure and use of two languages and that these two codes are closely related.

While gesture use is not related to proficiency according to Nicoladis, Jidong's (2011) review of four decades of research in the field of communication strategies comes to the conclusion that the use of other communication strategies may well be. Overall, linguistic strategies such as circumlocution have been found to be employed more frequently by speakers with a higher second language proficiency, while less proficient learners tend to use more communication strategies overall and more avoidance or L1-based strategies.

Furthermore, Jidong (2011) reports on a correlation between communication contexts and the use of communication strategies by bilingual speakers. Bilingual speakers have been found to use more avoidance strategies in formal classroom settings but more paraphrases in natural learning environments. Based on these findings, one can assume that simultaneous and sequential bilinguals might prefer paraphrases over avoidance strategies as they have a stronger need to achieve their communicative goals.

Yet another interesting finding in Jidong's review is the correlation between personality traits and the use of communication strategies. Extroverts habe been found to use more L2-based, cooperative and imitative strategies, while introverts resort more frequently to L1-based repair or reduction strategies.

This overview of strategic abilities in bilingual speakers suggests that they use a wide variety of techniques to prevent a communicative breakdown. It has further been shown that the type of communication strategy employed

appears to correlate with language proficiency, communication context and speaker's personality. This last finding is particularly revelent in the context of dynamic systems theory, as it illustrates the complexity of language knowledge and use and the variety of factors influencing the choice of communication strategies. It is therefore substantial to take these factors into account when analysing bilingual communication strategies, in order not to over-interpret what may be a personality trait as a bilingual specificity.

5.7 Monitoring Abilities

In the *Dynamic Model of Communicative Competence*, monitoring abilities describe the cognitive processes children need to communicate successfully. These include working memory and control functions (see section 4. 3. 5. for more details). It has been argued that bilingual children may have cognitive advantages due to their regular exposure to and use of two or more languages. Research in neurolinguistics has frequently pointed to the neural changes resulting from bilingualism (Olsen et al., 2015; Reiterer et al., 2005; Stein et al., 2009; Wattendorf et al., 2012), which indicate more efficient language processing in early and highly proficient bilinguals. This difference is also apparent in psycholinguistic studies, investigating the cognitive differences between monolingual and bilingual participants (Bialystok et al., 2012; Bialystok, 2007).

It has been pointed out, however, that cognitive changes due to bilingualism may not affect all aspects of cognitive processing equally (Barac et al., 2014) and that some advantages are a product of language proficiency, while others emerge through increased exposure (Bialystok & Barac, 2012). Therefore, two recent systematic reviews (Adesope et al., 2010; Barac et al., 2014) have investigated the extent and diversity of cognitive changes related to bilingualism in a total of 165 studies. The insights obtained from their data syntheses form the basis of this section on the monitoring abilities of bilingual children.

Adesope et al. analysed findings regarding attentional control,

metacognitive awareness, abstract or symbolic reasoning and creative and divergent thinking as well as problem solving. Barac and colleagues synthesised results on bilingual children's brain, *Theory of Mind* and memory development as well as their performance on neuropsychological assessments and their intelligence, processing speed and overall academic performance. Both reviews investigated bilingual children's metalinguistic awareness and their working memory. This section will focus in particular on their findings on attentional control, working memory and metalinguistic awareness because they are closely connected to (bilingual) language use and because Theory of Mind skills were already discussed in section 5.5.

Adesope and colleagues' meta-analysis revealed statistically detectable, but highly heterogeneous, mean effect sizes for all outcome measures in favour of bilingualism. This is to say, that bilinguals generally outperform monolinguals in tasks of attentional control, metacognitive and metalinguistic awareness tasks, abstract thinking, problem solving and working memory. According to Adesope et al.'s systematic analysis, attentional control produced the largest effect (.96 across 14 studies), which is supported by Barac et al's findings. In other words, the difference in cognitive skills between monolinguals and bilinguals is most apparent in their performance on tasks that require the inhibition of unwanted input. The superior performance of bilingual speakers on tasks of cognitive control is likely to be a direct result of their constant inhibition of one language when speaking another.

In relation to dynamic systems theory, this finding suggests once more that bilinguals' two languages are organised in a complex system and interactions between the components need to be suppressed in order to communicate in the language that is required by the linguistic setting. This assumption is supported by the fact that bilinguals have the ability to code-switch fluently if the communicative setting allows it. This corresponds directly to principle five of Larsen-Freeman's list (see section 4. 2. for details). According to this principle, the strength of interactions changes over time, which allows multiple routes between components over time. When applied to the interaction

between the two languages of a bilingual, this would indicate that they can either stand in direct interaction during a bilingual speech situation, or their connection can lie dormant if the communicative situation requires a bilingual person to converse in just one of their languages.

Bearing in mind that executive functions and working memory capacity are strongly correlated (McCabe, Roediger, McDaniel, Balota, & Hambrick, 2010), it seems only logical that Adesope et al.'s analysis further revealed an association between better working memory skills and bilingualism (.48). However, Barac et al.'s review did not come to the same conclusion. They report on two conflicting studies, which come to opposing conclusions regarding the working memory capacity of bilingual children. While Engel de Abreu's (2011) study did not reveal any significant differences in the working memory abilities of monolingual and bilingual children, Morales et al. (2013) come to opposite conclusion. Barac et al. suggest that differences in working memory abilities of monolingual and bilingual children might be particularly evident if the task demands high levels of executive functioning.

The next area investigated in both reviews, is the metalinguistic awareness of bilingual children. As metalinguistic awareness allows children to look beyond meaning in order to extract the underlying structure of language, one could hypothesise that this skill should be better developed in typically developing bilingual children, simply because they have twice as much training. Both Adesope et al., and Barac et al., found that this aspect of language ability has been thoroughly investigated across various language combinations in numerous countries. Adesope and colleagues report that bilingualism was associated with higher metalinguistic abilities when children spoke Spanish and English, or a mix of language not including French-English or English-Chinese. The same applied for comparisons to all monolingual groups apart from Chinese monolinguals. This finding suggests the extent to which bilinguals have better metalinguistic skills, may depend on the language combination they speak and possibly how closely related the languages are.

Barac et al. split metalinguistic awareness into phonological and morphological/syntactic awareness and conclude that the small body of

research on morphological/syntactic awareness shows no cost for bilinguals and better or equivalent performance for dual language learners. They add that status of the language (L1 vs. L2, minority vs. majority), use and exposure as well as fluency are likely contributors to children's performance on these tasks. According to their analysis of studies investigating the phonological awareness across bilingual children, Barac and colleagues come to the conclusion that findings are still inconconclusive. However, studies investigating cross-linguistic transfer of metalinguistic skills using within-subject designs, tend to find that bilingual children are able to transfer their knowledge from one language to the other. In other words, typically developing bilingual children tend to have equally developed metalinguistic awareness skills in both their languages.

In essence, this section on cognitive abilities of bilingual children revealed that they tend to outperform their monolingual peers on tasks of attentional control. In contrast, results on their working memory capacity and their metalinguistic skills are still less conclusive and require further attention. Metalinguistic abilities appear to depend on the language combinations children speak and enhanced working memory skills only become apparent in tasks requiring higher executive functioning.

Overall, the results presented in this section help to further illustrate language and communication as a complex system as experience in one aspect of cognitive processing, namely language, leads to changes in overall cognitive processing. This links in with principle three of Larsen-Freeman's list (see section 4.2. for details), which describes dynamic systems as comprising of many elements which interact. This automatically relates to principle four, describing the core role of change in dynamic systems, which becomes apparent in the cognitive changes resulting from bilingual exposure.

5.8 Multicompetence/Multilect

The preceding sections illustrated the differences between monolingual and bilingual speakers in the development of phonological (Anderson, 2004;

En et al., 2014; Kehoe, 2002), lexical (Rescorla & Okuda, 1987), morphological and syntactic (Lakshmanan, 2009; Paradis, 2010), discourse (Flecken, 2011; Kupersmitt et al., 2014), sociocultural (Barac et al., 2014; Tare & Gelman, 2010), interactional (Goss & Salmons, 2000; Heinz, 2003; Maschler, 2000a; de Rooj, 2000), strategic (Nicoladis, 2015) and monitoring (Adesope et al., 2010; Barac et al., 2014) abilities. Serratrice (Serratrice, 2013) provides further evidence for the qualitative differences in the language acquisition and representation of monolingual and bilingual children.

She points out that while simultaneous bilingual children may be able to learn their two languages as independent systems, this independence does not mean complete autonomy. Based on insights from speech perception, production, word learning, morphosyntax and cognitive correlates, Serratrice concludes that even though some parallels between monolingual and bilingual language acquisition can be observed, bilingual language acquisition and representation are qualitatively different in a number of ways.

Firstly, exposure to more than one language improves children's ability to discriminate between speech sounds in these two languages. Secondly, the representation of speech sounds appears to be quantitatively and qualitatively different in bilingual children. Thirdly, the exposure to two languages will naturally result in the development of some translation equivalents in bilingual children but not their monolingual peers. However, Serratrice also highlights the domain-specificity of bilingual lexical knowledge, which means that bilingual speakers are likely to develop language-specific lexical pockets and neither have the opportunity nor the need to acquire translation equivalents in both languages. Domain-specific language knowledge may be part of they reason why bilinguals are not necessarily very good translators, unless they are specifically trained as such. Another reason are their increased inhibitory functions (Ellen Bialystok et al., 2012), which help them to block out the language they do not currently use and hence may make it more difficult to access the same word simultaneously in two different languages.

With regard to their morphosyntactic development, Serratrice shows once more that bilinguals largely achieve the same milestones as monolinguals at

roughly the same time but bilingualism can lead to systematic cross-linguistic influences. Finally, Serratrice points out some of the cognitive changes resulting from bilingualism, which were described in detail in section 5.7. of this thesis.

Based on these insights, can simultaneous (and early sequential) bilinguals be considered native speakers of both their languages? On the one hand, they most certainly are as they learn both their languages from birth and are therefore natives to both language systems. On the other hand, research has shown (see Serratrice, 2013 for a detailed review) that even simultaneous bilinguals may differ in their knowledge and use of their two languages when compared to monolingual norms. It seems, once again important to note that these differences are not to be understood as disadvantages or advantages but rather as manifestations of two or more codes that stand in constant interaction with each other. This interaction has been illustrated in countless studies on the cognitive differences in bilinguals, which show processing differences that manifest themselves as neurological differences and in differing performance on psycholinguistic measurements.

This does not mean that bilinguals perform worse from their monolingual peers but their overall communication skills are qualitatively different. I would argue that this is the only realistic outcome in light of research in the field of general child development. If experiences, such as diet and exercise have an obvious effect on our bodies (i.e.: increased intake of fat and sugar leads to an increase in body fat while increase in exercise leads to increase in muscle mass), or driving a taxi changes neurological processing (Maguire et al., 2000; Wang, Liu, Shen, Li, & Hu, 2015), why would such a significant and long-term experience as speaking and listening to two different languages not change the way we hear, process and speak these different codes?

Therefore, it is the goal of this section to propose an alternative view of bilingualism, where the interaction between two (or more) languages results in unique patterns of language use and processing. This is, of course, not the first attempt to describe bilingual or second language patterns. Selinker (1972) proposed the concept of *interlanguage* to describe the rule-governed system

L2 learners develop on their way to proficiency. This interlanguage contains L1 interferences and L2 overregularisations.

Grosjean (1989) pointed out that bilinguals have unique patterns of language processing and therefore do not represent two monolinguals in one person. In his own words, a bilingual is "a specific and fully competent speaker/hearer who has developed a communicative competence that is equal, but different in nature, to that of the monolingual" (François Grosjean, 1994, p. 1657).

Not entirely satisfied with Selinker's definition of an interlanguage as it did not take speakers' L1 into account, Cook (1991) proposed the concept of *multicompetence* to refer to the two grammars in a bilingual mind. After numerous adaptations, the most recent definition sees multicompetence as "the overall system of a mind or a community that uses more than one language" (Cook, 2016, p. 2). According to Cook, this definition is preferable because it gives way to the more neutral 'system' as opposed to 'knowledge' and subsumes all processes involved in language use, processing and production.

Cook also advocated for the abandonment of native speaker standards for the foreign language classroom, based on the fact that L2 users differ from monolingual native speakers and therefore should be considered as speakers in their own right (Cook, 1999 and following publications). The notion of native speakers had already been questioned in 1985, when Thomas M. Paikeday put out a call to his colleagues to discuss what he referred to as a 'linguistic myth' (Paikeday, 1985).

Cook's concept of multicompetence is therefore entirely independent of monolingual norms and represents a bilingual view of language knowledge and use. This is particularly relevant in the context of this thesis, where the focus is not the comparison between bilingual and monolingual speakers but rather a direct juxtaposition of the communicative abilities of two different types of bilingual speakers. Cook put it brilliantly when he wrote "If L2 users are independent persons in their own right rather than the shadows of native speakers, the comparison between L2 users and monolingual native speakers

is about as revealing as, say, discussing how apples resemble pears, of little interest for those concerned with the distinctive qualities of apples“ (Cook, 2016).

In multicompetence, both languages are represented in an overarching system “with complex and shifting relationships between them, affecting the first language as well as the others“ (Cook, 2016). Cook stresses that these languages are not organised in a hierarchical fashion and explains that the number 2 in L2 should be read as a cardinal instead of an ordinal (i.e.: L two vs. second language).

To sum up, multicompetence as defined and developed by Cook, refers to the organisation of and interactions between all languages of a speaker in the same system. This complex system is independent of idealised monolingual speakers and therefore diverges from monolingual performance is expected and accepted rather than interpreted as compromised language abilities. Lastly, multicompetence affects the whole mind, including all languages and the cognitive system. This is, of course, in line with research on cognitive changes due to bilingualism (Adesope et al., 2010; Barac et al., 2014).

The concept of multicompetence relates to dynamic systems theory in that it describes the components of a larger, overarching system that stand in constant interaction with each other, creating unique yet systematic patterns. Therefore, Cook’s definition of multicompetence will be adopted to compare directly the language knowledge and use of one typically developing bilingual and one bilingual child with language impairment. The underlying question of this comparison is therefore not how these two bilingual language users compare to their monolingual peers, as this would be comparing apples to pears, as Cook (see above) pointed out, but rather how they differ in their multicompetence. This knowledge can then be used to inform language measurements, which assess multicompetence, instead of performance against a monolingual standard. Before results from this study are presented, the following sections will give an overview of findings regarding the linguistic, discourse, sociocultural, interactional, strategic and monitoring abilities in children with language impairment as well as the findings from a systematic

literature review comparing bilingual children with typical language development to their peers with language impairment.

5.9 Summary

In this section, research in the area of bilingualism was discussed in relation to the six components of the *Dynamic Model of Communicative Ability*. Overall, the studies presented in this section highlighted the crucial role of exposure, input, proficiency and socio-economic background for bilingual development. They further revealed that bilingual language development overlaps with monolingual language development in some but not all aspects.

Firstly, bilinguals simplify consonant clusters in a similar fashion to monolingual children but in addition, they might also show signs of interferences in either of their languages or even produce phonemes that do not belong to either language. Exposure, input and SES are essential factors in lexical and morphosyntactic development and some interaction between children's two languages have been observed.

Exposure also plays a significant role in the development of discourse abilities and it is still unclear whether or not bilingual children can transfer their macrostructural knowledge across languages. Their ability to do so may correlate with their language proficiency.

Research on their interactional abilities shows that bilingual children have got two language systems that interact, which leads to unique language use and conversation patterns. These can quite obviously not be found in monolingual children, as they only have one language to their disposal.

Studies investigating bilingual children's sociocultural abilities revealed that Theory of Mind and sociolinguistic skills are closely related. This is to say that children's ability to assign the appropriate language to their interlocutor and/or a conversational setting is related to their Theory of Mind. It has further been shown that bilingual children have superior Theory of Mind skills but that these have not been found to be reflected in their use of Internal State Terms.

Due to their exposure to two languages, bilingual children develop a wide

range of communication strategies, which correlate with their proficiency, the conversational context and their personality.

Finally, it was shown that bilingualism has a positive effect on attentional control but not on general working memory capacity. Findings on their metalinguistic abilities are still controversial and further research is required in order to shed light on this issue.

These findings were taken as the basis to re-visit the concept of bilingualism and the question whether or not bilinguals are two monolinguals in one person. I have argued that they are not. It has been shown that bilinguals exhibit unique language patterns. Bearing in mind that bilingualism is a very intense experience, these findings are not surprising. It is essential to note, however, that they must not be interpreted as disadvantages, but rather as qualitative differences, resulting from a distinct language learning and language use experience.

In order to illustrate this notion further, Cook's model of multicompetence was presented, which describes the organisation and interactions of all languages in one system. This corresponds directly to *dynamic systems theory*, of course, as languages are interpreted as components of a larger, overarching system. In such a dynamic system, it is only natural for these components to interact. Unique patterns emerge from this interaction, which sometimes can display chaotic variation (principle no. 11 of Larsen-Freeman's list). This is in line with most research in the field of bilingualism, which suggest that bilingualism is a highly heterogenous phenomenon. It is absolutely essential to keep this in mind when working with a bilingual population.

Children with LI are a similarly heterogenous group. Attemps have been made to classify them into different sub-categories, based on their language profiles but the following section will reveal that such classifications may be a research artifact, rather than a reflection of the actual disorder.

6 Language Impairment

This section is dedicated to the definition of (Specific) Language Impairment and a review of findings regarding the linguistic, discourse, sociocultural, strategic and monitoring skills in children with language impairment. The first part will discuss the definition of language impairment and how it has evolved from very narrow to much broader inclusion criteria, which has resulted in a recent debate regarding the nomenclature of this developmental disorder. This discussion will be presented in relation to *Dynamic Systems Theory* and the *Dynamic Model of Communicative Competence* before a more detailed overview of communication skills in children with language impairment will be reviewed. This is an expansion of the overview presented in Müller (2013).

6.1 Definition and Nomenclature Debate

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; Rice, 2004; Tomblin et al., 1997). 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 have 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 (Leonard, 1998; Nußbeck, 2007; Paradis, 2010; Rice, 2004; Tomblin et al., 1997). 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 have linguistic scores below the average (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 chapters, increaseing evidence suggests that cognitive and language skills are intertwined, which contradicts a definition of SLI, or rather (S)LI, that is purely restricted to the language domain.

This controversy regarding the inclusion criteria of (S)LI has led to a recent debate around the appropriate nomenclature for this developmental disorder, which is summarised by Reilly et al. (Reilly, Bishop, & Tomblin, 2014) based on the comments of fellow researcher on their preivous publication (Reilly, Tomblin, et al., 2014). They stress the importance of establishing consistent terminology when describing children with language difficulties in order to facilitate communication with parents and invidiuals with language impairment as well as the research community. Furthermore, access to professional support is often tied to a diagnosis, which makes the establishment of consistent diagnosistic criteria and terminology all the more important.

According to Reilly et al., agreement prevails among the research community regarding the existence of persistent language problems in children, the correlation between language skills and literacy development, the fact that these language problems are often overlooked unless accompanied by additional speech sound disorders, the lack of evidence for the incorporation of nonverbal intelligence in a diagnosis of language impairment, the need and the potential dangers of diagnostic labels and the existence of too many different labels and diagnostic criteria. Reilly et al. further identified three global questions which needed to be addressed in order to help establish a consistent nomenclature and diagnostic criteria. These questions were concerned with (1) the factors that needed to be considered as drivers of change, (2) the criteria to be used for the diagnosis of language impairment and (3) the appropriate terminology to describe this developmental disorder.

In their discussion of question number one, Reilly et al. raise two essential

issues. Firstly, they question whether the exclusion criteria mentioned above are still valid but also raise caution in regard to the lack of reliable inclusion criteria. Secondly, Reilly, Bishop and Tomblin address the crucial issue that participants in research studies who were recruited according to very strict criteria, do not match the actual caseload of speech and language therapy clinics. It has further become apparent that the profiles of children with language impairment are subject to change over time (Conti-Ramsden & Botting, 1999), a factor cross-sectional studies fail to take into account. This is to say that while a narrow definiton of language impairment may be useful for research practice in order to investigate specific phenomena without confounding factors, it needs to be borne in mind that these carefully selected study groups are not a representation of the average child with language impairment. Overall, Reilly, Bishop and Tomblin suggest that "evidence-based, holistic, life-span models are required" (2014: p. 455) in order to define language impairment in a way that is representative of the clinical population.

Regarding question number two, Reilly et al. suggest that an appropriate diagnosis of children with language difficulties is only feasible if (1) their language features, (2) the impact the impairment has on their functioning, (3) the presence of other impairments and (4) the language trajectory are taken into account. This clearly suggests that Reilly, Bishop and Tomblin advocate for a holistic description and definition of language impairment, which goes beyond pure language difficulties.

Regarding the first point of their list, Reilly, Bishop and Tomblin raise yet another substantial issue in the diagnosis of children with language impairment, namely the question as to whether so-called markers, such as verb finiteness and performance on nonword repetition actually pick up the children who are most in need of intervention. As has been shown by research in the field of English as a Lingua Franca, verb finiteness, such as the third person singular *-s* seldom carries any communicative function and is therefore often omited (Seidlhofer, Breiteneder, & Pitzl, 2006) in ELF conversations. Therefore, while the omission of verb finiteness may well be a marker for monolingual children with language impairment, it does not say

anything about their actual ability to communicate succesfully. The downside of a more global definition and diagnosis is that it may not pick up some of the subtle differences between children and sub-groups that may help in treatment and prognosis.

Therefore, Reilly, Bishop and Tomblin argue, the focus of research in clinical linguistics should lie on the question how and which differences impact children's ability to communicate. Regarding the comorbidity of language impairment and other disorders, Reilly, Bishop and Tomblin emphasise that language profiles of various populations, such as children with autism spectrum disorder, EAL, or Landau-Kleffner may look similar, which is why it might not be purposeful to separate them. It is important to note, however, that these similarities may only be a superficial occurrence and that the different groups may benefit most from different intervention. One example are the superficial overlaps between children with English as an Additional Language (EAL) and their peers with language impairment. While children with problems in their language development require specific intervention from a speech and language therapist, bilingual children with typical development do not. Furthermore, a comparison of Down Syndrome and SLI (e.g.: Eadie, Fey, Douglas, & Parsons, 2002), shows that even though both groups of children have communication difficulties, certain grammatical morphemes may be more difficult to acquire for one group than the other (e.g.: 3rd person singular *–s*). However, Reilly et al. conclude that the current stage of research does not allow for a clear separation of language difficulties and other developmental disorders, which is why they should be considered but not included in a diagnosis of language impairment.

Regarding language trajectories, Reilly, Bishop and Tomblin stress that more in-depth longitudinal studies are needed to trace children's language development and that methods for early diagnosis and intervention need to be improved further base don these insights.

Finally Reilly, Bishop and Tomblin discuss the advantages and difficulties with the terms primary language impairment, language disorder, specific language impairment, language impairment, developmental dysphasia,

developmental language disorder/impairment and language learning impairment to label children with language difficulties. They analysed these terms according to factors of current use, whether or not they incorporate exclusion, are suitable for adults and are good search terms. Their main findings are summarised in table 2.

Label	Incorporates Exclusion	Suitable for Adults	Good Search Term	Other
Language Delay	No	No	No	problem will resolve
PLI	Yes	Yes	Yes	“primary“ unclear
Language disorder	No	Yes	No	many conditions
SLI	Yes	Yes	Yes	redefine!
LI	No	Yes	No	fuzzy/unclear/broad
Developmental Dysphasia	Yes	Yes	Yes	medical connotation
Develop.Lang. Disorder	?	?	Yes	parallel with dev. dyslexia
Language Learning Impairment	No	Yes	Yes	Confusion with learning disability

Table 2 Overview Language Impairment Labels (Reilly, Bishop and Tomblin, 2014)

Based on the contributions from their commentators Reilly and colleagues rule out language delay, PLI and language disorder based on the fact that the first label may imply that the language problem will resolve and that it is an unsuitable term to describe adults’ language difficulties. PLI, which was suggested and is still used by the research team around Kathryn Kohnert (cf. Ebert, Pham, & Kohnert, 2014; Kohnert, Windsor, & Ebert, 2009) is discarded on the basis that it is unclear whether the term refers to children’s age (compare to primary school), or the nature of their impairment (i.e.: primary standing for the main problem). Language disorder is considered too vast and imprecise as a search term and is therefore abolished.

In contrast to Bishop (2014), who argued for the retention of SLI as a label for children with specific language difficulties, Reilly, Tomblin and Bishop (2014) call for caution. They argue that despite its common use in research, it is a term less pervasive in clinical practice. In addition, it strongly implies an impairment that is restricted to the language domain, which has repeatedly

been shown not to be the case for all children with language difficulties (Adams et al., 2012; Chiat & Roy, 2013).

Therefore, Reilly, Tomblin and Bishop (2014) also discussed the term 'language impairment', which does not carry the connotation of children's difficulties being restricted to the language domain but has been found too vast a search term (Bishop, 2014). While this paradigm shift would result in a much more heterogenous group of children, it may help to shift attention from purely diagnostic criteria to a more functional definition of language difficulties.

Another term discussed in Reilly, Tomblin and Bishop's review is 'developmental dysphasia', which has the advantage of being similar in wording to dyslexia or dyspraxia, but at the same time medicalises a condition whose neurological underpinnings are yet to be established. In addition, similar to language delay, the term 'developmental' may not be suitable for adults or adolescents, which is also true for the term developmental language impairment/disorder. While clinicians and linguists may be well aware that developmental is not to be understood as an indication of a person's age but rather as an opposition to acquired, this distinction may be less obvious for laypeople and hence these terms are not considered suitable.

Finally, language learning impairment was suggested as an alternative because parental questionnaires revealed this to be an acceptable term for most despite the fact that it may be associated with global learning difficulties. Bearing in mind that most of the curriculum in schools is accessed through the medium of language, one can see why a strict separation of the two is not always feasible.

Based on the reviews (Bishop, 2014; Reilly, Bishop, et al., 2014; Reilly, Tomblin, et al., 2014) presented here, I would argue that language impairment is the most suitable term to describe the condition in children with language difficulties. It has the advantage of not implying a strict separation between language and other cognitive skills, which is also in line with *Dynamic Systems Theory* and all findings presented so far in this thesis. While it carries the inherent disadvantage of being a much broader term than *Specific Language Impairment*, it is simply a more realistic term, which does not only

subsume a specific sub-group of individuals with language difficulties. Additionally, language impairment does not imply any neurological causes, language trajectories or general learning abilities. The only downside of this term is hence its imprecision, but it appears to be a more realistic portrayal of the vast range of profiles subsumed under this developmental disorder. Therefore, the term language impairment will be adopted in this thesis because it firstly, describes the language profile of the atypically twin in this study better than any of the other terms proposed and secondly, fits best with the *Dynamic Model of Communicative Ability* that underlies this study.

Now that the terminology around language impairments has been discussed in quite some detail and it was explained which term best reflects the principles of dynamic systems theory and hence the *Dynamic Model of Communicative Competence*, the remaining part of this section will review findings on the linguistic, discourse, interactional, strategic and monitoring functions of children with language impairment. It will become clear from this overview that while the vast majority of research has focused on children's morphosyntactic difficulties, the term *Specific Language Impairment* is quite misleading as their problems go beyond the level of grammar.

6.2 Linguistic Abilities

The following sections will discuss the phonological, lexical morphological and syntactic development of children with language impairment. The first section will review studies investigating phonological processing skills in atypically developing children. This will be followed by a section on their productive and receptive vocabulary development and finally their difficulties with noun and verb morphology will be discussed in the last section.

6.2.1 Phonological Development

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 children with language impairment, 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 that resembles an LI profile.

Research during the 1960s tried to better understand the auditory processing deficit they observed in LI, by first playing the same two tones and then two different tones to children with language impairment and a group of controls. Children with LI 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 form each other. A similar result has been replicated for a differentiation between the sounds [ʃ] 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 LI. Additionally, performance of atypically developing 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 LI process auditory input at a much slower rate than their typically developing peers. A hypothesis which has also been suggested by Alt and Suddarth (2012).

The phonological processing problems in children with LI are, however, not solely restricted to their perceptive skills. They have also repeatedly been found to be outperformed by typically developing peers on nonword repetition tasks (Archibald & Joanisse, 2009; Dollaghan & Campbell, 1998; Estes, Evans, & Else-Quest, 2007; Marton & Schwartz, 2003; Weismer et al., 2000). This finding has been replicated across languages (Bortolini et al., 2006; Dispaldro, Leonard, & Deevy, 2013; Guiberson & Rodriguez, 2013; Stokes, Wong, Fletcher, & Leonard, 2006) and even for bilingual children (Boerma et al., 2015; Girbau & Schwartz, 2008; Thordardottir & Brandeker, 2013;

Windsor, Kohnert, Lobitz, & Pham, 2010). Nonword repetition ability therefore appears to be quite a robust marker of language impairment.

Unfortunately, the majority of studies 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 they would provide further evidence for Tallal, Stark and Curtiss' (1976) findings that plosives and plosive clusters posed more substantial problem for children with LI than nasal consonants. Similarly, Stark and Tallal's findings (1979), 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 provided.

Furthermore, the GAPS test (Gardner, Froud, McClelland, & van der Lely, 2006), a screening tool which assesses children's grammatical and phonological abilities, has also repeatedly highlighted difficulties in these areas for children with language impairment (van der Lely, Payne, & McClelland, 2011). This test has also been shown to be a reliable tool in the diagnosis of children with SLI in other languages such as German, Italian, Romanian and Lithuanian (Fürst, Laaha & Dressler, 2009).

Drawing on the findings discussed in this section and combining them with dynamic systems theory, it can be inferred that weak phonological processing in children with language impairment 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, p. 63), can be expected to be particularly prone to omission or substitution, due to their shortness. However, it is not just the shortness but also the phonological complexity (Marshall & Van Der Lely, 2007) that influences the production of past tense inflection in children with (S)LI. Marshall and van der Lely have found that children with grammatical language impairment, which will be presented in more detail in section 6.2.3., were more likely to omit past tense inflections if these ended in consonant clusters. This suggests that morphonotactics are are more substantial area of difficulty than pure phonotactics and therefore emphasises

the interactive nature of language. This is in line with dynamic systems theory, which suggests that all aspects of language and communication are intertwined and therefore a breakdown in one area will have an effect on the remaining system. The interconnectedness of different aspects of language skills will further become apparent from the reviews of their lexical and morphosyntactic development, which will be presented in the following sections.

6.2.2 Lexical Development

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 LI. Leonard (1998: 44) concludes from his literature review that children with language impairment 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 (S)LI 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 (Harley, 2008: 123-124).

The difference in vocabulary size between typically and atypically developing children also becomes apparent in their storytelling abilities, where a higher number of lower number of different words (NDW) has repeatedly been reported for children with language impairment (Altman et al., 2016; Fey, Catts, Proctor-Williams, & Tomblin, 2004; Tsimpli, Peristeri, & Andreou, 2016).

Even though the amount of words children with LI 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 LI, just as their TD peers, acquire by far more general nominals than referents for actions (Leonard 1998), which may differ for children acquiring languages without a noun bias (cf. Choi, 2015). However, for children acquiring language with a noun bias, a differentiation with 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 with regard to the range 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 children but the latter have additionally been observed to employ verbs with a lower frequency. In other words, typically developing children were found to have higher lexical diversity.

This striking difference between the two groups of children, stretches well into the early school years where the group with language impairment 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 best learned word stems in sentence final positions (Leonard et al. 1983 qt. in Leonard 1998: 46). This finding emphasises the importance of position salience in language acquisition as sentence-final, phrase-final and word-final position facilitate perception and thus acquisition, even for younger typically developing children.

Moreover, school children with LI 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 LI 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 LI. Leonard (1998), on the other hand,

states that LI 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 may take them longer to add certain words, especially the ones with a lower frequency, to their long-term memory. In other words, he argues that the difficulty for children with LI 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 LI 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 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 LI on all word learning tasks. The interesting fact in this regard is, however, that atypically developing children performed only 0.6 standard deviations (SD) below the typically developing cohort. They therefore performed below the TD group but above the -1.25 SD cut-off that Tomblin et al. (1997) suggested as an indicator for language impairment.

Additionally, Kan 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 LI and TD children increased with the number of repetitions of target items. In other words, the performance of TD children increased steadily over the course of the experiment while the affected children's result stagnated. This led 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 LI children with regard to verb learning. While Kan and Windsor's meta-analysis provided crucial information to further illustrate the

differences in lexical output between LI and TD children, they did not suggest an underlying reason for the varying performances.

This task was taken up by Mainela-Arnold, Evans and Coady (2010), Alt and Suddarth (2012) 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 LI.

The authors of the first study took a slightly different approach to word learning than the studies summarised in Kan 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 children with LI. 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 LI 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), using three possible hypotheses.

The results of their non-word repetition and sentence completion tasks, led to their conclusion that deficits in lexical-semantic mapping in (S)LI children are most likely to be due to their limited ability to inhibit unwanted input. 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 children with LI 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.

Alt and Suddarth (2012) took yet another 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 LI showed the largest number of mispronunciations and ignorance of errors in word final positions. Surprisingly, even though longer words generally posed a bigger problems for both groups, they did not seem to affect the between group differences. Another finding seems to confirm the authors' initial hypothesis that children with LI process the phonological structure of words in a different manner than TD peers. According to Alt and Suddarth's findings, children with LI outperformed their TD peers in the detection of errors in word initial position. 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 LI. 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 the performance of children with LI did not decrease with longer words. This 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.

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 LI. Despite the different research question and focus of Gray, Brinkley 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 LI. They asked a group of 114 children, 40 of whom were diagnosed with LI, 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.

Their results suggest no significant difference between LI 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 LI 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 LI.

This is a further interpretation of Gray and colleagues' (2012) findings and it indicates that phonological working memory is not to be underestimated in the processing of language.

6.2.3 Morphological and Syntactic Development

As stated above, the morphological and syntactic development of children with language impairment has been the focus of most research in clinical linguistics. This is due to the initial definition of this developmental disorder as being exclusive to the grammar domain. As morphosyntax comprises the syntactic organisation of a language as well as grammatical morphology, this section will follow the same differentiation. 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 LI will be introduced.

One of the most robust findings regarding the morphosyntactic knowledge of children with language impairment, is their problem with the acquisition of finite verb morphology as well as copula/auxiliary *be* and auxiliary *do* (see Krok & Leonard, 2015; Leonard, 1998; Pawlowska, 2014 for comprehensive reviews & meta-analyses). Based on these insights, finite verb morphology has been suggested as a clinical marker for language

impairment.

Studies which compared children with language impairment to MLU (mean length of utterance) matched controls, rather than age-matched peers, found children with LI to require a higher MLU before the correct use of some grammatical morphemes. In other words, children with language impairment 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 LI acquire grammatical morphemes at a much slower rate than their TD peers. This was confirmed in a longitudinal study by Albertini (1980 qt. in Leonard 1998: 60).

An interesting qualitative difference between typically and atypically developing children is that English-speaking children with LI tend to make more omission than commission errors. This might point toward lower levels of metalinguistic awareness, which was also confirmed by Marshall and van der Lely (2012) as well as Leonard et al. (2007). However, this finding appears to apply mainly to morphologically relatively poor languages, such as English, as findings from other languages suggest that the error patterns found in children with language impairment, may be a lot more complex and versatile, with overgeneralisation of high frequency suffixes being a very common error (e.g.: Kauschke, Kurth, & Domahs, 2011 on German).

In relation to what has been noted above 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 LI children to acquire. According to Leonard (2007) 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. This is why they may require more repetitions before they acquire certain grammatical morphemes appropriately.

It is essential to note, however, that not all grammatical morphemes seem to be equally affected by language impairment. This becomes particularly

apparent from studies comparing different morphosyntactic markers of LI, such as past tense, third person singular -s and noun plurals (Conti-Ramsden, 2003; Leonard, 2007). They found differences in atypically developing children's ability to acquire noun plurals and finite tense marking. While Conti-Ramsden reported that plural was an independent predictor of group membership, Leonard (2007) showed that LI children acquired noun plurals much faster and more accurately than the present simple third person singular *–s* (an observation that can also be made in L2 learning). He explains this difference with a shorter phonetic duration of the third person singular *–s* as opposed to plural *–s*, which may make the latter easier to acquire for children with language impairment.

Smolik and Vavru's (2014) pioneering investigation of grammatical abilities in LI children speaking a Slavic language, came to the conclusion that verbs and clitics are also disproportionately impaired in this group. The Czech-speaking participants in their study also frequently omitted verb endings, which is in line with data from Germanic-speaking children (Krok & Leonard, 2015), and Romance languages (e.g.: Italian). This finding is particularly interesting in relation to Kauschke et al.'s (2011) study, which found more complex error patterns in the plural production of their German-speaking participants with language impairment. This disparity indicates that more studies are needed on a wider range of languages in order to pin down cross-linguistic similarities and differences in children with language impairment.

Another aspect of grammar that has repeatedly been shown to pose problems to children with language impairment across languages, is syntax (Archibald & Joanisse, 2009; Eadie, Fey, Douglas, & Parsons, 2002; Riches, Loucas, Baird, Charman, & Simonoff, 2010; Riches, 2012; Seeff-Gabriel, Chiat, & Dodd, 2010; Smolik & Vavru, 2014; Stokes et al., 2006). They have been shown to omit function words, inflections and optional clauses and to simplify complex syntactic constructions.

This is further supported by findings from narrative tasks, which have repeatedly found a lower MLU in children with language impairment, which is a sign of lower sentence complexity (Altman et al., 2016; Cleave, Girolametto,

Chen, & Johnson, 2010; Norbury & Bishop, 2003; Tsimpli et al., 2016).

This concice overview of morphological and syntactic abilities in children with language impairment have highlighted three crucial points. Firstly, finite verb morphology appears to be a fairly robust marker for language impairment in monolingual English-speaking children but requires further investigation in other languages. Secondly, language impairment does not affect all grammatical morphemes equally, with (auxiliary) verbs and clitics being disproportionately affected. Finally, sentence repetition abilities have been found to be a reliable indicator of language impairment across languages, with atypically developing children omiting function words, optional sentence elements and simplifying syntactic structures.

It seems noteworthy at this point that the one most commonly recognised marker of language impairment in monolingual English-speaking children, namely the omission of verb inflections, and particularly the third person singular *–s,* is actually an occurrence in many native English dialects (cf. Trudgill, 2002). According to Trudgill, the omission of the third person singular *–s*, carries the "linguistic advantage of linguistic naturalness and simplicity" (Trudgill, 2002: 98). This links in with the crucial discussion about functionality and language impairment that was addressed in section 6. 1. of this thesis. This is to say that while the omission of third person singular *-s* may well be a marker of certain forms of language impairment in monolingual English-speaking children, we must be cautious not to overestimate its significance for actual language use and communication.

6.3 Discourse Abilities

In addition to sentence repetition or comprehension tests, narratives are a common way to elicit longer utterances from children with LI. They do not only provide the opportunity to test children's grammatical abilities in context but are also a common way to assess their macrostructural abilities.

Studies investigating the narrative abilities of children with language difficulties, tend to observe microstructural differences in the stories of TD

children and those told by their peers with language impairment (Altman, Armon-Lotem, Fichman, & Walters, 2016; Cleave, Girolametto, Chen, & Johnson, 2010; Fey, Catts, Proctor-Williams, & Tomblin, 2004; Leonard, 1996; Norbury & Bishop, 2003; Tsimpli, Peristeri, & Andreou, 2016). Their differences in lexical diversity and mean length of utterance have already been mentioned in sections 6. 2. 2. and 6. 2. 3.

However, findings with regard to story length, structure and complexity have been controversial. Only some studies find story length to differentiate between children with and without language impairment, with typically developing children usually outperforming their peers with language impairment (Cleave et al., 2010; Fey et al., 2004).

Findings are similary controversial with regard to story structure. While some studies do not find any significant differences in the story structure of typically and atypically developing children (Altman et al., 2016; Norbury & Bishop, 2003; Tsimpli et al., 2016), others do report on story grammar being affected by language impairment (Cleave et al., 2010; Reilly, Losh, Bellugi, & Wulfeck, 2004).

Based on the findings presented in this section, it can be concluded that further studies are needed in order to answer the question whether children with and without language impairment differ in aspects of narrative organisation and story length.

The next sections of this literature review will present findings in considerably less researched aspects of communication. The bias in research toward an investigation of grammatical properties of language impairment can be explained with the initial definition of this neurodevelopmental disorder as exclusive to the grammatical domain (see section 6. 1. for a detailed discussion). More recently, the clear boundaries between pragmatic and (specific) language impairment have been discussed and questioned, with proposals ranging from the two being distinct impairments (Schaeffer, 2005), to two ends of a continuum (Bishop, 2000), or co-occuring (Buiza, Rodríguez-parra, & Adrián, 2015; Osman, Shohdi, & Aziz, 2011). The following two sections will present findings from studies on the interactional and

sociocultural abilities of children with language impairment and it will become clear that these skills are highly overlapping. This is, of course, in line with the pillars of the *Dynamic Model of Communicative Ability*, which suggests a continuous interaction between all six components and all languages.

6.4 Interactional Abilities

The limited number of studies investigating interactional abilities in children with language impairment have focused on parent-child interactions (Blackwell, Harding, Babayigit, & Roulstone, 2014; Justice & Kaderavek, 2003), and conversational responsiveness (Bishop, Chan, Adams, Hartley, & Weir, 2000).

Blackwell et al.'s systematic review of parental interactions with their children with language impairment, revealed five major areas of interest: quantity and complexity of language, dialogue participation, purpose of communicative act and conversational responsiveness. The majority of studies reviewed by Blackwell et al. come to the conclusion that utterances produced by children with language impairment tend to be less complex (lower MLU) than those produced by their TD peers. However, controversy remains regarding the overall number of utterances produced by atypically developing children. Some studies report a similar number of utterances for both groups while others found significant differences in the quanitity of utterances produced by TD and LI children. Furthermore, mothers of children with LI were observed to speak more than mothers in control groups and to adapt their language input to children's receptive language skills rather than their expressive language knowledge. The discrepancy between mothers and children in regard to their language complexity has further been found to be larger in the LI group and to increase with greater delay.

So, if mothers of children with LI speak more than mothers of typically developing children, what happens when they do not speak for a while? Based on the results of five studies included in their review, Blackwell et al. come to the conclusion that children with LI are less likely to initiate conversations than their TD peers but that the number of conversational turns

and topic initiations is equal in both groups. In other words, children with LI appear to be less likely to start a conversation but once a dialogue has been initiated, they respond adequately and in similar ways to their peers. Justice and Kaderavek (2003) also found children with LI to initiate an equal number of topics as their mothers and to follow their mothers' topical lead.

Bishop et al. (2000) and Osman et al. (2011) come to a slightly different conclusion as they observed children with LI to be less responsive to adult solicitations and their replies to be incorrect or less adequate to the context. Bishop et al. add, however, that even though the significant group difference may suggest otherwise, children with LI responded to the majority of adult initiations. Bishop and colleagues also found children with LI to use fewer nonverbal responses than their TD peers, which seems somewhat counterintuitive and it does not become clear whether they use verbal or no responses instead.

The remaining studies reviewed by Blackwell et al. found parents of children with LI to use more questions, while their children used fewer questions than their TD peers. No major differences were observed for parental responsiveness in both groups and both groups of children mostly responded adequately to questions asked by their parents. Overall, the studies come to the conclusion that parental input does not differ significantly between the two groups, unless a change of strategy is required due to the child's limited language skills. This suggests that children with and without LI get the same amount and type of input but the latter may not be able to use it as efficiently as their peers.

This summary highlights a number of key points regarding the interactional behaviour of children with language impairment (and their parents). Firstly, the utterances produced by children with language impairment tend to be less complex. Secondly, they appear to ask fewer questions and initiate fewer conversations but an equal number of topics as their interlocutors and TD peers. Thirdly, parental input does not appear to differ significantly between parents of children with typical development and those with language difficulties. However, controversy remains as to the quantity of utterances they

produce and their general quality of conversational responsiveness. Therefore, more studies investigating the interactional abilities of children with language impairment are needed, in order to establish their streangth and weaknesses and to target intervention appropriately (cf. Gerber, Brice, Capone, Fujiki, & Timler, 2012).

6.5 Sociocultural Abilities

The introduction to this section already hinted on the fact that pragmatic difficulties in children with language impairment have received increasing attention. This attention has mainly resulted from an increase in studies that compared the language skills of children with language impairment and those with autism (Bishop, 2003; 2010; Chiat & Roy, 2013; Conti-Ramsden, Simkin, & Botting, 2006; Norbury & Bishop, 2003; Riches et al., 2010; Ruser et al., 2007; Williams, Botting, & Boucher, 2008). The results obtained from these investigations come to quite controversial conclusions. While the question whether autism and LI are in fact two manifestations of the same aetiology is, undoubtedly, an interesting question, the word limit of this thesis does not allow for an in-depth exploration of this question. However, the interest in the exact relationship between these two neurodevelopmental disorders, which have long been considered as entirely independent from each other, is essential for the context of this thesis.

While researchers may argue for or against the co-morbidity of language impairment and autism, parallels in their language profiles are undeniable. These parallels have led to a substantial increase in studies investigating the pragmatic (or social communication) abilities in children with LI, leasing to rather controversial results.

Schaeffer (2005) argues that grammar and pragmatics are two distinct properties, which develop independently from one another and that pragmatics are not affected in children with language impairment. This stands in contrast to Osman et al. (2011), Chiat and Roy (2013), Bishop (2000) Buiza et al. (2015), who all argue for an interaction between the linguistic and pragmatic skills in children with LI.

Osman et al. (2011) and Buiza et al. (2015) found children with LI to be outperformed by their peers with typical language development on all measures of pragmatic language skills, which included understanding and describing object functions, conversational skills, inentionality and narrative skills. Chiat and Roy (2013) also found a substantial number (almost one third) of their participants to have social communication difficulties aged 9-11. It is important to note that these children had initially been referred to clinical services because of their language difficulties and neither of them had been diagnosed with ASD. These findings suggest that sociocognitive skills and language are interrelated and that pragmatic difficulties affect a substantial number of children with language impairment. Finally, Bishop's (2000) investigation of the question whether pragmatic language impairment should be considerate a correlate of LI or a distinct sub-type led to the conclusion that they are related manifestations on a continuum of language impairment which may or may not co-occur.

Finally, a crucial aspect of social communication skills, is the understanding of *Theory of Mind* as it allows us to infer how much information our interlocutors require in order to follow our communicative goal. The importance of this skill in the context of bilingualism was explained in detail in section 5.5. of this thesis. It has repeatedly been shown that age-matched typically developing children outperform their peers with language impairment on *Theory of Mind* (usually false belief) tasks (Andrés-Roqueta, Adrian, Clemente, & Katsos, 2013; Farrant, Fletcher, & Maybery, 2006; Loukusa, Mäkinen, Kuusikko-Gauffin, Ebeling, & Moilanen, 2014; Miller, 2001).

Studies investigating Theory of Mind skills in children with language impairment have found that they tend to be outperformed by their peers but perform similarly to MLU-matched control groups (Andrés-Roqueta et al., 2013). This implies that their development of Theory of Mind is delayed, rather than qualitatively different from that of typically developing children. Furthermore, this finding allows for the conclusion that *Theory of Mind* and language skills are inter-related. This hypothesis is confirmed by Loukusa et al.'s (2014) finding that the association between the language and ToM

scores of children with language impairment was stronger than in children with autism and that the LI group performed better on nonverbal *Theory of Mind*. Miller (2001) comes to a similar conclusion, based on her finding that children with LI performed similarly to TD controls on ToM tasks with a lower linguistic complexity.

The performance of children with language impairment on Theory of Mind tasks is also interesting in relation to their use of internal state terms as the two have been found to be associated (cf. section 5.5.). While Altman et al. (2016) and Ziatas et al. (1998) did not find significant differences between children with and without LI, others did. Tsimpli et al. (2016) found both their bilingual and their monolingual TD groups to outperform their peers with language impairment on their use of *internal state* and *Theory of Mind* terms. Similarly, the children with language impairment in Cleave et al.'s (Cleave et al., 2010) showed below average performance on measures of literate language.

In essence, this section on the sociocultural skills in children with language impairment strongly implies that social and language skills are related, which corresponds to dynamic systems theory. However, it also became apparent that further studies are needed to shed more light on the Theory of Mind skills in children with language impairment and how they relate to their use of internal state terms.

The following section will summarise the very scarce insights on communication strategies in children with language impairment before finally, their cognitive development is going to be discussed.

6.6 Strategic Abilities

To my knowledge, only one single study focused specifically on communication strategies in children with language impairment.

Merrison and Merrison (2005) differentiate between children with specific language impairment and a group with pragmatic language impairment. They come to the conclusion that the group of children they refer to as having SLI,

show similar communication strategies to TD peers while the group with pragmatic difficulties initiates repair significantly less frequently. This finding is in line with Bishop (2000) suggestion that some children with language impairment may have co-occuring pragmatic difficulties, while others may only have problems in the grammatical domain, which is also confirmed by Chiat and Roy's (2013) study. While the differentiation between pragmatic and specific language impairment is certainly debatable, Merrison and Merrison's study shows that (some) children with language impairment show difficulties with communication strategies.

This is confirmed by Osman et al. (2011), who investigated communication strategies as sub-components of conversational skills. In contrast to Merrison and Merrison (2005), they found children with 'classic' specific language impairment to be outperformed by their peers with typical language development on communication strategies.

While caution must be exercised due to the limited number of studies investigating strategic abilities in children with language impairment, the results available to date suggest that this area also poses difficulties for atypically developing children. Again, this is in line with dynamic systems theory and previously presented results, which suggest that language impairment goes beyond the morphosyntactic properties of language and affects children's general communication skills. More studies providing an analysis of the qualitative differences in communication strategies employed by children with and without language impairment are certainly required.

6.7 Monitoring Abilities

The results on cognitive abilities in children with language impairment presented in this section, will largely be centred around two meta-analyses (Gallinat & Spaulding, 2014; Vugs, Cuperus, Hendriks, & Verhoeven, 2013). Gallinat and Spaulding provide a review of children's performance on norm-referenced test of nonverbal cognition, while Vugs et al. focus on their visuospatial working memory. Their findings are particularly relevant in

relation to the discussion about the definition of language impairment as a language-specific or a domain-general neurodevelopmental disorder.

Gallinat and Spaulding's review of 131 studies revealed that, on average, children with language impairment performed -0.693 standard deviations below their TD peers on measures of nonverbal IQ even after variability was taken into account. This is a significant difference and questions the definition of language impairment as being exlusive to the linguistic domain, to say the least. Once more, this result is in line with dynamic systems theory, which suggests that all levels of cognitive and language processing are intertwined.

Vugs et al.'s (2013) meta-analysis of 21 studies on visuospatial working memory came to a similar conclusion. They found significant effect sizes for visuospatial storage central executive tasks, with atypically developing children performing an average of half a standard deviation below their typically developing peers. This suggests that the problems of children with language impairment are not solely concerned with the verbal domain of working memory, but also affect their performance on visuospatial tasks, such as *Corsi Blocks*. Vugs et al. add, however, that the effect size in their meta-analysis is only about half to one third of the difference on verbal working memory tasks (Graf Estes et al., 2007).

In sum, the insights from the two meta-analyses presented in this section, together with the results from Graf Estes et al.'s (2007) analysis, which were presented in more detail in section 6. 2. 1. of this thesis, suggest that language impairment is not a domain-specific phenomenon.

6.8 Summary

This section started out with a discussion on the definition of language impairment, the controversy around exclusion criteria and markers, the debate around the requirement of a mismatch between cognitive and linguistic skills and, connected to all of these points, the disagreement around the correct nomenclature for this neurodevelopmental disorder. I have argued for the adoption of *language impairment* as a term, based on the fact that it does not

imply a restriction to the language domain, quite unlike the terms *specific/primary language impairment*. Furthermore, it does not medicalise a condition whose neurological underpinnings we have not yet understood entirely. It is also a suitable term for adults with language difficulties, as it does neither imply an envisaged end of the condition, nor the age of people affected by it, unlike terms containing the words *developmental* or *delay*.

Bishop (2014) argued that language impairment is too vast a search term and therefore rejected it. I would argue to the contrary and say that this heterogeneity is a more accurate reflection of the average caseload in a speech and language therapy clinic and helps to do away with the prejudice that language impairment is exclusive to the domain of morphosyntax. The wide variety of conditions subsumed under the umbrella term language impairment is also in line with the results presented in sections 6. 2. through to 6.7., which reviewed the linguistic, discourse, interactional, sociocultural, strategic and monitoring abilities in children with language impairment.

It became clear from these summaries that while the vast majority of research focused on children's phonetic/phonological and grammatical abilities, an increasing number of studies indicates that their discourse, interactional, sociocultural, cognitive and even their strategic competences are also affected by this neurodevelopmental impairment.

It was shown that nonword repetition task are a promising method to distinguish between typically developing children and their peers with language impairment across languages. Furthermore, verb finiteness has been found to be a particular weakness in monolingual children with language impairment, who speak Germanic languages. It is still unclear, however, whether or not the same is true for children who speak morphologically richer languages and therefore more studies are needed to shed additional light on this question. Differences were also observed in the ability of children with language impairment to acquire lexis, with verbs representing a particular area of weakness. This finding was also supported by data from narrative tasks, which repeatedly found a lower number of different words (NDW) in children with language impairment. Syntactically, children with language

impairment have firstly, been found to perform worse on sentence imitation tasks and to produce less complex sentences than their age-matched peers, which became particularly apparent in their lower mean length of utterance (MLU).

However, those differences in NDW and MLU have not necessarily been found to be reflected unanimously in the macrostructural organisation of stories told by children with and without language impairment. It was therefore concluded that further studies investigating story length, structure and complexity are needed in order to shed light on the question whether children with and without language impairment differ in this aspect of storytelling ability.

Section 6. 4. reviewed studies investigating the turn-taking behaviour of children with language impairment in contrast to their peers with typical development. It emerged that children with language difficulties tend to initiate fewer conversations, use simpler syntax and ask fewer questions than their peers, but initiate an equal number of topics. Furthermore, a comparison of parental input in the two groups did not reveal any significant differences. The overall number of utterances produced by children with language impairment and the quality of their responses still requires further investigation, as different studies come to controversial conclusions.

The ability to interact with another person in a meaningful way is, of course, essential to communication and requires an abstract understanding of the speech situation as well as the interlocutor's previous knowledge and their communicative intents. Children with autism tend to struggle particularly with the social aspect of communication and traditionally, ASD and (S)LI were treated as entirely independent conditions. However, a recent increase in studies investigating the overlaps between these two neurodevelopmental disorders have (partly) come to the conclusion that they might rather represent a continuum of communication impairments. Based on the review of studies investigating the pragmatic skills of children with language impairment, it can be concluded that language and pragmatic skills are closely related and therefore an impairment in one domain may, or is likely to have

repurcussions in the other.

Children with language impairment have also been found to show a different and less efficient repair behaviour than their peers with typical language development. Finally, two reviews of their cognitive development clearly indicate that their nonverbal abilities are also affected by this neurodevelopmental impairment. While the gap between TD children and their peers with language difficulties was more substantial in verbal working memory skills, it still amounted to ¾ of a standard deviation in nonverbal IQ and visuospatial memory. These findings clearly question a domain-specific definition of language impairment.

Overall, all insights obtained in this section are in line with *Dynamic Systems Theory* and therefore the *Dynamic Model of Communicative Ability*, as they show a clear interconnectedness between all components of communication. It may well be the case that children with language impairment may present with a variety of superficial manifestations of this neurodevelopmental disorder, based on their language experience and other underlying conditions. However, I would strongly argue, that a restriction of an impairment to just one domain is the exception, rather than the rule. I would further suggest that the representation of language impairment as a domain-specific condition is a result of a bias in research toward large group studies, which require a focus on very specific phenomena. Furthermore, large group studies face the inherent drawback that time constraints only allow for participants to be screened superficially in order to establish whether or not they meet the (arbitrary) exclusion critera for language impairment, making it impossible to describe in-depth language profiles.

While insights from quantitative studies are undoubtedly essential for our partial understanding of language impairment, it needs to be borne in mind that they can only ever paint a fraction of the picture. Therefore, they need to be complemented by in-depth holistic analyses such as the one presented in this thesis. Before the results of the twin case study are presented, the results of a systematic review of studies directly comparing bilingual children with and without language impairment, will be presented. The studies were organised

according to the six components of the *Dynamic Model of Communicative Abilities*, whereever possible but the reader will soon realise that, similar to studies on monolingual language impairment, research on bilingual language difficulties has a strong bias toward morphosyntactic difficulties. It will be discussed at the end of the following section, why this approach may be detrimental to the study of typical and atypical language development.

7 A Systematic Review of Typically Developing Bilingualism and Bilingual Language Impairment

7.1 Introduction

This systematic review sets out to provide an overview of peer-reviewed studies that have been published on the intersection of typical and atypical bilingual language development and to provide a summary of their results. The last such review was published in 2009 (Kohnert & Medina, 2009). The *COST Action IS0804,* entitled *Language Impairment in a Multilingual Society: Linguistic Patterns and the Road to Assessment,* focusing on precisely this disentanglement of overlaps between typically and atypically developing bilingualism started in the same year. It was therefore deemed appropriate to re-visit this area of research two years after the project came to a close and publications resulting from it were becoming available. Systematic reviews originated in the medical sciences and their aim is to provide an unbiased summary of available studies focusing on a specific topic. In order to achieve this goal, they follow a very strict methodology, which will be outlined in the following section.

7.2 Method

The systematic review presented here was guided by the principles of the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009) and the checklist therein, as far as they could be applied to case-control studies.

7.2.1 Criteria for including Studies

Population. Participants had to be preschool and school children (usually aged 2;0-5;0 and 6;0-12;0 years) and include one group of children with language impairment and one control group of typically developing children. The group with language impairment either had to be diagnosed by trained speech and language therapists or assessed and subsequently diagnosed as part of the empirical study. The language impairment had to be diagnosed in

the absence of autism, hearing loss and atypical nonverbal development. The two groups had to be matched on either age or mean length of utterance (MLU). Both groups had to be bilingual, either from birth (simultaneous) or with a later onset (sequential) and be matched on their exposure to both languages. There was no restriction as to the language combinations involved. Studies comparing either bilingual group solely to a monolingual group were excluded. So were studies on bi-modalism, investigating bilinguals who sign one of their languages.

Variables measured. All studies investigating, testing or observing one or more aspects of bilingual spoken language development were included in this review.

Type of study. Case-control studies reporting on original data, comparing bilingual children with and without language impairment, were included in this review. In addition, case studies and single-subject experimental designs, comparing one bilingual child with language impairment to one (or more) typically developing control children were also considered. Peer-reviewed journal articles, book chapters, doctoral dissertations and conference proceedings were included. Intervention studies were not included in this review. Neither were reviews, anecdotal reports, summaries of previously published data, conference presentations that were not publicly available, comments and other forms of publication not including original data.

7.2.2 Search Methods

Twelve electronic databases were identified according to their use in systematic reviews of bilingual language development (Kohnert & Medina, 2009) and related fields (e.g.: Blackwell, Harding, Babayit, & Roulstone, 2014): Academic Search Complete, CINAHL Plus with Full Text, MEDLINE Complete, PsycARTICLES, PsycINFO, SocINDEX with Full Text, Child Development & Adolescent Studies, Communication Source, eBook Collection (EBSCOhost), ERIC, and accessed in July 2015. Boolean logic and keyword mapping were used to include the widest possible range of variants of the

search terms “bilingual language impairment” (see Appendix). The search comprised titles and text words, and identified publications were subsequently searched for further references. The search included articles published in English, German, French and Polish.

7.3 Search Results

The database search yielded a total of 446 results. An additional 72 references were added from other sources, including previous and subsequent hand searches as well as Kohnert & Medina’s (2009) review. After duplicate removal 462 articles remained for title screening. The titles of the studies were screened against the search terms and 329 studies were excluded for the following reasons; monolingualism, autism, fMRI studies, speech/sound disorder (in isolation), bi-modality or entirely unrelated topics. The abstracts and full texts of the remaining 133 articles were evaluated by the authors based on the inclusion and exclusion criteria and and CASP (Critical Appraisal) Checklist for case-control studies and a total of 60 articles were eliminated due to wrong publication type (n=22), one of the two bilingual groups missing (n=32), based on their checklist score (n=5) or because the full text was not available upon request (n=1). In total, 44 references, comprising peer-reviewed journal articles, doctoral theses and book chapters build the basis for this literature review. Fig 11 illustrates the search process.

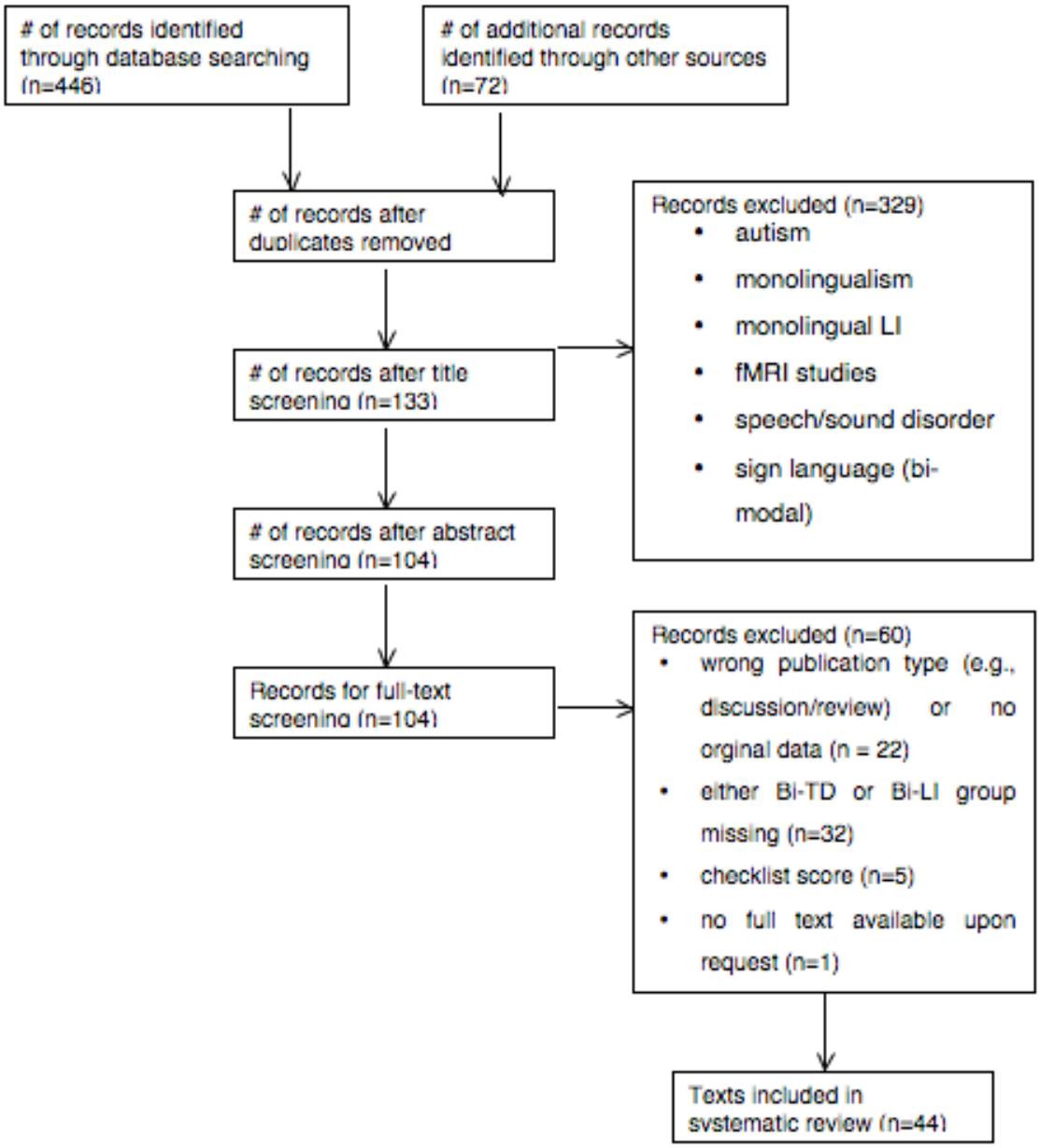


Figure 11 Flowchart of Review Process

7. 3. 1. Included Studies

Forty-four studies were retained for inclusion in this review. The included studies were published between 1983 and 2016. Two of the references in this review are published doctoral dissertations (Juarez, 1983; Orgassa, 2009).

The majority of the studies included in this review (n=32) are case-control studies, containing one Bi-LI group and one age-matched Bi-TD group. Two of the studies included in this review are case studies, comparing one bilingual child with language impairment to either one (Restrepo & Kruth, 2000) or three (Lee & Gorman, 2008) typically developing bilingual children.

In total, the findings presented in this review are based on 1202 typically developing bilingual children, 752 bilingual children with language impairment, 945 atypically developing monolingual children, 329 typically developing monolinguals and 25 English language learners, who were acquiring English in a form setting. 16 of these were children and nine were adults.

All studies retained for this review were published in English. This dominance of English also becomes apparent from the languages combinations investigated in the included studies. The majority of studies investigated some language combination including English (n=34), with English-Spanish being the most common language combination (n=28). English was also studied in combination with Hebrew (n=2), French (n=1), Korean (n=1) and other (mixed) languages (n=2). Spanish was the second most researched language in the studies included in this review. Followed by language pairs including Turkish (n=9) and Dutch (n=6). Four studies investigated Dutch-Turkish (only) bilinguals, followed by any of the following; Dutch-Turkish/Moroccan/Berber/Surinamese (n=2) and German-Turkish (n=2). Lastly, two studies examining Swedish-Arabic and Greek with a combination of other languages, are included in this review.

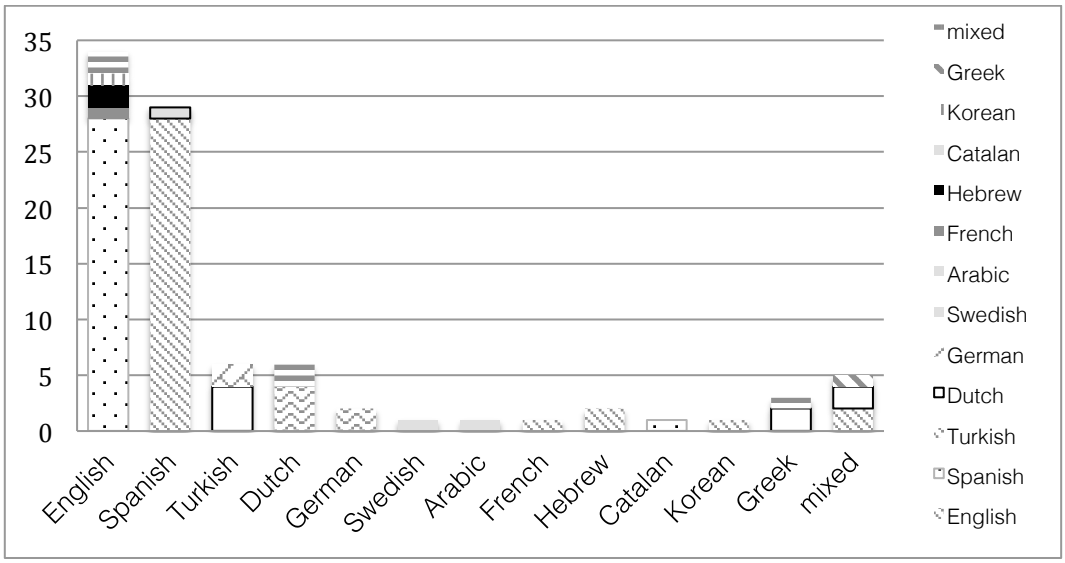


Figure 12 Language Combinations

Only 18 of the 44 studies in this systematic review tested both the children's languages and only one study (Iluz-Cohen & Walters, 2012) also investigated bilingual mode. This is the deliberate mixing of a child's two languages in interaction with another bilingual interlocutor. Two studies assessed children's preferred language (Peña, 2000; Sanz-Torrent et al., 2008), the latter of which also accepted bilingual mode as a language choice. Sixteen of the studies investigating only one of the children's languages, focused on their L2 while the remaining eight assessed their first language.

Most studies (n=29) included in this systematic review investigated some aspect of grammar. The majority focused on a combination of verb and noun morphology (n=10) [1] or just verb morphology (n=9) [2]. Verhoeven and colleagues took an integrated approach by researching the phonological, morphosyntactic, lexical and textual abilities of bilingual children with and without language impairment (2011; 2012). Lexis (Gibson, Peña, & Bedore, 2014; Jacobson & Walden, 2013) and case morphology (Lee & Gorman,

[1] Gillam et al.,2013;Gutiérrez-Clellen et al.,2008;Gutiérrez-Clellen&Simon-Cereijido, 2007; Jacobson, 2011; Juarez, Manuela, 1983; Orgassa, 2009; Restrepo & Kruth, 2000; Restrepo, 1998; Salameh et al., 2004; Simon-Cereijido. Gutierrez-Clellen, 2007

[2] Blom, De Jong, Orgassa, Baker, & Weerman, 2013; Blom & Paradis, 2013, 2014;

[2] Blom, De Jong, Orgassa, Baker, & Weerman, 2013; Blom & Paradis, 2013, 2014; Clahsen et al., 2014; Jacobson, Peggy F. Schwartz, 2005; Jacobson, Peggy. Livert, 2010; Orgassa & Weerman, 2008; Sanz-Torrent et al., 2008; Verhoeven, Steenge, & van Balkom, 2011

2008; Rothweiler, Chilla, & Babur, 2010) were investigated in two studies respectively and four studies were dedicated to either definite article and noun agreement (Eng & O'Connor, 2000), grammatical development (Håkansson, Salameh, & Nettelbladt, 2003), the use of clitic pronouns as direct objects with finite verbs (Jacobson & Schwartz, 2002) or syntax (Merino, 1983).

Three studies investigated phonological processing (Girbau & Schwartz, 2008; Thordardottir & Brandeker, 2013; Windsor, Kohnert, Lobitz, & Pham, 2010;). Four studies (Altman, Armon-Lotem, Fichman, & Walters, 2016; Iluz-Cohen & Walters, 2012; Squires et al., 2014; Tsimpli, Peristeri, & Andreou, 2016) researched narrative abilities. Pragmatic abilities of typically and atypically developing bilingual children were also assessed in two of the studies included in this review (Brice & Montgomery, 1996; Damico & Oller, 1983). Peña and colleagues investigated modifiability (i.e.: planning, attention to task/discrimination, motivation, transfer, responsivity, and examiner effort) twice in this population (Peña, Gillam, & Bedore, 2014; Pena, 2000) and Roseberry and Connell (1991) investigated the ability of bilingual children with and without language impairment to learn new grammatical rules. Children's understanding of semantics was assessed twice by Sheng and colleagues (Sheng, Bedore, Pena, & Taliancich-Klinger, 2013a; Sheng, Pena, Bedore, Fiestas, 2012). One study explored the code-switching behavior of typically and atypically developing bilingual children (Gutiérrez-Clellen, Cereijido, & Leone, 2009).

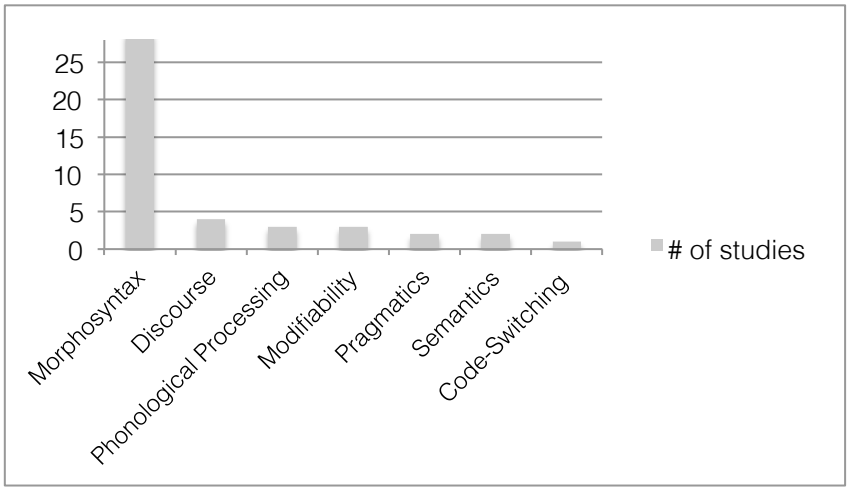


Figure 13 Studies According to Focus

When looking at the ratio of publications per year, it becomes clear that more articles featured in this review were published in the five years between 2009 and 2014 than the preceding 25 years. This is in line with the expectations outlined in the introduction to this review, namely that the COST Action IS0804 would generate a surge in publications and thus warrants a re-visit of this area of research. It is also apparent that the field of Bi-LI started out as a heterogeneous area of research, investigating not only the morphosyntactic abilities of bilingual children but also their pragmatic understanding, their semantic skills and possible differences in modifiability between the typically and the atypically developing population. This changed drastically between the years 2002 and 2007, when the main focus of all articles included in this review were the morphosyntactic differences between bilingual children with and without language impairment. From 2008 onwards, the main interest remained morphosyntax; however, phonological skills, code-switching, discourse and semantics also started to be investigated (again).

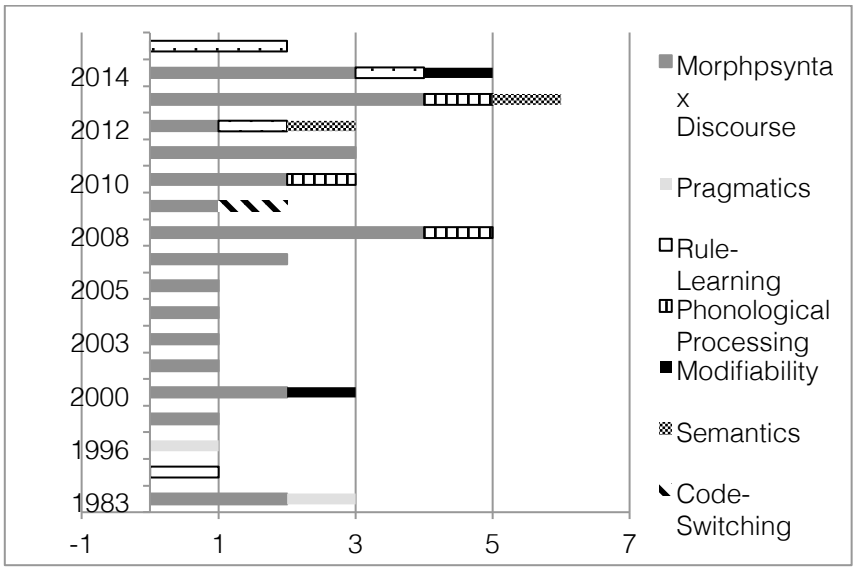


Figure 14 Study Focus According to Year

In light of recent research, questioning the restriction of language impairment to the domain of grammar (e.g. Adams, Lockton, Gaile, Earl, & Freed, 2012; Chiat & Roy, 2013; Conti-Ramsden, Simkin, & Botting, 2006), leading to a discussion regarding the most appropriate nomenclature for this developmental disorder (Bishop, 2014; Reilly, Bishop, et al., 2014; S. Reilly,

Tomblin, et al., 2014), the absence of studies investigating the social communication skills of atypically and typically developing bilingual children is particularly remarkable.

7.4 Risk of Bias

According to the *Critical Appraisal Skills Programme Checklist for Case Control Studies* (CASP; 2013), risk of bias refers to the quality and validity of studies and the credibility of their results. Overall, all studies included in this review are of a mid-to-high quality as assessed by CASP. Based on case and control recruitment, assessment of exposure and socio-economic status (SES) and credibility of their results, twenty-seven studies were judged to be of high and seventeen studies of medium quality (see table 3).

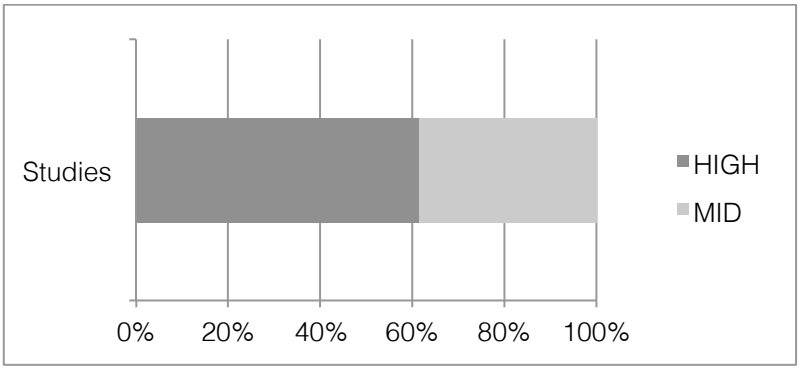


Figure 15 Quality of Studies According to CASP Case-Control

Cases were considered to have been recruited in an acceptable way if they had either been diagnosed with language impairment by qualified speech and language therapists who had experience working with and diagnosing bilingual children, if parents and/or teachers raised concerns with regards to the children's language development, or if children performed a minimum of 1SD below the norm on two of the subtests administered by the research team. Any of these criteria in isolation or in combination were considered acceptable. Only one study included in this review (Eng & O'Connor, 2000) did not specifically state how the group with language impairment was recruited. Among the remaining studies, fourteen used previous diagnoses by speech and language therapists (SLT) or enrollment in a special school for

language problems as the single inclusion criterion for the language impaired group. However, the majority of studies employed a combination of two or more of the following; SLT diagnoses, formal language tests, teacher referrals, percentage of grammatical utterances and grade retention. Using more than one criterion for the diagnosis of language impairment can be considered more reliable due to the complex nature of bilingualism and the frequent misdiagnosis of bilingual children.

A further potential confounding factor lies within the inherent nature of bilingualism research and comprises the appropriate selection of controls. While age-matched controls allow for an assessment of children's language delay in comparison to their peers, any differences in communication skills may be attributed to their limited language abilities. Therefore, language-matched controls are sometimes given preference over age-matches. In this case it needs to be borne in mind, however, that typically developing language-matched children tend to be a lot younger than clinical populations and hence children with language impairment but no other cognitive difficulties tend to be developmentally a lot more advanced. In most of the studies included in this review, preference was given to age-matches over language-controls. Only six studies included both age and MLU comparisons.

Exposure is a further aspect that needs to be accounted for when assessing bilingual children's language skills is their exposure to their two languages. This measurement should comprise the first contact with a second language as well as daily language use as both are highly influential in bilingual language development and thus hamper comparisons across bilingual groups. Exposure tends to be measured either through parental or teacher questionnaires or in terms of school entry or years of residence in a country.

The problem with using school entry or years of residency as an indicator of exposure is that neither account for older siblings, friends or relatives speaking the community language; TV programs in the societal language or other channels through which a child may be introduced to the majority language in a country. In-depth information about children's language use and

exposure, as obtained from interviews and questionnaires should hence be given preference over years of residency or school entry as they have been found to be a more reliable measurement of both children's language skills and language use (Tuller, 2015).

Thirteen of the studies analysed here did not specify how or if they accounted for exposure in the recruitment and matching of their two groups. The majority of the studies measuring exposure used parental and/or teacher questionnaires. Only three studies measured exposure according to years in school (Brice & Montgomery, 1996) or pre-school (Håkansson et al., 2003; Salameh, Håkansson, & Nettelbladt, 2004).

Another potential bias in the studies was related to limited information on the children's socio-economic background. Seventeen of the forty-four selected studies in this review either did not mention SES in their selection of subjects or did not provide any information in regard to this potentially confounding factor. In light of recent research (Czinglar, Kröll, Sharma, & Dressler, in press; Chiat & Polišenská, in press) emphasising the crucial role of socio-economic background for language development, this seems particularly noteworthy.

Of the twenty-seven studies that did report on their participants' SES twelve recruited their subjects from families with a low-to-mid socio-economic background. Three studies covered the whole span from low to high SES and three further studies focused on low-income families. Two studies reported on children from mid socio-economic backgrounds, two from high and one from mid-to-high. Five studies indicated that their participants were matched on SES but did not provide any further information on their socio-economic background.

Similar to the assessment of exposure, a child's SES can be measured in numerous ways. One of the most commonly employed tools (Adams & Weakliem, 2011) in this respect is Hollingshead's "Four Factor Index of Social Status" (Hollingshead, 1975), which originally combined a person's level of education, employment type, marital status and sex to calculate their SES.

More recently preference is given to the combination of just two factors,

namely education and employment type. Five studies included in this review relied on Hollingshead's classification to determine children's SES. Three studies used a combination of parental education and eligibility for free lunch as indicators of socio-economic background, while the remaining studies employed singular measures such as maternal education, parental education, parental occupation, family income or eligibility for free lunch to determine SES. In order to assure the reliable affiliation of children with a social group as well as appropriate across-group and across-country comparisons, preference should probably be given to an established tool such as Hollinghead's index of social status, or a combination of parental occupation and education.

Author (year)	3 case recruitment acceptable?	4 controls acceptable?	5 exposure measured accurately?	6b confounders considered?	9 Results believable?	Quality
Altman et al. (2016)	Yes (SLT & tests)	Yes (age)	Yes (parental questionnaire)	No SES	Yes	HIGH
Blom et al. (2013)	Yes (SLT & tests)	Yes (age)	Yes (p.questionnaire)	No SES, just region	Yes	HIGH
Blom & Paradis (2013)	Yes (SLT)	Yes (age & MLU)	Yes (p.questionnaire)	Yes	Yes	HIGH
Blom & Paradis (2014)	Yes (SLT)	Yes (age & MLU)	Yes (p.questionnaire)	Yes	Yes	HIGH
Brice & Montgomery (1996)	Yes (SLT)	Yes (age)	No (acc. to school years)	No SES	Yes	MID
Clahsen et al. (2014)	Yes (tests&interviews)	Yes (exposure&MLU)	CT	No SES	Yes	MID
Damico et al. (1983)	Yes (tests & referral)	Yes (age)	CT	No SES	Yes	MID
Eng & O'Connor (2000)	CT	Yes (yes)	Yes (p.questionnaire)	No SES	Yes	MID
Gibson et al. (2014)	Yes (SLT&P/T)	Yes (age&experience)	Yes (p&t.questionnaire)	Yes	Yes	HIGH
Gillam et al. (2013)	Yes (tests)	Yes (age)	Yes (p.questionnaire)	Yes	Yes	HIGH
Girbau & Schwartz (2008)	Yes (SLT)	Yes (age)	Yes (p.questionnaire)	Yes	Yes	MID
Gutierrez-Clellen et al. (2007)	Yes (%gramm.utt&P&T)	Yes (age)	Yes (p&t questionnaire)	Yes	Yes	HIGH
Gutierrez-Clellen et al. (2008)	Yes (SLT&P&T)	Yes (age)	Yes (p&t questionnaire)	Yes	Yes	HIGH
Gutierrez-Clellen et al. (2009)	Yes (SLT&P&T&tests)	Yes (age)	Yes (p&t questionnaire)	Yes	Yes	HIGH
Hakansson et al. (2003)	Yes (SLT)	Yes (age)	No (exposure to Swedish in preschool & parental dialect)	Yes	Yes	HIGH
Iluz-Cohen & Walters (2012)	Yes (special school&SLT)	Yes (age)	Yes (school)	Yes	Yes	MID

Jacobson & Schwartz (2002)	Yes (SLT&tests)	Yes (age)	Yes (p.questionnaire)	Yes	Yes	HIGH
Jacobson & Schwartz (2005)	Yes (SLT&tests)	Yes (age)	Yes (p.interview & residency)	Yes	Yes	HIGH
Jacobson & Livert (2010)	Yes (SLT/%gramm.utt/grade retention)	Yes (age-younger)	Yes (p&c questionnaire)	Yes	Yes	HIGH
Jacobson (2011)	Yes (SLT/grade retention/tests)	Yes (age)	Yes (p&c reports)	No SES	Yes	MID
Jacobson & Walden (2013)	Yes (SLT/grade retention/tests)	Yes (age-difference at higher age)	Yes (c&p report)	Yes	Yes	HIGH
Juarez (1983)	Yes (SLT)	Yes (age)	CT	Yes	Yes	MID
Lee & Gorman (2008)	Yes (SLT&P&T)	Yes (age&MLU)	Yes (p&c&t interview)	Yes (high)	Yes	HIGH
Merino (1983)	Yes (SLT&T&tests)	Yes (age)	CT	Yes	Yes	HIGH
Orgassa & Weerman (2008)	Yes (SLT)	Yes (age)	Yes (p.questionnaire)	No SES	Yes	MID
Orgassa (2009)	Yes (SLT)	Yes (age)	Yes (p.questionnaire & school records)	No SES	Yes	MID
Pena (2000)	Yes (T&P&observation)	Yes (age)	CT	No SES	Yes	MID
Pena et al. (2014)	Yes (SLT)	Yes (age)	Yes (p&t report)	Yes	Yes	HIGH
Restrepo (1998)	Yes (SLT)	Yes (age)	Yes (classroom placement/language-arts instruction/p&t questionnaire)	Yes	Yes	HIGH
Restrepo & Kruth (2000)	Yes (SLT)	Yes (age)	Yes (p.questionnaire)	Yes	Yes	HIGH
Roseberry & Connell (1991)	Yes (SLT&tests)	Yes (age)	CT	No SES	Yes	MID
Rothweiler et al. (2010)	Yes (SLT)	Yes (age; younger vs. older)	CT (school entry?)	No SES	Yes	MID

Salameh et al. (2004)	Yes (SLT)	Yes (age)	No (exposure to Swedish in preschool & parental dialect))	Yes	Yes	HIGH
Sanz-Torrent et al. (2008)	Yes (tests)	Yes (age&MLU)	CT	Yes	Yes	HIGH
Sheng et al. (2012)	Yes (test&P&T)	Yes (age & language)	Yes (p. &t. interview)	Yes	Yes	HIGH
Sheng et al. (2013)	Yes See above	Yes (age)	Yes (p.&t. interview)	Yes	Yes	HIGH
Simon-Cereijido & Gutierrez-Clellen (2007)	Yes (SLT/P/T)	Yes (age)	Yes (p. &t. questionnaire)	Yes	Yes	HIGH
Squires et al. (2014)	Yes (SLT)	Yes (age)	Yes (p&t interview)	No SES	Yes	HIGH
Thordardottir & Brandeker (2013)	Yes (tests)	Yes (age)	Yes (p. questionnaire)	Yes	Yes	HIGH
Tsimpli et al. (2016)	Yes (SLT – diagnostic centre + tests + parental questionnaire)	Yes (age)	CT	Yes (but: Mono-TD SES > Bi-TD, Bi-LI & Mono-LI)	Yes	HIGH
Verhoeven et al. (2011a)	Yes (multidisciplinary team &tests)	Yes (age)	CT	No SES	Yes	MID
Verhoeven et al. (2011b)	(multidisciplinary team	Yes (age)	CT	No SES	Yes	MID
Verhoeven et al. (2012)	Yes (multidisciplinary team)	CT (previous study)	CT	No SES	Yes	MID
Windsor et al. (2010)	Yes (tests&SLT&P)	Yes (age)	CT	No SES	Yes	MID

Table 3 Risk of Bias Assessment per Study

7.5 Linguistic Abilities

An analysis of the bulk of studies investigating similarities and differences in the use of grammatical features by bilingual children revealed seven potentially differentiating factors between children with and without language impairment. These include overall accuracy, omission vs. commission, relationship between L1 and L2, order of acquisition, lexical diversity, complexity and phonology. The findings regarding each of these features will be described in turn in the following parts of this section.

7.5.1 Phonetic and Phonological Development

The correct pronunciation of foreign languages tends to be particularly tedious, if not impossible, to learn. It is an area that has been investigated rigorously (e.g. Penfield and Roberts, 1959; Lenneberg, 1967; Long, 1990; Birdsong 1999, 2004; Bongaerts 2005 for an overview) as part of critical period research and has been found to be the strongest argument for the existence of such a sensitive time frame. Considering that the cut-off ages for monolingual native-like attainment range from three years of age to puberty, the question as to whether the pronunciation of typically and atypically developing bilinguals differs is relevant for the underlying systematic review. Indeed, a number of studies included in this review have given particular attention to the articulation of bilinguals with and without language impairment. The first study to do so was Merino's (1983) investigation of English-Spanish bilinguals, which found typically developing bilinguals to outperform their peers with language impairment on measures of Spanish articulation and particularly on consonant clusters. It is noteworthy in this regard that differences between the two groups were particularly evident around the age of five and diminished with increasing age.

Verhoeven, Steenge and van Weerdenburg (2011) found six–to eight-year-old bilingual children with typical language development and various L1s to outperform their peers with language learning difficulties on Dutch

articulation and auditory discrimination tasks at all ages. A similar pattern emerged for the two monolingual groups. Interestingly, their analyses only revealed negative effects of bilingualism on auditory discrimination for their group of seven-year-olds but not the six or eight-year-olds and no bilingualism effect for any age on the articulation task. In other words they found a significant disadvantage on the auditory discrimination and the articulation task due to LI but no significant differences between monolingual and bilingual children with language impairment. Unfortunately, no further information as to the qualitative differences between the two groups or particular areas of difficulty are available from this study.

In 2012, Verhoeven, Steenge and van Balkom studied the pronunciation and auditory discrimination skills of Turkish-Dutch bilinguals with language impairment in both their languages and found the expected age effect for all tasks and interesting language effects for the articulation and auditory discrimination measures. While all children performed better on the Turkish auditory discrimination task, they all scored higher on the Dutch articulation measure. Moreover, the gap between their performance on Turkish and Dutch auditory discrimination decreased with age. The Bi-TD group outperformed the Bi-LI group on Dutch articulation and auditory discrimination – no data is available on their Turkish pronunciation. Similar to their previous study, the authors do not provide any information on distinctive error patterns in the two groups.

Another common approach to assess children's articulation and phonological processing skills is the use of nonwords, as opposed to real words, which were given preference in the previously presented studies. Three studies included in this systematic review made use of this methodology in order to assess children's phonological processing skills.

While Girbau and Schwartz (2008) solely tested participants' performance on nonwords following Spanish phonotactic patterns, Windsor and colleagues (2010) as well as Thordardottir and Brandeker assessed both languages. Despite these differences, all three studies come to the conclusion that nonwords accurately distinguish between the typically and the atypically

developing group of bilingual children. They additionally all find the length of nonwords to affect children with language impairment to a larger extent than typically developing children. An interesting difference becomes apparent, when comparing correlations between language experience and performance on NWR tasks in Thordardottir and Brandeker's as well as Windsor and colleagues' studies. While the former report on nonwords accurately distinguishing between the two populations, even with little exposure to either language, the latter show strong correlations between exposure and performance on either NWR task. Girbau and Schwartz further describe some qualitative differences and similarities in the error patterns of the two groups, including more consonant substitutions and omission in the LI group but overall more consonant than vowel errors in both groups.

From a comparison of these three studies investigating the similarities and differences of phonological processing in bilingual children with and without language impairment, it becomes clear that nonword repetition tasks seem to have a lot of potential to distinguish accurately between the two populations. However, the exact relationship between language exposure and performance on these tasks as well as the extent to which they distinguish between children with and without language impairment still requires further investigation.

Overall this summary of typically and atypically developing children's phonological skills reveals that bilingual children with and without language impairment do indeed differ in their overall articulation skills and their ability to acquire phonological patterns of their languages though it remains unclear whether these differences are to be attributed to distinct acquisition processes or merely a delay.

7.5.2 Lexical Abilities

Lexical knowledge was the focus of four studies reviewed in this section.

Gibson and colleagues (2014) showed a higher overall score for typically developing seven-to-ten-year-old English-Spanish bilinguals on semantic knowledge and a larger gap between receptive and expressive knowledge for the group with language impairment. For both Bi-TD and Bi-LI this gap was however only significant for English and not Spanish and both groups showed better receptive than expressive vocabulary knowledge.

Verhoeven, Steenge and Weerdenburg (2011) found no significant difference in receptive Dutch lexis between the Bi-TD and and Bi-LI group aged six, seven or eight. They did, however, find a significant difference between the two groups for word definition at ages seven and eight. In a study of Turkish-Dutch bilinguals, Verhoeven and colleagues (2012) revealed significant differences between Bi-TD and Bi-LI in both receptive and expressive Turkish but not Dutch lexis, aged six to seven. Jacobson and Walden (2013) calculated lexical diversity in a sample of eight-year-old English-Spanish bilinguals using NDW (number of different words) and by using D statistics, which takes account of the length of a sample, given that the probability of introducing new words increases with length (see p. 558). Interestingly, their analyses revealed no significant differences in lexical diversity between the Bi-TD group and the Bi-LI group. Additionally, they did not find the D statistics measurement to provide any further essential information about the lexical knowledge of bilingual children and thus conclude that lexical diversity is not a good predictor for language impairment.

This stands in contrast to studies reporting on NDW differing significantly between typically and atypically developing bilingual children (Altman et al., 2016; Iluz-Cohen & Walters, 2012; Tsimpli et al., 2016). Similarly, Iluz-Cohen and Walters (2012) reported on the TD group outperforming the LI group on nine out of ten lexical measures. This is is also in line with Restrepo and Kruth's (2000) findings in their case study, which showed more variety in verb types, prepositions and pronouns for the typically developing child. Sanz-Torrent et al. (2008) also report a higher variety in verbs for their unimpaired

group, which is in line with Altman et al. (2016), who found children with language impairment to use more all-purpose verbs.

It is difficult to interpret these mixed results in a meaningful way, let alone a recommendation for assessment. When assessing lexical knowledge and diversity, it needs to be borne in mind that lexis is highly dependent on exposure and previous language knowledge. The latter may explain some of the variety in the results, as Spanish/Catalan speaking bilingual children could benefit from one of their languages to acquire the other, because they are so closely related. Based on these studies in can therefore be concluded that linguistic diversity is strongly dependent on exposure and that it may distinguish better between children with and without language impairment in children speaking two lexically related languages than in children who speak two structurally distinct languages.

7.5.3 Morphological and Syntactic Abilities

In this section studies investigating the differences between typically developing bilingual children and their peers with language impairment with regard to overall accuracy, omission/commission, order of acquisition and variety/complexity will be presented. The first section is concerned with the question whether scores of overall grammatical accuracy could potentially distinguish between bilingual children with and without language impairment. The following section investigates the question whether typically and atypically developing children differ with regard to the type of errors they make and whether differences can be generalised to all language combinations. This will be followed by a discussion of studies investigating the order in which the two groups of language learners acquire grammatical features in their two languages. Finally, studies investigating syntactic complexity in bilingual children with and without language impairment will be reviewed.

Overall Accuracy

A number of studies indicate that typically developing bilingual children outperform their peers with language impairment when tested on aspects of morphology and syntax. This has, for example, been shown by Juarez's (1983) study of English-Spanish bilinguals, Lee and Gorman's (2008) investigation of Korean case morphology, McKaig's (1988) or Restrepo and Kruth's (2000) study of English and Spanish grammar production, Orgassa and Weerman's (2008) research on Dutch verb position and inflection, Rothweiler and colleagues' (2010) examination of Turkish case morphology, Blom and colleagues' (2013) study of Dutch verb inflection or Blom and Paradis' (2013; 2014) studies of English verb inflection. However, further analysis shows that two factors need to be taken into account in order for overall accuracy to distinguish between typically and atypically developing bilingual children; age and/or exposure to languages and particular languages spoken by the participants.

In Sanz-Torrent and colleagues' (2008) study of Spanish/Catalan bilinguals' acquisition of verb morphology, an overall difference in number of errors only became apparent at the second data collection point when children were 4;9 years old. Simon-Cereijido and Gutierrez-Clellen (2007), whose participants overlapped with Sanz-Torrent's in age and one language (Spanish), come to a similar conclusion. They found fair sensitivity and specificity for a morphological (i.e.: correct percent use of verbs, articles, and clitics) and a semantic-syntactic complexity model (i.e.: MLUW, theme omission, use of di- transitive verbs) for the identification of Spanish LI. Gutierrez-Clellen and Simon-Cereijido (2007) further found their E-MST test to distinguish well between the 5-year-olds in the southwestern, however not their northeastern sample. In all but one (McKaig, 1988) study which found significant differences in the overall morphological and syntactic accuracy of bilinguals, children were aged five and above. It may thus be the case that overall accuracy is an age-and/or exposure related distinctive factor.

This would in turn be supported by studies on younger children, which did not find overall accuracy in their use of clitic pronouns and definite article and

noun agreement to be a distinctive differentiating factor between the two groups (e.g.: Jacobson & Schwartz, 2002; Eng & O'Connor, 2000). As Gutierrez-Clellen and colleagues (2008) point out in their study of finite verb morphology and subject use, it is important to include exposure as a crucial variable in the comparison of typically and atypically developing bilinguals because profiles of second language learners with little exposure can resemble that of bilingual children with language impairment. This is also confirmed by Jacobson (2011) and Jacobson and Walden (2013) who show that profiles of English-Spanish bilingual children with and without language impairment overlap more in lower than in higher grades, where exposure to the target language seems to have had a larger impact on typically developing children. It needs to be borne in mind, however, that Gutierrez-Clellen et al. (2006) found their S-MST test to distinguish well between the ages of 4 and six but not beyond.

Contrary to the studies mentioned above, Salameh and colleagues (2004) found quantity of errors to differentiate between the group with and without language impairment as early as aged 3;10 in Swedish-Arabic bilingual children. As their participants were otherwise very similar to the children investigated in the remaining studies, in that they are sequential bilinguals first exposed to the majority language upon entry into pre-school, this difference may be attributed to the language combination studied in their project. As Arabic is a morphologically richer language than Spanish, one possibility is that children may develop better metalinguistic abilities at an earlier age, which they may be able to subsequently apply to their second language. Furthermore, richer morphology is likely to stimulate children to devote more effort to learning morphology.

It could thus be concluded that overall accuracy on noun and verb morphology seems to be a differentiating factor between Bi-TD and Bi-LI, from the age of five onwards, as long as they are matched on exposure. For children speaking morphologically rich languages, such as Arabic, overall error frequency may even differentiate accurately at an earlier age.

Despite this tendency it appears to be difficult to establish reliable cut-off

scores to distinguish between typically developing bilingual children and their peers with language impairment. Gillam and colleagues' (2013) investigation of original EpiSLI criteria as established by Tomblin et al. (1996), clearly illustrate the problematic situation of using these criteria with a bilingual population. The use of a standard score of 6.25 or less on two or more composites, yielded a strong sensitivity of .95 and but weak specificity of .45 when used with bilingual children and would thus have led to an overdiagnosis of typically developing bilinguals.

The authors therefore developed an optimal prediction model, which makes it possible to calculate the probability of bilingual children having language impairment based on their results on vocabulary, grammar and narrative composites. It needs to be noted, however, that none of the nine subtests alone could reliably distinguish between Bi-LI and Bi-TD. This finding is confirmed in Simon-Cereijido and colleagues' (2007) study investigating the distinctive ability of a variety of Spanish language markers[3]. None of these markers in isolation could accurately distinguish between the two groups, while an overall score did so to an acceptable degree.

They propose two models to accurately distinguish Bi-TD from Bi-TD: a morphological model combining percentage of correct verbs, articles and clitics or a semantic-syntactic model assessing MLUW, theme, omission and use of di-transitive verbs. Both models showed fair sensitivity and specificity; the morphological model had 80% specificity and sensitivity and the semantic-syntactic model had a sensitivity of 100% and specificity of 80%. It hence emerges that an accurate assessment of bilingual children must comprise a variety of measurements.

Based on the results of one exploratory and one confirmatory discriminant analysis, Gutierrez-Clellen and colleagues (2007) calculated a cut-off score of .61 on the E-MST, which assessed a variety of grammatical features[4], to

[3] MLUW, UNGRAMM, ART, VERB, CLIT, THEME, DITR)

[4] possessives, 3rd person singular, regular & irregular past tense, plurals, copula, auxiliary, negation, passive voice, complex sentences (adverbial & relative clauses & conditionals)

distinguish between typically and atypically developing bilinguals. While they found this cut off score to distinguish adequately between the two groups in their south-western American sample, these results could not be confirmed in the north-eastern group. It thus seems like language scores were not only influenced by the presence or absence of language impairment but also by the region the children were growing up in. These differences may be due to dialectal variations and emphasise once again the variety of factors that need to be taken into account when assessing bilingual children.

Restrepo (1998) shows that a large variety of these factors can be accounted for when using a combination of parental report, family history of language impairment, mean length of T-unit and errors per T-unit to assess bilingual children. She showed that the level of accuracy could be maintained even when only using parental report and number of errors. The parental interview in Restrepo's study elicited a family and a child history of educational, language and speech problems using fifty questions in yes/no format. This study hence indicates that a combination of formal assessment and parental questionnaires could lead to reliable indications about bilingual children's language status, which may be due to the latter covering a large number of crucial factors responsible for language development but which are not evident from formal testing alone.

The further advantage of parental questionnaires is that they provide information on the children's home language in addition to the majority language, which can be assessed using formal tests. This point is particularly relevant in light of research (Håkansson et al., 2003; Verhoeven, Steenge, & van Balkom, 2011) which shows that in typically developing children at least one language is well developed, while participants with language impairment exhibit low linguistic abilities in both their languages.

These two studies therefore emphasise the importance of assessing bilingual children's two languages, not only for the sake of completeness but also because the respective scores as well as the relationship between the two languages can reveal crucial information about the children's language status. In addition, Restrepo's (1998) study shows that parental

questionnaires may be a reliable and practical way of assessing children's home language skills, which is particularly relevant in cases where the SLT is not familiar with the child's home language.

Omission vs. Commission

The omission commission distinction in bilingual children with and without language impairment was investigated and confirmed in fourteen studies included in this review. These studies examined Turkish, Dutch, English and Spanish and all came to the conclusion that children with typical language development tend to produce more overgeneralised verb forms, while children with language impairment show a tendency to omit inflections. This difference also was apparent in Jacobson and Schwartz' (2005) study of English past tense morphology, which revealed higher accuracy for regular past tense forms in the Bi-TD group but better performance on irregular forms in the Bi-LI group. These findings point toward higher rule-learning capacities in children with typical language development than among their peers with language impairment. In spite of this large number of studies coming to similar conclusions, the picture does not appear entirely clear-cut.

Eng and O'Connor (2000), for example, conclude that even though Bi-LI children exhibit lower overall accuracy in Spanish gender marking, they follow an expected developmental trajectory from most to least transparent determiner noun agreement. Based on this finding, the authors infer that regular rule-learning ability for Spanish gender marking is not impaired in atypically developing bilingual children.

Sanz-Torrent and colleagues (2008) did not find the omission commission difference to hold for Spanish-Catalan bilinguals. Clahsen and colleagues (2014), who studied German past particle morphology in Turkish-German speakers, similarly present a more complex picture with regard to the omission or overgeneralisation of verb forms. While they found children with language impairment to omit the regular German past tense ending more often than children with typical development, they also found both groups to

overgeneralise the regular past tense ending in irregular contexts. It thus seems like the omission commission distinction may be yet another language-dependent feature. It could, however, also be a test artifact as as commission errors occur later and only after omission errors in child development. Therefore, as children with language impairment are delayed in their language development, an opposition of commission vs. omission errors may only occur at certain ages.

However, Rothweiler and colleagues' (2010) study, which also investigated German-Turkish bilingual children but focused on Turkish, did find more omissions in Bi-LI children and more overgeneralisations in Bi-TD children. Although they also found substitution errors to pertain longer in children with language impairment (until 5-6) than in their TD peers (until age 3), age of participants could not explain the differing results in the two studies as they were approximately of the same age. Exposure, on the other hand, may play a significant role. Children in Rothweiler and colleagues' study were assessed in their first language, Turkish, to which they had been exposed since birth while participants in Clahsen and colleagues' study were tested in their second language.

In light of previously presented findings which suggest different (a)typical language development trajectories dependent on language type, the fact that Turkish is an agglutinating and German a fusional language, may also be relevant. However, more evidence from a larger variety of languages is needed in order to determine whether the different results in the studies presented here can indeed be assigned to the different languages involved or whether they are merely due to varying scoring and/or sampling methods.

In summary, overgeneralised as opposed to omitted inflection appears to be a promising differentiating factor between typical and atypical language impairment. The prominence of this distinction might, however, depend on either or any combination of the following factors; age of the participants, their exposure to the two languages and the language type.

In addition to the omission or overgeneralisation of verb inflections, the omission and substitution of gender marking in bilingual children with and

without language impairment has been of interest to a number of research studying different language combinations. Similar to verb inflection, the emerging picture is rather diverse. Merino (1983) found differences in the overall accuracy in the Spanish gender marking of bilingual children with and without language impairment but no remarkable disparity in their order of acquisition or rank of difficulty.

Jacobson and Schwartz (2002), on the other hand, not only found the bilingual children with typical language development to use gender-marked clitic pronouns more often and more accurately but also that the group with language impairment made gender subsitutions more frequently and employed the unmarked Spanish form *lo* more regularly. In 2011, Jacobson confirmed these findings.

Orgassa and Weerman (2008) studied Dutch gender as realised in determiners and adjective inflection by Turkish-Dutch bilinguals. They found more omissions of definite articles and overgeneralisations of *de*, the common Dutch determiner, and more *schwa* overgeneralization in adjectival inflection for children with language impairment.

In contrast, the Bi-TD group produced the neuter gender more regularly. Findings in the two studies thus seem to be parallel in regard to the overgeneralisation of unmarked gender forms in bilingual children with language impairment despite different language combinations studied.

However, Spanish-English speaking bilinguals with language impairment appear to substitute gender, while Dutch-Turkish bilinguals show a tendency to omit definite articles. This may partly be explained by the language combinations at hand as Turkish is a gender-neutral language whereas Spanish is not. The concept of gender and determiner agreement may thus be more accessible for Spanish-speaking children than it is for their Turkish-speaking peers. Once more this section suggests that varying language combinations can lead to distinct error patterns and that generalisations for the wider bilingual population are only partly feasible.

Order of Acquisition

One major point of discussion in the field of bilingual and also monolingual language impairment is the question as to whether children with atypical language development differ qualitatively in their language acquisition, or if they simply learn at a slower rate. Merino (1983) and Hakansson et al. (2003) both studied bilingual children's language development and come to quite contrary conclusions. While Merino's investigation of Spanish-English bilingual children revealed a different order of difficulty of Spanish grammatical structures for the two, Hakansson and colleagues conclude that children with language impairment follow the same developmental trajectories in Swedish and Arabic but at a different pace.

Eng and O'Connor (2000) present similar insights in their study of Spanish-English bilinguals, where both groups perform best on the most transparent noun-gender matches and worst on nouns ending in vowels but not taking the predicted gender marking. Merino does point out that her findings may be due to an overall high performance by both groups and therefore mistakes by the group with language impairment could be the product of occasional slips of concentration by these children. However, as these could only partly explain the lack of overlap between the two groups, Merino suggests that the order of acquisition may differ for some but not all grammatical features.

This hypothesis would be confirmed by Jacobson and Schwartz (2005) who found the performance of typically and atypically developing bilinguals to overlap with early developing tense forms, such as the present indicative, preterite, simple future and the imperfect but the Bi-TD group to outperform their peers with language impairment on later developing forms, such as progressive and present and past subjunctive. This corresponds to findings from Moore and Johnston's (1993) study on monolingual children with language impairment, which indicated asynchronous language development for verbs and adverbs in children with language impairment. It may therefore be the case that bilingual and monolingual children with language impairment alike experience particular difficulties with the more complex aspects of

language learning, resulting in asynchronous language acquisition rather than an overall language delay.

However, in light of the controversial findings in this area of research, no conclusive answer as to the developmental trajectories of typically and atypically developing bilingual children can be drawn. Therefore, more research covering a wider range of language combinations and studies comparing the two groups longitudinally, rather than cross-sectionally is required to shed light on this aspect of language development.

Complexity

This section introduces studies investigating grammatical complexity in typically and atypically developing bilingual children. In addition to the wider variety of verb types, prepositions and pronouns reported above, Restrepo and Kruth (2000) also found the English-Spanish participant in their case study to know and use a wider variety of sentence types. She also used the progressive future as well as gerund forms more regularly and more accurately than her peer with language impairment.

Sanz-Torrent and colleagues' (2008) investigation revealed similar differences between the two groups in the mean number of tenses as early as aged 3;9, in their sample of Spanish-Catalan bilinguals. This gap was observed for age as well as MLU matched controls.

In addition to lexical variety, both Restrepo and Kruth (2000) and Verhoeven and colleagues (2011) also investigated syntactic complexity and grammaticality. Restrepo and Kruth found that both the typically and the atypically developing bilingual child used simple, conjoined and complex sentences in English but with differing frequency. While 83% of the sentences uttered by the child with atypical language development were simple, 7% conjoined and 10% complex, 21% of the sentences used by the control child were simple, 56% conjoined and 13% complex. These numbers alone do not allow for a clear distinction between the typically developing bilingual child and the child with language impairment, but when the number of clauses and grammatical correctness are added as variables, a distinction becomes

feasible. Upon investigation of their Spanish sentence structure, a slightly different picture emerges. In Spanish, 71% of the sentences expressed by the typically developing child were simple and 24% complex, as opposed to 99% simple and 1% complex sentences by the atypically developing child. Again, grammaticality of these sentences was a distinctive factor between the two children.

Verhoeven and colleagues (2012) come to a similar conclusion in their assessment of seven- and nine-year-old children learning Dutch as a second language. They fund typically developing children to outperform their peers with language impairment on both mean length of utterance and grammaticality. This is in line with Simon-Cereijido and Gutierrez-Clellen (2007) who found a combination of grammaticality and mean length of utterance to show fair ability to distinguish between Bi-TD and Bi-LI.

Further evidence for a difference in MLU is provided by Iluz-Cohen and Walters (2012) as well as Altman et al. (2016), who found the Bi-TD group to outperform their peers with language impairment on MLU. Altman et al. further found Bi-LI participants to use more omission and frozen tense errors in English. The Bi-LI group in Iluz-Cohen and Walter's (2012) study was found to omit more prepositions and articles. Altman et al., (2016) on the other hand, did not find significant differences between the two groups with regard to their use of prepositions or agreement mismatches in pre-subject copula.

In consequence, controversy remains whether sentence complexity alone distinguishes sufficiently between typically and atypically developing bilinguals, or whether a combination of grammaticality and sentence complexity is more reliable.

7.6 Discourse Abilities

Four studies analysed in this systematic review investigated the narrative abilities of typically and atypically developing bilingual children.

Iluz-Cohen and Walters (2012), Squires (2014) and Altman et al. (2016) investigated English in combination with either Hebrew (Altman et al., 2016; Iluz-Cohen & Walters, 2012) or Spanish (Squires et al., 2014). Tsimpli et al.

studied bilinguals with a combination of Greek and either of the following languages, Albanian/Bulgarian/English/Albanian/German.

While Iluz-Cohen and Walters (2012) elicited spontaneous narratives, Squires and colleagues' (2014) analyses are based on re-tellings of two of the frog stories (Mayer, 1973; 1975 qt. in Squires et al., 2014). Altman et al. (2016) and Tsimpli et al. (2016) elicited narratives using the MAIN narrative elicitation task (Gagarina et al., 2012).

The four studies come to opposite conclusions regarding the differentiating capacity of macrostructural elements. While Iluz-Cohen and Walters (2012), Altman et al. (2016) and Tsimpli et al. (2016) did not find any significant differences between the bilingual group with language impairment and their typically developing peers in regard to story structure, the TD group in Squires and colleagues' study clearly outperformed the LI group in this aspect. In addition to a significant group interaction, Squires and colleagues also report a clear Time x Group interaction, suggesting a steeper developmental curve in both languages for the TD group than their LI counterparts. This coincides with findings from Sheng and colleagues' studies (Peña et al., 2014; Pena, 2000). They suggest that language learning abilities and thus language development trajectories differ quantitatively and qualitatively between the two groups.

In addition to diverging findings with regard to story grammar, the studies also come to different conclusions regarding children's performance in their two languages. While Iluz-Cohen and Walters (2012) did not find any significant difference between children's scores in their two languages, Squires and colleagues report moderate correlations between English experience and English, but not Spanish macrostructure scores. Altman et al. (2016) did not find any significant differences between their participants' L1 and L2 in regard to macrostructure (goal, attempt, outcome) but in their use of pronouns instead of names (L2 > L1).

From this comparison of four studies investigating the similarities and differences in the story-telling abilities of typically and atypically developing bilingual children it can thus be concluded that controversy prevails with

regard to differences in story grammar in the two groups. From the longitudinal study it becomes clear that language experience and performance are correlated, which emphasises once more the crucial role of exposure in the study of bilingualism.

7.7 Interactional Abilities

Two studies included in this systematic review assessed bilingual children's pragmatic skills. Damico and Oller (1983) carried out a two-level analysis of spontaneous speech samples assessing surface structure and pragmatics. Pragmatic measures comprised nonfluencies, revisions, delayed responses, nonspecific vocabulary, inappropriate response, poor topic maintenance and need for repetition. They found pragmatic criteria to be more reliable indicators of academic language development and thus disorders than surface criteria. The children who exhibited a steeper increase in academic performance between time points one and two also had higher pragmatic scores.

Brice and Montgomery (1996) took a slightly different approach and used teacher ratings of bilingual students on the *Adolescent Pragmatic Screening Scale*. Their results showed that typically developing bilinguals gained higher scores than children with language impairment. They differed particularly in the initiation and maintenance of conversations, the cueing of listeners regarding topic shifts, self-expression, greetings and active listening. Despite the fact that participants in Brice and Montgomery's study were significantly older (11-14 years) than children in Damico and Oller's study (6;4-8;3), both studies come to the conclusion that pragmatic skills are an important differentiating factor between children with typical and atypical bilingual development and indicate once more the necessity to move beyond morphosyntax when assessing and studying bilingual children with and without language impairment.

7.8 Sociocultural Abilities

Sheng and colleagues (2012; 2013) investigated semantic convergence in bilingual children with and without language impairment. Semantic convergence in this context refers to a speaker's ability to use and interpret language similarly to their speech community. In order to assess semantic convergence in the two bilingual groups, Sheng and colleagues used a test of semantic association where participants had to think of three words that were semantically linked to twelve translation equivalents in English and Spanish. Responses were coded as either paradigmatic, syntagmatic or errors. Paradigmatic responses were semantically connected to the stimulus and of the same grammatical category, while syntagmatic responses were related in meaning but of a different grammatical category, while errors comprised no responses, phonological associations and translations. Code-switches were coded dually to denote the switch from one language to the other and the type of association. They were hence not scored as incorrect.

A semantic depth score was calculated by assigning paradigmatic associations two, syntagmatic associations one and errors zero points. According to Sheng and colleagues (2012) bilingual children with language impairment scored significantly lower on semantic depth than their typically developing peers and NDW was correlated with semantic depth scores. This performance gap depended on language and response type and was particularly apparent in conceptual scores, this is combined scores of L1 and L2, of paradigmatic responses. Overall, participants scored higher in Spanish than in English, their performance decreased between the three trials with paradigmatic errors decreasing and error rates increasing and their conceptual scores were higher than single language scores. In other words, all participants scored higher when both their languages were counted together.

In 2013, Sheng and colleagues further investigated the qualitative differences in children's responses and found bilingual children with language impairment to generate significantly fewer most frequent associations (7%) than the bilingual group without language impairment (15.2%) even when

differences in vocabulary size were accounted for. In other words, the answer of typically developing bilingual children corresponded more to those of a norm group than the answers provided by their peers with language impairment. For both groups semantic associations in Spanish were weaker than in English despite their stronger Spanish language skills but semantic convergence was equally strong in both languages. This points toward semantic depth and semantic convergence being two related yet separable skills. In other words, the bilingual children in this study may have less in-depth semantic knowledge in their second language but they appear to be as sensitive to conventional language use.

Moreover, considerable but not perfect overlap between word learning abilities and language impairment diagnosis was found. The group with typical language development further produced the same responses to numerous different items, which the authors interpret as an indication of hub words – a phenomenon that was not apparent in children with language impairment.

Unfortunately, no studies icompared the Theory of Mind skills of typically and atypically developing bilingual children. It is therefore yet to be determined whether bilingual children with language impairment benefit to a similar extent from a bilingual advantage in ToM as their peers with typical language development. In contrast to Theory of Mind, the use of internal state terms was assessed in two studies reported here. However, they come to oppositional results. While Squires et al. (2014) found the Bi-TD group to outperform their bilingual peers with language impairment on their use of internal state terms (IST), Altman et al. (2016) did not find a significant difference between the two groups in their use of IST. They did, however, find that both groups produced more mental state terms in their L2.

The collective results from Sheng and colleagues' studies therefore point toward quantitative and qualitative difference in semantic associations of bilingual children with and without language impairment. Considering that mutual semantic references are a prerequisite for successful communication, these findings are crucial for the understanding of language impairment as they indicate that language learning difficulties stretch beyond morphosyntax.

Furthermore, the lack of studies investigating Theory of Mind in the two groups of dual language learners and the controversial results with regard to their use of internal state terms suggests that more studies are needed to disentangle the similarities and differences in this aspect of communication.

7.9 Strategic Abilities

Gutierrez-Clellen and colleagues (2009) investigated code-switching phenomena in a group of 6-year old English-Spanish bilinguals. In this study, spontaneous and re-told narratives as well as spontaneous speech were elicited and analysed. The authors came to the conclusion that code-switches of bilingual children with and without language impairment differed neither qualitatively nor quantitatively. Most code-switches occurred for nouns, followed by conjunctions. Both groups further conformed to Poplack's bound morpheme constraint, which forbids code switches at bound morpheme boundaries, and neither group violated syntactic rules of either language during code-switches.

The language problems of children with language impairment became apparent from their omission of articles, rather than an unusual employment of code-switches. It is necessary to note, however, that this analysis is based on a very low percentage of overall code-switches (6.5%), which may have distorted the results. This becomes particularly relevant in light of Iluz-Cohen and Walter's (2012) study of narratives, which was described in the previous section and which also investigated code-switching.

Their findings contrast with Gutierrez-Clellen and colleagues' in that they did find significant quantitative differences between the groups. Not only did the Bi-LI group code-switch more overall than the Bi-TD group but up to twice as much in noun phrases. Interestingly, higher rates of code-switches emerged in L2 settings for the TD group but in L1 settings for the LI group.

An analysis of directionality of code-switches revealed more code-switches from L1 to L2 in typically developing children and from L2 to L1 for children with language impairment. This was also found by Sheng (2012).

This summary shows that the two main studies investigating code-

switching come to completely divergent conclusions which could be due to a myriad of factors such as methodological differences, amount of exposure, status of languages or possibly the younger age of participants in Iluz-Cohen's study. In any case, further studies investigating this phenomenon are necessary to shed further light on this crucial component of bilingual speech.

7.10 Monitoring Abilities

Pena (2000) and colleagues (2014) investigated modifiability in bilingual children in two studies included in this review. In her first study, Pena used dynamic assessment to investigate planning, attention to task/discrimination, motivation, transfer and responsivity as well as examiner effort and found typically developing children to outperform children with language impairment overall and on subscales despite some overlap between the two groups. On average the typically developing group scored three more points on the modifiability scale than their peers with language impairment and children with lower language ability had more difficulties attending to tasks, transferring new information and using strategies when acquiring new language skills.

The only measure the two groups did not differ on, when assessed in isolation, was motivation, but this was not entered into the discriminant function and it seems important to consider these in combination with other language learning strategies.

In 2014 Pena and colleagues used a dynamic assessment approach to analyse the narrative and modifiability skills of bilingual children. Interestingly they found no significant differences between the two groups in pre-/post-test NDW, TNW and MLU in words for spontaneous narratives but significant differences in the total number of grammatical utterances, overall story scores including setting, dialogue, and complexity of vocabulary and overall modifiability. However, the typically and atypically developing bilingual groups did not differ in regard to anxiety, nonverbal self-reward, verbal mediation and responsiveness to feedback. The most reliable measurement to distinguish between bilingual children with and without language impairment was a combination of modifiability and posttest narrative measures.

Hence, from the results reported in these two studies, it seems that dynamic assessment should be considered as a viable tool in the assessment of children from culturally and linguistically diverse backgrounds.

As has already been suggested in a previous section on omission and commission errors by bilinguals with and without language impairment, these two groups of language learners may differ in their ability to acquire grammatical rules.

Roseberry and Connell's (1991) study investigated precisely this ability and is closely related to Pena and colleagues' study in that it also investigated bilingual children's ability to learn and apply new, invented linguistic rules instead of their abstract linguistic knowledge. In their study they taught the two bilingual groups a suffix that was structurally and functionally similar to English plural and diminutive. According to their findings, the two groups differed quantitatively and qualitatively in that the typically developing group outperformed the group with language impairment in their overall rule-learning ability and the latter making predominantly omission errors.

7.11 Conclusion

The aim of this systematic literature review was to present the current state of the art in research on the crossroads of typical bilingualism and bilingual language impairment. Such an investigation was deemed timely at a point when publications in this discipline underwent a substantial influx following the European Bi-SLI Project and necessary in order to gain an overview of the current insights, summarise the most meaningful findings for clinical practice with bilingual children and indicate directions for future research.

Based on the review of 44 studies, features of bilingual speech have been classified into four categories based on their potential to distinguish between typically developing bilingual children and bilingual children with language impairment. An overview of this classification is given in Figure 16 below. Six phenomena of bilingual speech and language development have emerged as

more reliable in the distinction between children with and without language impairment; phonological processing, semantics, pragmatics, rule-learning, relationship between L1 and L2 and microstructure.

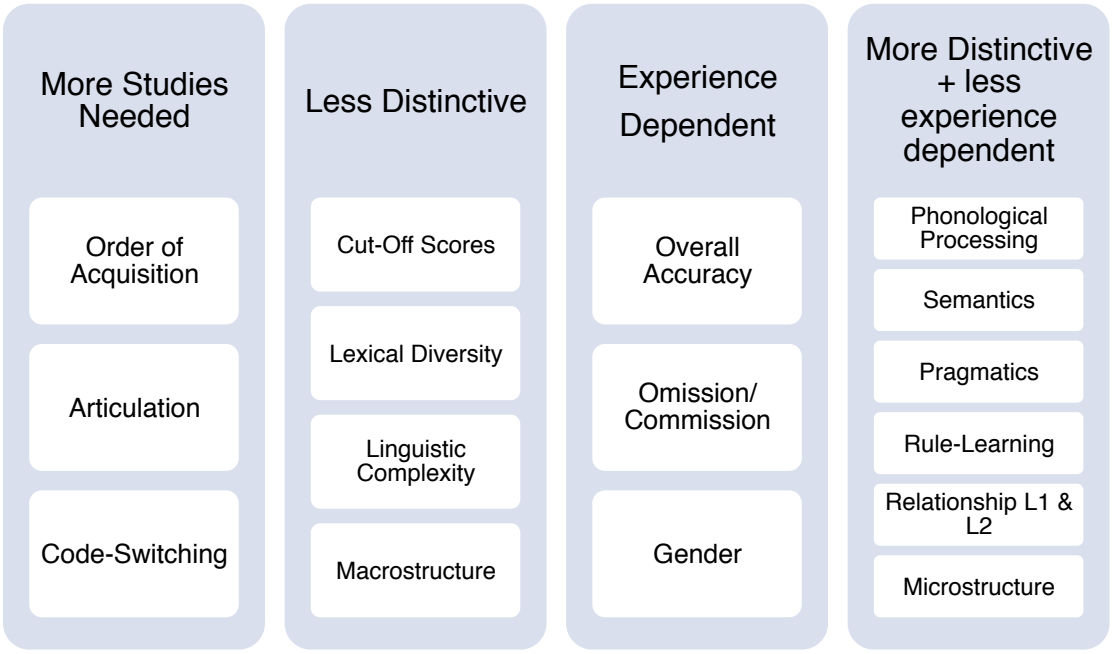


Figure 16 Illustration of Distinctive Properties of Features of Bilingual Speech

Interestingly, most of these features are fairly language independent, which indicates that aspects which are less dependent on exposure may have more distinctive power than exposure-dependent features, such as morphosyntactic accuracy. In this respect it seems like the assessment of bilingual children might have to differ substantially from that of their monolingual peers. This is the case because morphosyntactic accuracy, and particularly verb finiteness, was found to be a reliable marker of monolingual language impairment across many languages such as English, French, and Italian (Arosio, Branchini, Barbieri, & Guasti, 2014; Bortolini et al., 2006; Conti-Ramsden, Botting, & Faragher, 2001; Conti-Ramsden, 2003; Prigent, Parisse, Leclercq, & Maillart, 2015; Rice, Hoffman, & Wexler, 2009; Rispens & Been, 2007).

However, the cross-linguistic picture is far from clear-cut, even among monolingual children. While certain features such as direct object clitics may distinguish well between monolingual French or Catalan speaking children with and without language impairment they do not appear to be an adequate

marker for Cypriot and Standard Modern Greek, Spanish or Romanian monolingual language impairment as discussed by Theodorou & Grohmann (2015). Based on this diversity of experience dependent LI markers across languages, it can be argued that the establishment of cross-linguistic markers of LI is a challenging, not to say impossible task, even for monolingual children. For bilingual language impairment the task may even become insurmountable due to a high number of different language combinations and specific error patterns resulting from cross-linguistic influences and interferences.

While the description of grammatical profiles of children with language impairment is undoubtedly crucial for the field of linguistics, the search for cross-linguistic morphosyntactic markers of language impairment appears to be a rather time-consuming and ultimately futile endeavour.

Less exposure and experience dependent languages measures might therefore not only ameliorate bilingual language assessment but also be useful for the accurate diagnosis of monolingual children. Estes and colleagues' (Estes et al., 2007) meta-analysis of 23 studies investigating monolingual children's performance on nonword repetition tasks revealed that children with language impairment performed on average 1.27SD lower than their peers without language impairment. Even though effect sizes differed with the task used, this meta-analysis clearly indicates that phonological processing, as measured by nonword repetition tasks, appears to differentiate well between monolingual children with and without language impairment. As became apparent in this systematic literature review, the same observation can be made for bilingual children.

The crucial role of exposure in bilingual language development has been stressed repeatedly throughout this review and becomes particularly apparent in measures of overall accuracy and the omission-commission opposition. Their distinctive power has been found to rely heavily on bilinguals' experience with their two languages as well as the linguistic properties of these languages. A further language-dependent marker of bilingual language impairment is use of gender. Firstly, this feature is of course only relevant for

languages which mark for gender but its use has further been found to depend substantially on children's L1 and whether it marks for gender or not. Therefore, while gender marking may be a useful differentiating marker between Bi-TD and Bi-LI for some language combinations, error patterns depend on specific language combinations at stake.

This systematic review could not shed further light on the question as to whether bilingual children with language impairment acquire their native grammars in the same order as their typically developing peers. This area therefore requires more research, investigating grammatical development in actual longitudinal studies as opposed to cross-sectional investigations. Research on the articulation skills of bilingual children further points toward distinct error patterns in the two groups of language learners but further research needs to establish whether these can be attributed to distinct learning processes or rather a delay in children with language difficulties. Additionally, code-switching behaviour requires more attention in order to answer the question as to whether the two bilingual groups differ in this aspect of bilingual speech.

Overall, this systematic review hence comes to two major conclusions. Firstly, a variety of language features need to be assessed in order to reliably distinguish between bilingual children with and without language impairment. Secondly, less language and exposure-dependent features of bilingual speech are more promising as distinctive markers between typical and atypical bilingual speech and should therefore be given preference in both the study and assessment of bilingual children. On a larger scale this review is in line with most recent findings in the discipline of (bilingual) language impairment, which imply that language learning difficulties are not restricted to language-specific grammatical features. Therefore, a more holistic approach should be taken to the study of atypical language development, aiming to shed light on the overall picture of language knowledge and use.

8 Methodology

This section is dedicated to the description of the methods employed to assess the communicative ability of one typically developing bilingual child and his twin brother with language impairment. It will start out with a rationale of the study, which will explain the motives behind the study design and how they relate to the literature review and the *Dynamic Model of Communicative Ability*, which were presented in the previous section. This will be followed by a brief discussion of the benefits and drawbacks of (longitudinal) case study research. Section 8.3. will present the formal tests used in the longitudinal and cross-sectional assessment of both children and in both their languages. Finally, it will be discussed how spontaneous speech was used to complement the data obtained from formal language testing.

8.1 Rationale

It became clear from the review of definitions of language, which was presented in section two of this thesis, that for many philosophers of language and linguists, language is more than grammar. Social definitions of language, such as the ones proposed by Aristotle, Saussure, Coseriu, Wittgenstein and Bakhtin, describe language as a social phenomenon, which is shared by a group of people. Contextual definitions, such as (part of) Descartes' and Cambell and Wales' depictions, regard the social context in which an interaction occurs as essential and defining for language and communication.

This is to say that what we say and how we say it will be influenced by the communicative setting. Functional definitions, such as Jakobson's and Halliday's, portray language mainly as a tool to achieve specific goals, such as the construction of human experience, the interaction between two or more people or the organisation of a text. It is important to note that according to Halliday, these functions are universal, while their encoding changes from one language to the next. Finally, Jakobson's definition of language was presented as an example of a theory that is social, contextual and functional.

It describes the interaction between a sender and a receiver, the relation between language and the context it occurs in and six major functions it can convey.

The subsequent section presented models of communicative competence, which were developed in response to Chomsky's competence term. Hymes first suggested a revision of Chomsky's terminology, so that it would also contain the ability to apply abstract knowledge in an actual communicative setting. Therefore, he regarded social appropriateness as equally important to grammatical correctness. Following Hymes' proposition, it was discussed whether his or Chomsky's proposition was preferable and alternative terms such as *capacity* (e.g.: Widdowson, 1983) capability (e.g.: Widdowson, 2003) or *Communicative Language Ability* (Bachman and Palmer, 1990) were proposed. The main question underlying this discussion was whether or not communicative competence, capacity or ability should encompass both knowledge and the ability to use this knowledge or only one of the two.

In addition to discussions about the competence term, models of communicative competence/ability/capacity also became increasingly more elaborate as additional competences, such as discourse, strategic, interactional, functional, and sociocultural abilities were added. In parallel to an expansion of the models, the relationship between the separate components was addressed. However, the suggested interactions still followed a hierarchical organisation.

Therefore, section four of this thesis presented the *Dynamic Model of Communicative Ability*, which consists of six components (linguistic, discourse, interactional, sociocultural, strategic and monitoring) that stand in constant interaction with each other and the communicative situation. The model is rooted in *Dynamic Systems Theory*, which describes complex systems consisting of many elements. They interact with each other and the environment which leads to constant re-organisation and change. The systems are open and dynamic, their complexity is emergent and results are potentially nonlinear to its cause. Based on Larsen-Freeman (2012) and Herdina and Jessner (2002), it was argued that *Dynamic Systems Theory* has

the potential to describe the chaotic variation in language development in general, and (a)typical bilingualism in particular.

Following the presentation of this new model of communicative competence, literature on bilingualism and language impairment was reviewed according to the six components of the DMCA. It became clear form this review that bilingual language development is qualitatively different from monolingual language acquisition and it was argued that this difference should neither be interpreted as an advantage, nor a disadvantage, but a logical conclusion from a distinct experience. Therefore, Cook's model of multicompetence, which combines two (or more) languages in one system, was suggested as a model that is both in line with literature on bilingual development and the DMCA.

The literature review of research in the field of language impairment revealed that language and other cognitive functions are closely related, which also suggests that they are part of a complex overarching system. Despite an increasing number of research and systematic reviews illustrating this connection between general cognitive skills, such as working memory, and language abilities, the focus of research in monolingual and bilingual language impairment alike, has remained steadily on their grammatical abilities.

I would argue that the search for clinical markers of language impairment, such as the lack of finite verb marking, bears similarities to the search for the Holy Grail. While the thought of finding a marker that distinguishes accurately between all children with and without language impairment is, undoubtedly, tempting it is rather unrealistic. This is not to say, of course, that the lack of verb finiteness cannot distinguish between some children with and without language impairment. It has been shown by Krok and Leonard's (2015) review of studies investigating Germanic languages that verb finiteness may indeed be a marker for children speaking these languages. The picture is less clear, however, for children speaking morphologically richer languages and even less evident for those growing up with two languages (cf. section 7. 5. 3. of this thesis).

Bearing in mind the high prevalence of bilingualism (cf. the introduction to this thesis and section 5), its inherent heterogeneity due to differences in exposure, SES and a myriad of possible language combinations, I would suggest that research should focus on more global communication skills. This research should aim to answer questions about functionality and regard bilingualism independent of monolingual norms. We should therefore focus on direct comparisons between typical and atypical bilingual development, in order to establish the boundaries between typical and impaired multicompetence.

In addition to benefiting bilingual children with language impairment, I would contend that a broader approach to the study and description of language impairment would equally improve the diagnosis of monolingual children. As Reilly et al. (Reilly, Bishop, et al., 2014) argued, the strong research bias toward a sub-group of children with *Specific* Language Impairment, does not reflect the actual caseload of speech and language therapists. Therefore, more studies are needed to establish which other skills may be affected by this impairment, in order to learn more about the continuum of developmental disorders.

It was therefore the aim of this study to:

1. directly compare typical bilingualism to bilingual language impairment.
2. give a holistic account of the communicative abilities in bilingual typical development and bilingual language impairment.
3. establish how some of these abilities evolve over time.

1) The inherent heterogeneity of bilingualism and language impairment make direct group comparisons very difficult. Therefore, a case study approach was chosen for this project. The rare case of a bilingual twin pair, where one child is typically developing, while the other has language impairment, is the perfect opportunity to directly compare typical and atypical bilingualism in a perfectly controlled group.

2) Based on the *Dynamic Model of Communicative Ability*, presented in section four of this thesis, measures were chosen to assess the two children's linguistic, discourse, interactional, sociolinguistic, strategic and monitoring abilities. All components of their communicative ability were assessed separately, using established (language) measures wherever they were available. Both children were assessed in both their languages, English and Polish. In addition, the children were recorded in interactions with their caretakers, each other and myself to complement the insights obtained from formal assessments.

3) The participants' linguistic and discourse abilities were assessed aged 4;8, 5;6, 6;8, 7;9, 8;6. This part of the study is a continuation of my diploma thesis (Müller, 2013), where TDB's and LIB's results from ages 4;8 and 5;6 were presented. For the sake of consistency, the same measurements were employed throughout the four years of this longitudinal project.

The following sections will give an overview of the advantages and some drawbacks of case study research, describe the participants in more detail and present the measures used for this study.

8.2 (Longitudinal) Case Study Research

In a discipline that is largely governed by quantitative research and large-scale studies, it seems necessary to explain the motives behind this case study and to elaborate on some of the characteristics of this form of research.

The first motive for this study design is rooted in the inherent heterogeneity of bilingualism and LI, which makes generalisations problematic. Sections five and six of this thesis illustrated the wide range of profiles in a diagnosis of language impairment and emphasised the myriad of factors influencing bilingual development. It became clear from these overviews that quantitative studies have to focus on very restricted questions and specific sub-groups in both populations, while a case study can take a wider approach. In addition, the rare case of a bilingual twin pair, where one child has typically developing language, whereas the other has a diagnosis of language impairment,

provides the unique opportunity of a direct comparison, (practically) free of confounding factors, such as language input and exposure or socio-economic background. The two children presented in this study have the same age of onset, the same exposure to their two languages, equal socio-economic background, they go to the same school and they even share 50% of their genes. They hence present a perfectly matched sample.

The study of the individual allows for a more holistic picture of their overall language ability and can thus provide crucial insights for the study of language. Hymes even goes as far as to assign “foundational status“ to individual language profiles and to see them as a "vantage point from which to consider questions of method and theory in the study of language in general" (Hymes, 1979). A case study also provides the perfect ground for research in *Dynamic Systems Theory*, as it allows to investigate the system as a whole and the interaction between separate components.

Case studies can also have “a high degree of completeness, depth of analysis, and readability“ as emphasised by Duff (2008, p. 43) because adequate qualitative analyses of language data are complemented by detailed case histories, which provide essential background knowledge to accurately interpret language data. Such an in-depth description of background factors, is less feasible in group studies. Concentrating on one or few cases further makes longitudinal studies and holistic description of language development more feasible.

As a case study approach is by definition exploratory and data-driven (Duff 2008, p. 44), it can generate theories or hypotheses which can in turn be verified or falsified on a larger cohort. One such example is Diamond et al.’s (1985 qt. in Duff, 2008) post-mortem disection of Einstein’s brain which revealed extensive growth of dendritic spines on neurons. A finding that was later replicated in a large number of cross-sectional brain studies (cf. Duff, 2008). Similarly, some of the most crucial insights about the organisation of cognitive systems stem from Caramazza’s (1986) case studies.

The debate on the correct terminology for language impairment, which was presented in section 6.1. of this thesis, further emphasised the need of

“evidence-based, holistic, life-span models“ (Reilly, Bishop, & Tomblin, 2014: 455), which is particularly relevant in light of research describing the changing language profiles of children with language impairment over time (Conti-Ramsden & Botting, 1999). To my knowledge, no study has compared the language development of typically and atypically developing bilingual children across time. The advantage of longitudinal studies is that they yield multiple data sets so that children’s development can be traced and results can be compared in order to establish whether their languages develop in parallel and in a linear fashion.

Stake (2005) differentiates between *intrinsic* and *instrumental* case studies, whereby the first term refers to a study where the main interest is the case itself, not its comparison to other cases or the illustration of a theory. Instrumental case studies, on the other hand, do just that. They use single cases to question generalisations and to represent larger issues. In this sense, the twin case study presented in this thesis can be classified as an instrumental case study as it serves to address questions in bilingual language development in general, and their dynamic communicative abilities, in particular.

This is not to say, however, that this study has the goal to generalise its findings to the wider population. Case studies should be regarded as food for thought or an invitation for further research. Therefore, rather than seeking the correct interepretation of a phenomenon, case study research seeks to complement common interpretations and existing (quantitative) research.

8.3 Participants

This study evolves around a male dizygotic English-Polish bilingual twin pair. Their personal information was obtained using two parental questionnaires and complemented by parental interviews.

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 is based on Stromswold’s (2006) study and

inquires about a number of pre-, peri-, and postnatal factors influencing language development. Additionally, a semi-structured interview was carried out with the twins' mother.

The two boys were born in London to Polish parents and were tested between the ages of 4;8 and 8;6. The younger twin was diagnosed with *expressive language disorder* aged 4;6. The diagnosis of language impairment was further confirmed by his score on the CELF-4, which was administered by the school's SLT in November 2015. He achieved a Core Language Score of 75, which corresponds to the fifth percentile. This corresponds to a diagnosis of moderate language impairment.

Based on the fact that bilingual children are prone to be misdiagnosed with language impairment due to their language status, the author of this thesis re-administered the CELF-4 to both children. The child with language impairment achieved a slightly higher Core Language Score (81), which corresponds to the 10 percentile and a diagnosis of marginal/borderline/mild language impairment. In contrast, his brother achieved a *Core Language Score* of 96, which corresponds to the 39 percentile and represents average language knowledge. Their scores on the CELF-4 are summarised in figure 17 below. LIB's two scores were collapsed into an average.

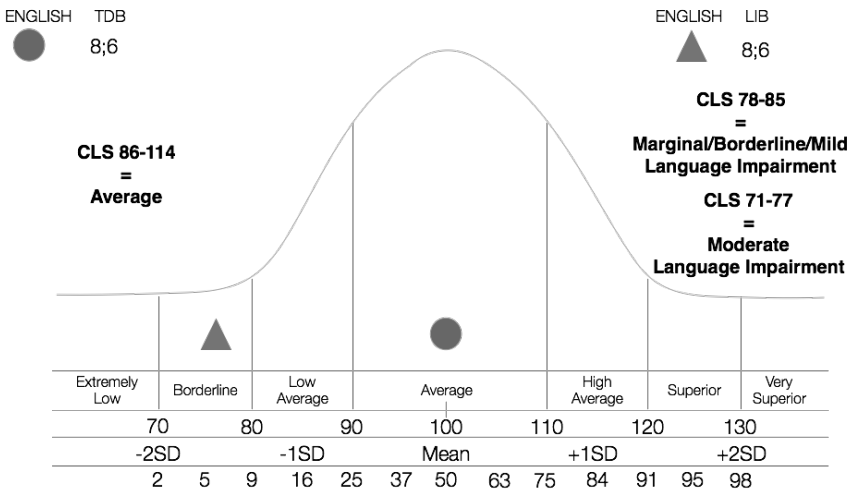


Figure 17 LIB's & TDB's CELF-4 Core Language Scores

The graph clearly illustrates that LIB's and TDB's scores deviate by nearly two standard deviations and that LIB's score is 1.5 SD below the mean. This

corresponds to the cut-off score proposed by Tomblin et al. (1997) who suggested a score of 1.25SD for a diagnosis of language impairment. The English diagnosis was further confirmed for Polish based on the assessment by a Polish speech and language therapist.

Furthermore, the twins' mother voiced cause for concern about her son's language development in the parental questionnaires as well as the semi-structured interview.

While the twins were not born prematurely, LIB was born second at only 1.8kg, as opposed to his brother, whose birth weight amounted to 3.1kg. LIB spent eight days in the NICU, while TDB was released from the hospital after only five days. Stromswold (2006) named low birth weight and prolonged time spent in the NICU as risk factors for language impairment.

The subjects also differ in regard to their language dominance. While the mother did not report any preference or dominance for TDB, LIB's dominant language appeared to have changed from Polish to English between the first two rounds of testing. Both boys uttered their first words in Polish, 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. Books were read to them in Polish when they were younger and the boys still prefer to watch TV in Polish. Now that they can choose their own reading material, they tend to read in English and TDB prefers stories and novels, while LIB shows a preference for short, factual texts.

The twins 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 during the summer holidays. They also attend Polish school for four hours a week on Saturdays. There they learn about Polish culture and how to read and write in their family language.

In a regular week the children speak English more frequently than Polish as they use the majority language at school and during their extra curricular activities. The twins use both their languages when interacting with each

other, adapting to their environment and sometimes taking a domain-specific approach, when English is said to be used during fights, whereas Polish is used to express their (positive) emotions for their brother and their parents, which indicates en emotional preference for Polish.

The parents' views about bilingualism are very positive. They state a broader worldview, better cognitive development and bi-culturalism as advantages of bilingualism. They add, however, that the latter might also result in a lack of identity. The twins' family has a high socio-economic status as both parents have completed tertiary education and now work in their professions.

Finally, when asked to characterise her children, the mother states that TDB 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 they attend). This also led the older of the two to often take over responsibilities and to talk for his 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.

8.4 Tests & Analyses

The study presented in this thesis is based on a mixed-methods design, combining a longitudinal investigation, cross-sectional measurements and recordings of spontaneous speech. The longitudinal study is a continuation of my diploma thesis (Müller, 2013) and therefore employs the same language tests, covering mainly the linguistic ability of the *Dynamic Model of Communicative Ability*.

For this thesis, tests and spontaneous speech recordings have been added to assess the remaining five abilities. An overview of all tests and the components of *Dynamic Communicative Ability* they correponds to, can be found in figure 18. It was already pointed out that the components of Dynamic Communicative Ability are not to be understood as independent of each other, but rather as interacting with one another and the communicative environment they occur in. However, as ability is defined as the abstract knowledge and the ability to apply this knowledge in a communicative setting, various measurements that focus on these specific abilities have been chosen. The spontaneous speech recordings of everyday conversations then combine the various components into an overarching communicative ability.

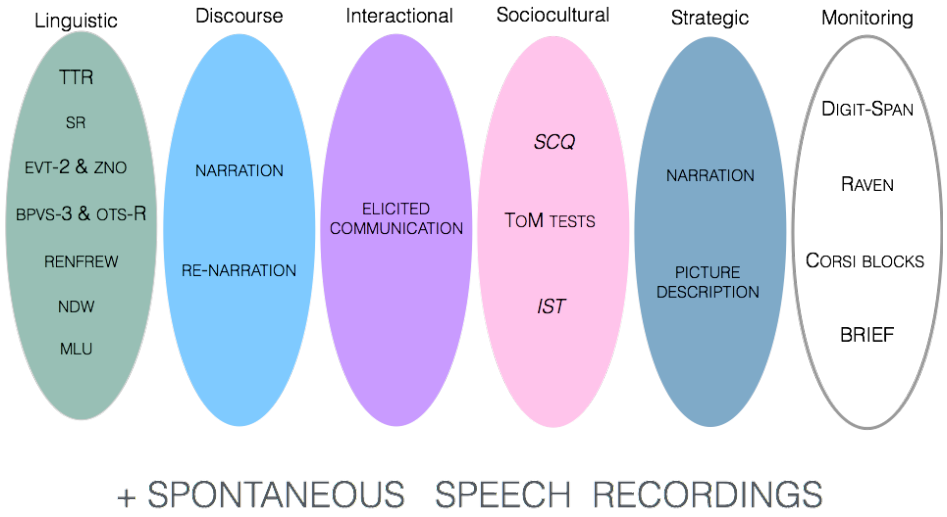


Figure 18 Overview of all measures of communicative ability

All tests were performed in English and Polish and administered by the author of this thesis as well as trained research assistants. All testers were native speakers of the language they tested and only one language was

tested per sitting. The following sections will describe the tests used more specifically, according to the components of *Dynamic Communicative Ability* they tested.

8.4.1 Linguistic Abilities

This section will give an overview of the measurements assessing the linguistic abilities of one typically developing bilingual and his twin brother with language impairment. All tests, apart from the verbal recall task, presented in this section were administered to both children in both languages aged 4;8, 5;6, 6;8, 7;9 and 8;6.

The results of the first two rounds of assessment were already presented in my diploma thesis (Müller, 2013).

Phonological Development: Nonword Repetition & Verbal Recall

Nonword repetition tasks were used to assess children's phonological processing aged 4;8 and 5;6 in Polish only and aged 6;8, 7;9 and 8;6 in English and Polish. In the first two sessions only their dominant language was assessed as this was the protocol proposed by the Polish affiliation of the COST project. However, following the principles of multicompetence and dynamic systems theory, it was decided for this thesis that both languages should be assessed in order to get the full picture of their phonological skills.

The test employed in this study, is the prototype of a later version of a cross-linguistic NWR task developed by members of the COST Action IS0804. Even though the shorter version became available during the testing phase for this project, it was decided to continue testing with the longer version for the sake of consistency. An in-depth description of the NWR repetition test developed by the researchers involved in the COST Action IS0804 can be found in Chiat (2015).

The nonword repetition tasks used in this study are language specific, this is to say that the phonological content is representative of the phonology in the target language. Phonological factors that are known to pose particular problems to monolingual children with language impairment have been

manipulated, so that they can be tested on bilingual children with and without language impairment (cf. Chiat, 2015). The “English” and the “Polish” versions both contain 60 items, controlled for length, prosody and syllable structure. The sixty items are equally divided between two, three and four syllable items. The items are further controlled for segemental complexity, phonotactic probability and wordlikeness.

The items were presented to participants using a child-friendly layout. They were told that an alien would like to teach them its language and they were asked to repeat what it says. A short animation is presented after each set is completed and participants took a break after half of the items had been presented. Children’s answers were voice recorded and scored after the testing session.

In addition, Polišenská’s (2012) verbal recall task was administered at the age of 8;6 in English, in order to assess the influence of prosody, lexis, semantics and syntactic structure on their ability to recall verbal input. This test assesses the following seven different conditions; well-formed sentences with natural prosody, well-formed sentences with list prosody, semantically implausible sentences, ungrammatical sentences, pseudosentences with content words replaced by nonwords, pseudosentence with all nonwords and pseudosentence with function words replaced by nonwords. The aim of administering this test to TDB and LIB was to determine whether they show any differences in their phonological processing in comparison to monolingual peers and to each other. To this end, their results were compared to the data provided in Polišenská (2012) and will be discussed in more detail in section 9.2.1. of this thesis.

Lexical Development:

EVT-2 & ZNO – Renfrew — BPVS-3 & OTS-R — TTR

The twins’ lexical abilities were assessed using one productive and one receptive vocabulary test in each language. In addition, the number of translation equivalents they knew was assessed with a productive lexical task, which was translated into Polish. In addition, their lexical diversity was

assessed by calculating the type-token-ratio in their narrative productions. In this section, the naming tests will be presented first, followed by the receptive lexical tests. At the end, the TTR analysis will be discussed briefly.

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 was used, in which one fully coloured picture per page is presented on an easel, accompanied by a question that is indicated on the tester's scoring sheet. Starting items are based on children's chronological age. The ceiling item is reached once the test taker replies incorrectly to five consecutive items or reaches the end of the test. Monolingual standard scores corresponding to raw scores are available from the manual.

The Polish naming test, *Zadanie Nazywania Obrazków* (Haman & Smoczynska, 2010) also consists of seventy fully coloured items, which are also presented on an easel and accompanied by a specific question. This test contains fifty items in total.

As the EVT-2 and the ZNO do not necessarily contain translation equivalents, the *Word Finding Vocabulary Scale* (Renfrew, 1995) was additionally administered in English and in Polish at ages 6;8 and 7;9 to assess how many translation equivalents the twins knew.

In addition to a quantitative scoring, answers to the productive lexical tasks were also analysed qualitatively in regard to code-switching and error type.

The third edition of the *British Picture Vocabulary Scale-3 (BPVS-3)* (Dunn, Dunn, Styles, & Sewell, 2009) was used in this study in order to determine the subjects' receptive 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. Again, the pencil and paper version of this test was used. The ceiling set is reached as soon as the participant makes more then eight mistakes in a single set of 12. Lexical items in the BPVS-3 include abstract and concrete nouns as well as verbs and adjective from various semantic categories.

The Polish OTS-R (Haman & Fronczyk, 2010)is also a test of word retrieval. The test is discontinued after the participant incorrectly answers four items in a row. Monolingual norms are availabe for the Polish test of passive vocabulary.

TTR was calculated using CLAN. For the Polish narratives, TTR was calculated using the *freq* comand and then verified and adjusted accordingly due to the lack of a Polish grammar in the CHILDES programme (i.e.: when inflected words were counted as separate tokens by the programme, these mistakes were corrected manually).

Morphology and Syntax: Sentence Repetition Tasks – TROG - MLU

As a measurement of syntax and morphology, the *SASIT – School Age Sentence Repetition Task* (Marinis, Chiat, Armon-Lotem, Gibbons, & Gipps, 2011) and its Polish adaptation (Banasik, Haman, & Smoczyńska, 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 after each ten sentences and a short break was made right before the most complex syntactic structures.

The children's responses were voice recorded and analysed quantitatively and qualitatively. That is, their overall accuracy, grammaticality of sentences (i.e.: sentence is not an exact replica of target sentence but grammatically correct) and their acquisition of grammar (plural, finite verb forms, case inflection, determiners, pronouns, preposition, relative clauses) were assessed. 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).

Similar to the *Sentence Repetition Tasks*, participants also listen to pre-recorded voices through headphones during the TROG (Bishop, 2003; polish translation: Smoczynska, 2005). However, rather than to repeat the auditory input, participants have to point to one out of four pictures, which correspond

to the stimulus. The pictures were displayed on a computer screen and children's responses were video-recorded. This test investigates children's understanding of morphology and syntax. For example, their understanding of plural, pronouns and complex sentences is tested.

The TROG and its Polish translation are divided into twenty different sets, which each contain four syntactically identical sentences. These range from simple to compound and complex syntactic structures and comprise negative, positive, active and passive sentences. All sets are administered to participants.

In addition to the sentence repetition tasks and the TROG, MLU in words was calculated for narratives and spontaneous speech in order to determine sentence complexity. MLU was calculated using CLAN.

8.4.2 Discourse Abilities

The twins' discourse abilities were analysed longitudinally and cross-sectionally. The MAIN narrative assessment tool (Gagarina et al., 2012, translation: Kiebzak-Mandera, 2012) was used for the longitudinal part of the investigation and three wordless picture books were used additionally, to provide both children with different stimuli.

The MAIN narrative assessment consists of four different picture stories (two for re-narration and two for narration). Each story consists of six sully coloured pictures, which feature various animals as their protagonists (figure 19).

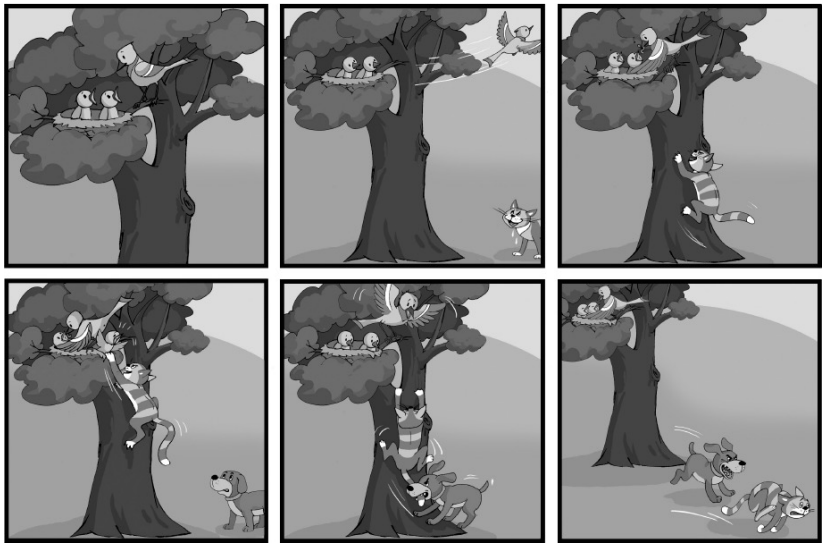


Figure 19 Example of stimuli in MAIN narration task (Gagarina et al., 2012)

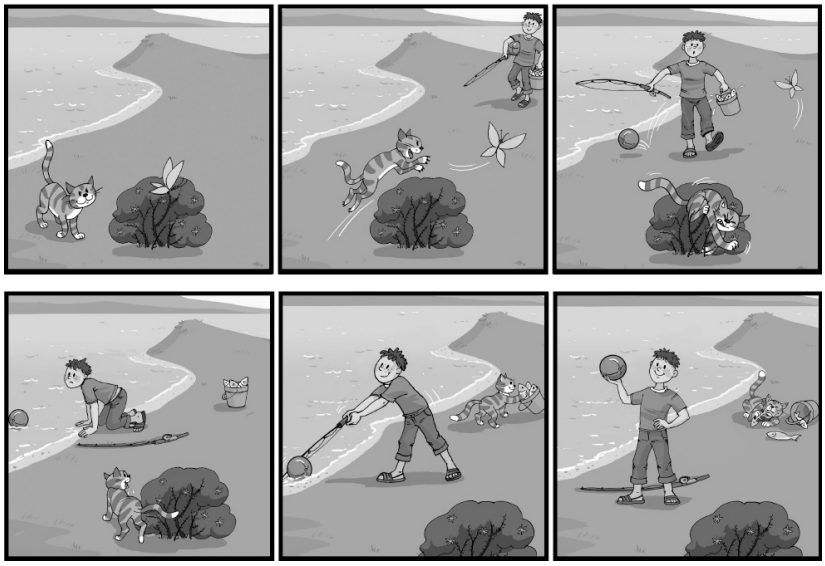


Figure 20 Example Stimuli MAIN Re-Narration (Gagarina et al., 2012)

The story for the re-narration task (fig. 20) is similar in length and features an animal stealing some food from a person (quite strikingly this person is a boy in both stories). The re-narration task is preceded by some warm-up questions about 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.

Following this warm-up conversation, 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 is known to the experimenter, the child chooses one story and looks at it without showing it to the tester. Once the participant has told the story, further questions about the plot and the protagonists' emotions are asked, in order to test children's understanding of *Theory of Mind* (cf. section 5.7, 6.7 & 7.8 for an overview of ToM in Bi-TD and Bi-LI).

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 pointed to the respective image, without emphasising the role of any of the protagonists. Once the story is told, the participant repeats the story as best as she or he can, which is again followed by a number of questions by the researcher. Narratives were analysed on micro- and macrolevel according to the key provided by Gagarina et al. (2012).

8.4.3 Interactional Abilities

The twins' interactional abilities were assessed using elicited speech. During testing sessions, children were asked about recent events in their lives, such as holiday destinations and activities, or to describe a LEGO creation they were asked to build beforehand. In addition, recordings from their conversations with parents and each other were analysed. Their conversations were assessed for turn-taking behaviour, conversational responsiveness, number of utterances in a conversation, MLU and number of questions asked and answered.

8.4.4 Sociocultural Abilities

The twins' sociocultural abilities were assessed with a combination of *Theory of Mind* tests and parental questionnaires. The first *Theory of Mind* assessment is the *Test Refleksji nad Myśleniem*: TRM (Białecka-Pikul, 2012). It was administered in Polish aged 4;8 as part of the COST Action IS0804 and in English aged 6;8 and 7;9. The test manual requires for the test to be administered only in the child's dominant language, which explains why they were only tested in their dominant language, which was Polish at the time. The test has a digital picture book format, where children's understanding of *first-order-belief, unexpected identity, interpretation, deception, ambiguity, emotions resulting from false belief, seeing-knowing and second order belief* is tested.

In addition, LIB and TDB were assessed using a novel *Theory of Mind Scale* developed by the author of this thesis, which is based on Wellmann and Liu (2004), Perner and Wimmer (1985) and Banerjee et al. (2005). It includes questions about *diverse desires, diverse beliefs, knowledge access, contents false belief, explicit false belief, belief-emotion, real-apparent emotion, second order thinking* and *faux-pas tasks*.

The order of the tasks is based on the age of participants in Wellmann and Liu's (2004) ToM scale, Perner and Wimmer's (1985) study on second-oder-thinking and Banerjee and Watling's (2005) investigation of faux pas. Wellmann and Liu's study includes the first seven tasks. According to Perner and Wimmer, second order thinking develops around the age of seven and therefore after real-apparent emotion, the last skill on Perner and Wimmer's task. Banerjee and Watling (2005) showed that the ability to understand unintentional insults develops around the age of eight, which is why this task was placed at the end of new ToM scale presented here. A graphic overview of the task order is given in fig 21.

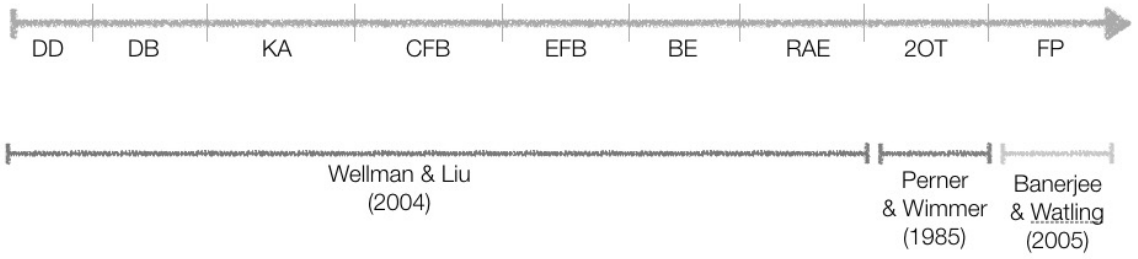


Figure 21 Order of ToM tasks in Extended Theory of Mind Scale

The *Extended Theory of Mind Scale* was developed to address critique concerning complex language in existing ToM tasks. It has been argued that children with LI may perform worse on these sociocognitive tasks, not because they actually have worse understanding of ToM, but rather because existing tests use complex sentences in the description of the various situations (cf. section 6.5 for a discussion). Therefore, the *Extended Theory of Mind Scale* uses simplified language and each sentence is accompanied by new visual stimuli, to support children with language problems in the completion of this test.

Personae were designed specifically for this test and controlled for gender, ethnicity and abilities. See fig. 22 for an overview of characters.

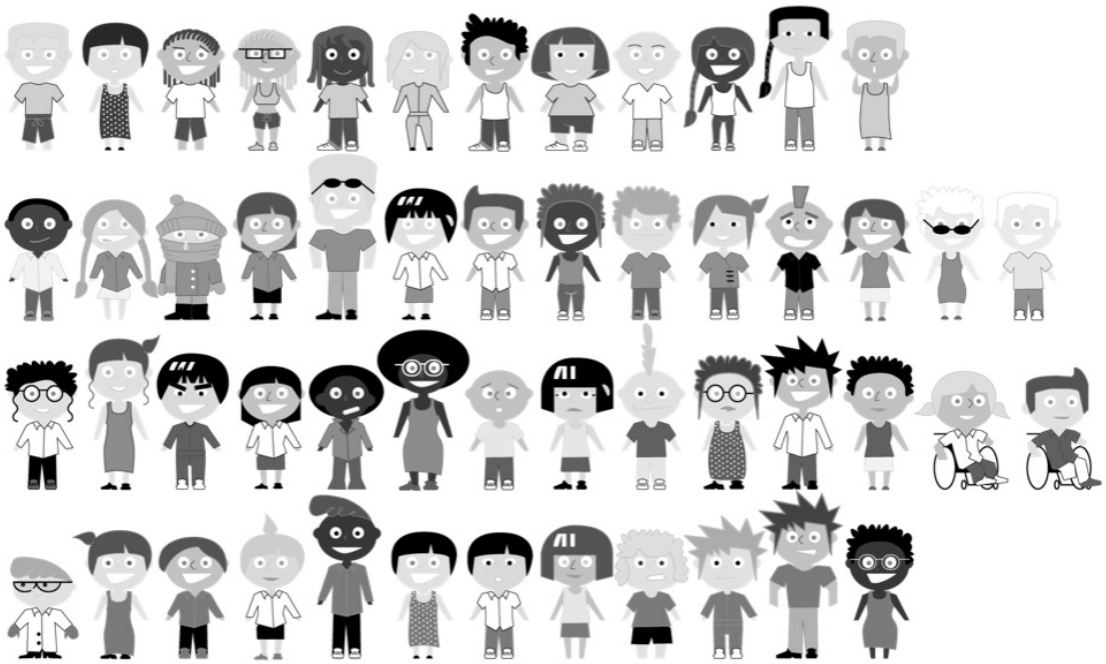


Figure 22 Overview of characters in Extended Theory of Mind Scale

Two parallel versions of the test were developed for English and Polish, in order to avoid a learning effect, and the two versions were matched on task and syntactic complexity. For example, in version A, Jack has the choice between two snacks, an apple and chocolate and in version B, Lorn has the choice between two drinks, lemonade and coke. Each new sentence is either presented with a new slide, or accompanied by explicit pointing to the items, in order to facilitate understanding. See figure 23 for an example of the explicit false belief task in both versions. The whole test and testing protocol is available in the appendix.

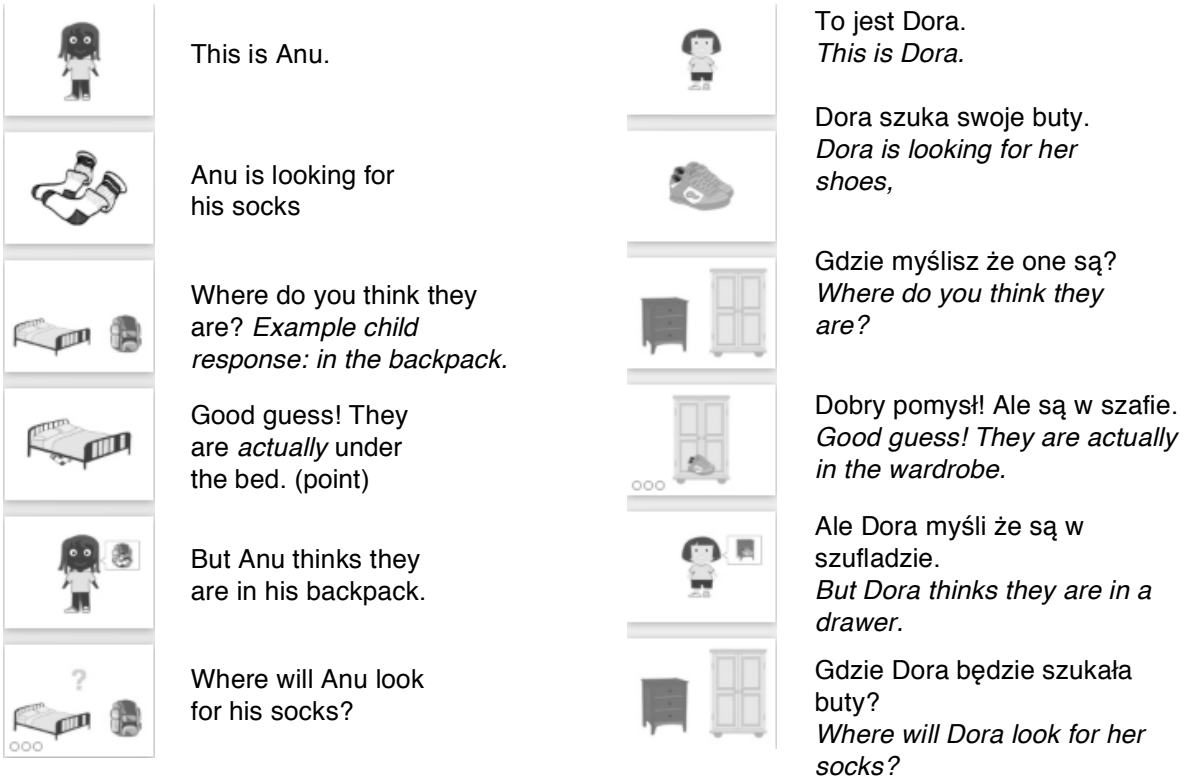


Figure 23 Example of Explicit False Belief Task

The children's results were analysed in order to establish whether they had already mastered all of the required formats, whether they were acquiring them in the suggested order and in how far their acquisition process was parallel.

Furthermore, TDB's and LIB's use of internal state terms in their narrative was analysed based on the associations between ToM and IST that were reported in the literature (cf. section 5.5).

In addition to the two *ToM* tasks, the Social Communication Questionnaire SCQ (Rutter, Bailey, & Lord, 2003) were used to assess TDB's and LIB's sociocultural abilities.

8.4.5 Strategic Abilities

LIB's and TDB's strategic abilities were assessed using three different wordless picture books, a picture description, in elicited and spontaneous speech and as part of their performance on other language measures, such as the EVT-2. The analysis focused on instances of code-switching and other communication strategies. Their use of circumlocution, approximation, substitution, neologisms, code-switching, avoidance and message abandonment was analysed (based on Bialystok, 1990).

The book first book used to elicit communication strategies aged 6;8, 7;9 and 8;6 was *Rainstorm* (Lehman, 2007). The reasons for this choice are twofold. Firstly, it has clear, colourful illustrations and a simple storyline (cf. figure 24 for an excerpt).

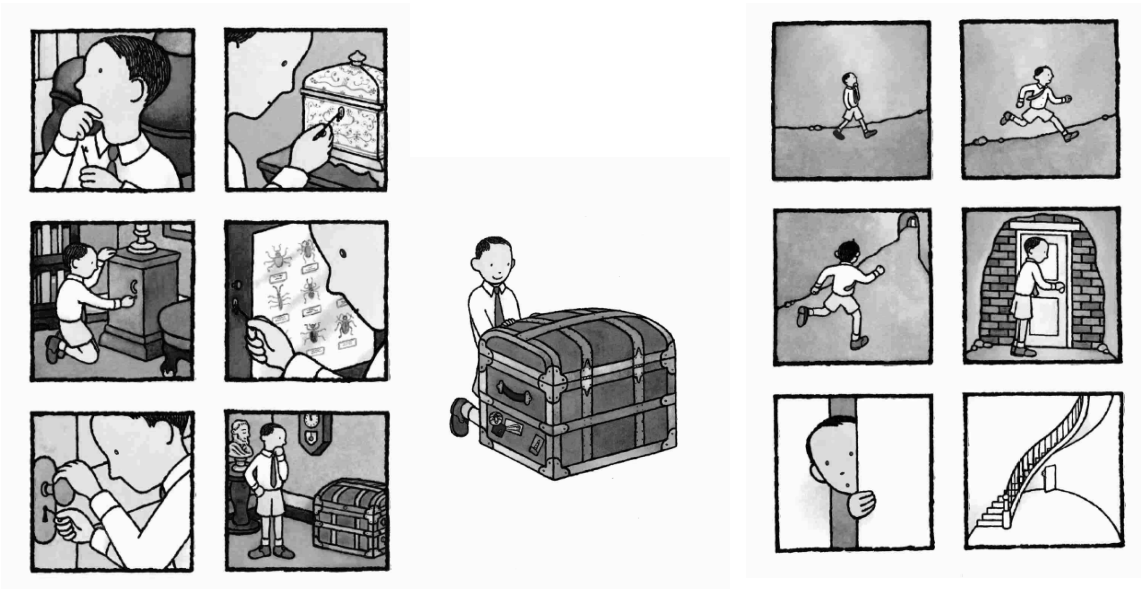


Figure 24 Excerpt from Rainstorm by Barbara Lehman (2007)

Secondly, it features a number of low-frequency words, which were used to prompt communication strategies. It was hypothesised that the children in this study may not be familiar with these words because of their low frequency

and their bilingual status. Therefore they would need to use their strategic abilities to tell the story. The story format was chosen over a naming format because narratives are more representative of actual conversations than single-word naming tasks (cf. Gagarina et al. 2012). In addition, it was hypothesized that children would have more intrinsic motivation to finish telling a story and therefore, this format could elicit a wider variety of communication strategies.

Word frequency for English was determined based on the SUBTLEX-UK (CBBC) and the CHILDES databases. The SUBTLEX-UK and the sub-corpus from the TV channel CBBC, which is aimed at primary school children, was used in addition to CHILDES because not all words were available in the limited number of transcripts of older children's language in CHILDES. Frequencies were calculated using the ChildFreq tool (Bååth, 2010) and the SUBTLEX-UK online tool. For Polish, frequencies were calculated using the SUBTLEX-PL tool, which is based on Polish film and TV subtitles. Ths tool was chosen because it is parallel to the SUBTLEX-UK tool and therefore comparability could be ensured. Unfortunately, the SUBTLEX-PL tool does not contain a sub-corpus for children's TV shows, so the general corpus needed to be used for Polish. According to these criteria, Rainstorm contains sixteen low-frequency words.

The cut-off for low frequency words was set at ≤35 pmw or ≤4.5 on the Zipf word frequency scale (Van Heuven, Mandera, Keuleers, & Brysbaert, 2014). In van Heuven et al.'s seven-point Likert scale, 3 corresponds to 1pmw and the range between 3 and 4 represents the threshold between low and high frequency (cf. appendix for a list of word frequencies).

Aged 7;9 and 8;6 LIB and TDB further told stories based on the wordless picturebook *Where is Walrus?* (Savage, 2011). This book features a walrus that escapes from a zoo and is then chased through the whole city by his zookeeper (figure 25). He finally finds the walrus in a high diving competition and decides to build him a platform in the zoo, so that he can continue to dive there. Again, the illustrations are very clear, the storyline simple and easy to follow but it also contains a number of low frequency

words that are essential for the story.

The same procedure to determine word frequency was used as in the previous book (freq: ≤35pmw/≤4.5 Zipf). It contains sixteen low-frequency words. Please refer to the appendix for a detailed list of stimuli and their frequency.

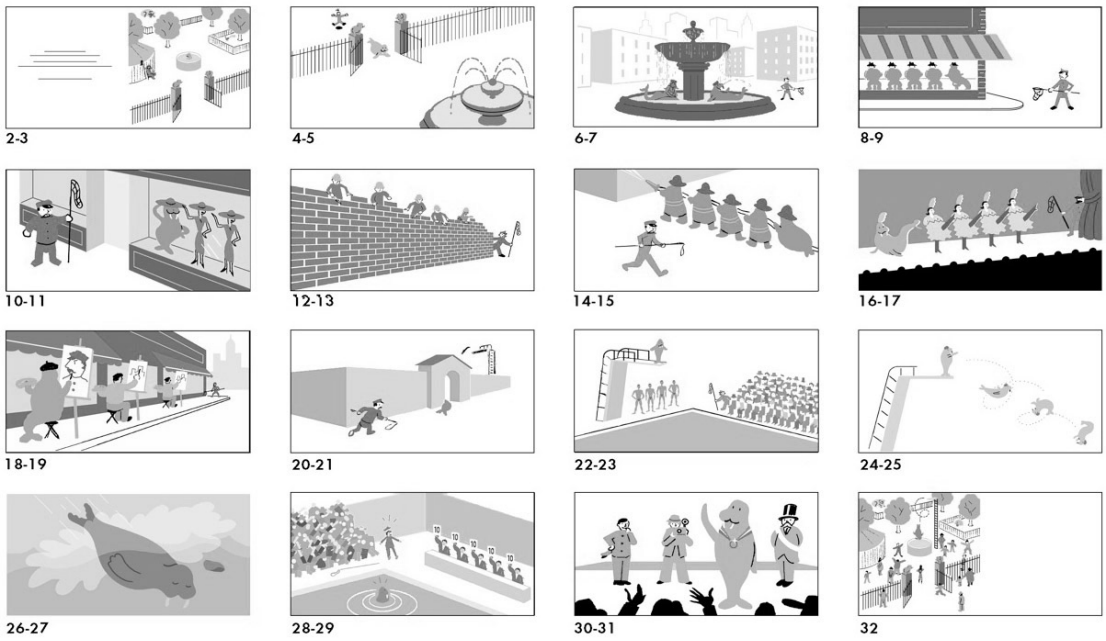


Figure 25 Walrus by Stephen Savage (2011)

Aged 7;9 TDB and LIB told stories in English and Polish based on the wordless picture book *Quest* (Becker, 2014). This book contains fifteen low-frequency words, which were determined based on the same criteria as above (freq: ≤35pmw/≤4.5 Zipf). According to this cut-off, fifteen low-frequency target words were determine for Quest. This book was chosen in addition to *Rainstorm* and *Walrus* because of its more challenging storyline in order to see whether this difference would have an effect on children's ability to employ communication strategies.

The story evolves around two children who are given a map and magic crayons by a king who appears under a bridge in a city on a rainy day. They have to collect the missing crayons in order to bring peace back to the kingdom. They can use the crayons' magic powers to bring objects they draw

to life. These objects are all low-frequency words (e.g.: rhinoceros, dragonfly). A complete list can be found in the appendix and an excerpt of the book in figure 26.

Figure 26 Excerpt from Quest by Aaron Becker (2014)

In addition to the three storytelling tasks, TDB and LIB were also asked to describe pictures from *The World of Mamoko In The Year 3000* by Aleksandra and Daniel Mizielinski (Mizielinska & Mizielinski, 2014) aged 7;9. It is a wordless book featuring many different phantasy animals engaging in various futuristic activities. The aim of this task was to elicit communication strategies from the children when they referenced the phantasy creatures. Two different pictures were chosen for the English and the Polish task and after TDB and LIB had finished describing the pictures, clarification questions were asked. Figure 27 presents an excerpt of *Mamoko*.

Figure 27 Excerpts from The World of Mamoko in the Year 3000 (Miezielinska & Miezielinski, 2012)

All elicited speech was analysed according to the question whether the communication strategies employed by LIB and TDB differ qualitatively and quantitatively.

8.4.6 Monitoring Abilities

TDB's and LIB'S monitoring Abilities were assessed using *Raven Coloured Matrices*, a digit span task and the Corsi Block task. These tests were chosen as they combine an assessment of general cognitive abilities, verbal short-term memory and nonverbal short-term memory. Bearing the discussion in mind, whether or not language impairment is or can be a language-specific disorder, it is necessary to assess children's cognitive skills via nonverbal tests in studies of language impairment.

The *Raven Coloured Progressive Matrices Test* (Raven, 2003), 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. TDB and LIB were tested aged 4;8 and 5;6 in order to test the robustness of the results. They were required to complete the whole test. Results were compared to normed data.

The digit-span test (Wechsler, 1997) tests children's verbal working memory. They are asked to repeat digit spans of increasing length, first in the right and then in the reverse order. Their digit span is determined based on the last completely correct items they can repeat. This test was administered when participants were 7;9 years old. Results were compared to normative data from Brito et al. (Brito, Alfradique, Pereira, Porto, & Santos, 1998).

Finally, the *Corsi Blocks* task (Kessels et al. 2000) tests children's visuospatial memory. The tester taps on an increasing number of blocks, which are arranged on a wooden plate, in a set order and children are asked repeat the sequence according to the example given. Their ceiling item is calculated based on the last sequence they are able to repeat correctly. The

Corsi Blocks task was administered to TDB and LIB when they were 7;9 years old. Results were compared to normative data from Farrel Pagulayan et al. (Farrell Pagulayan, Busch, Medina, Bartok, & Krikorian, 2006).

In addition to these formal assessments, the BRIEF Behaviour Rating Inventory of Executive Function (Gioia, Isquith, Guy, & Kenworthy, 2013) was used to collect additional information about the children's executive functions. The advantage of this parental questionnaire is that it gives a more holistic idea of children's inhibition, shifting, emotional control, initiation, working memory, planning/organization, organisation of materials and monitoring abilities. The questionnaire contains 86 items, which elicit responses about children's general behaviour. The caretakers responses are subsequently scored against the categories mentioned above. Two separate sub-scores are calculated based on the caretakers responses.

The Behaviour Regulation Index (BRI), subsuming inhibition, shift and emotional control, and the Metacognitive Index (MI), combining all remaining categories. The sum of the two indexes is the Global Executive Composite (GEC). Overall, this questionnaire therefore gives an in-depth insight into children's overall executive functions as well as their behaviour and metacognitive skills. In addition, the questionnaire contains a negativity scale, testing whether caretakers have a negative bias toward their child while answering the questions, and an inconsistency scale, which assesses whether caretakers' reponses are consistent throughout the questionnaire. Together, these measures ensure a high level of reliability.

Together, the combination of formal tests and a parental questionnaire provide an extensive insight into children's verbal and nonverbal cognitive skills.

8.5 Spontaneous Speech

The introduction to section two of this thesis discussed a mismatch between children's test performance and their spontaneous speech (Dressler & Laaha, 2012; Korecky-Kröll et al., 2012; Laaha, Ravid, Korecky-Kröll, Laaha, & Dressler, 2006). Based on the finding that children's answers in test situations are not necessarily a reflection of their actual knowledge but rather a test artifact, we decided to include recordings of spontaneous speech in addition to the formal assessments described in the previous section.

Recordings of spontaneous speech also allow for an analysis of parental input patterns, which is essential in order to understand whether differences in output are due to differences in input or divergent language profiles (Czinglar et al., 2015; Annick De Houwer, 2007; Hoff & Core, 2013).

LIB and TDB were recorded monthly over the period of one year, during conversations with their parents and the author of this paper. The recordings were transcribed according to CHILDES and coded in NVivo. The excerpts were analysed according to the children's linguistic, interactional, and strategic abilities. In other words, the transcripts were coded for grammatical accuracy, turn-taking behaviour, conversational responsiveness, MLU, total number of turns and questions as well as communication strategies. As monitoring ability describes the underlying cognitive processes of communication, it was not assessed directly in the spontaneous speech samples, but is reflected in the overall conversational behaviour.

9 Results

This section will present the results from a longitudinal twin case study, comparing one English-Polish bilingual child with typical development to his twin brother with language impairment. The results will be presented according to the six components of *Dynamic Communicative Ability*, which were described in detail in section four of this thesis.

9.1 Linguistic Ability

In this section the longitudinal data on TDB's and LIB's phonological, lexical and morphosyntactic development will be presented. First, their scores on an English and Polish nonword repetition task will be summarised, before their productive and receptive lexical scores will be addressed. Finally, their productive and respective morphosyntactic abilities, as assessed by two sentence repetition tasks and the TROG, will be analysed. In each section their test results will be compared to narrative and spontaneous speech data.

9.1.1 Phonological Development

Aged 4;8 TDB and LIB were assessed as part of the Bi-Sli-PL project, led by Ewa Haman and Zofia Wodniecka, and according to the testing procedure of this project, the NWR was only administered in children's dominant language. This procedure was followed in the follow-up investigation, aged 5;6. However, as the aim of this thesis was to investigate TDB's and LIB's language and communication skills more holistically, their nonword repetition skills were assessed in both English and Polish aged 6;8, 7;9 and 8;6. Results from this longitudinal investigation are illustrated in figure 28 below. In addition, their phonological skills were assessed aged 8;6 using the Verbal Recall Task (Polišenská, 2012) as it measures memory span beyond the word level. In this section, the results from the longitudinal investigation are presented prior to the analysis of the results obtained from the Verbal Recall Task.

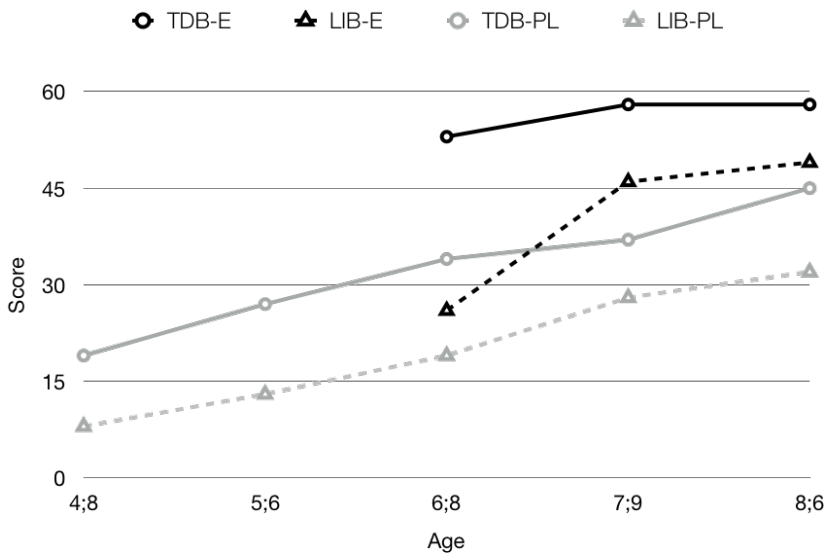


Figure 28 NWR-E & NWR-PL results

As an overall trend it becomes clear that TDB outperformed LIB at all ages and in both their languages. While this difference fluctuated slightly, it stayed around ten points in the Polish task, but decreased substantially, from twenty seven to nine points, between the ages of 6;8 and 8;6, in the English task.

The graph further indicates that TDB performed at ceiling on the English NWR task aged 7;9 and 8;6, while LIB scored 37 and 45 out of 60 points respectively. Furthermore, LIB's score on the English NWR task increased considerably (from 26 to 46 points) between the ages 6;8 and 7;9, while TDB's performance shows a more linear development. In parallel to the steep increase in LIB's English NWR score, the gap between his English and Polish score widened by eleven points in this time frame, as opposed to only two points for TDB.

Both children performed better on the English than the Polish NWR task at all ages, however the gap between the two languages shows a reverse trend in the two children. While the difference between TDB's and LIB's English and Polish score stagnated around twenty points aged 6;8 and 7;9, this difference dropped to thirteen points at the last assessment. In contrast, the difference between LIB's English and Polish score amounted to seven aged 6;8 before it increased to eighteen aged 7;9, where it stabilised.

Qualitative Analysis

In addition to the quantitative analysis presented above, TDB's and LIB's performance on the nonword repetition tasks was also analysed qualitatively. Based on Chiat's review (2015) of the performance of children with and without language impairment on nonword repetition tasks across languages, the role of nonword length and complexity was analysed in the English version of the test. In order to do so, a selection of two-syllable words containaining consonant clusters and all three and four-syllable nonwords were analysed. All consonant clusters within and across syllables were studied (see appendix).

The analysis of the Polish version of the test was based on Marecka et al.'s (Marecka, Wrembel, Zembrzuski, & Otwinowska-Kasztelanic, 2015) study of the Polish phonological development in early Polish-English bilinguals. According to this study, early English-Polish bilinguals displayed particular difficulties in the acquisition of Polish-only consonants and (Polish) consonant clusters, occasional problems with Polish nasal vowels and reduction of vowels in Polish due to cross-linguistic influence from English. These features were analysed in TDB's and LIB's performance in order to determine whether the two children differed in this aspect of their language acquisition (see appendix for a detailed list). In addition, the role of length of nonwords for performance was also assessed. In parallel to the English nonword repetition task, all three and four syllable words were analysed in addition to a selection of two-syllable words containing consonant clusters.

English nonword repetition task: The analysis of the English version of the nonwords repetition task revealed that nonword length and complexity, that is consonant clusters, differentiated reliably at all ages between TDB and LIB. TDB consistently performaned better than LIB on longer nonwords. This difference was particularly apparent for four-syllable words aged 6;8 (21/23 vs. 6/23). The gap between TDB's and LIB's performance on four-syllable words decreased over time (7;9: 22/23 vs. 14/23; 8;6: 22/23 vs. 17/23) but still amounted to five nonwords at the last data collection point. LIB's performance

on four-syllable nonwords at the age of 8;6 still lay 4 points below TDB's performance aged 6;8. This indicates that nonword length can potentially distinguish reliably between Bi-TD and Bi-LI, even at higher ages. This suggests a difference in their phonological working memory

In addition to nonword length, performance on consonant clusters was also found to distinguish well between TDB and LIB at all testing points. Aged 6;8, TDB made errors with two consonant clusters (tr → tər; kl → p), both word central and within syllable. In contrast, LIB mispronounced thirteen such clusters (word initial within syllable dʒ → tr, gl → g, fr → pr; word central cross-syllable *mb* → *b*, tn → kn, tj → tʃ, nj → m, kʃ → ks, sf → st; word central within syllable gr → əw/r, kl → kr/k, sli → zɪ, kj → ij). This number decreased for both children aged 7;9, to one (word central within syllable kl → gr) for TDB and eight for LIB (word initial within syllable pr → p; word central within syllable gr → gw/r, kl → kr/k, kj → kr; word central cross-syllable tj → tʃ; word final within syllable tl → tor, nt → t, ns → nt;). Finally, aged 8;6 TDB made one error, simplifying the word central within-syllable cluster /gr/ to /g/ by dropping the second consonant. LIB, on the other hand, substituted or omitted consonants in nine clusters (word initial within syllable gl → g; word central within syllable dʒ → tʃ, kl → gl, gr → g, kl → Ø, kj → ke; word central cross-syllable tj → dj, sf → ʃm; word final within syllable ns → nt). Overall, this analysis suggests that nonword complexity is potentially a further differentiating factor between Bi-TD and Bi-LI.

A comparison of clusters occurring within syllables as opposed to those stretching syllable boundaries revealed that both children performed better on consonant clusters spanning two syllables with the exception of LIB aged 6;8. TDB performed at ceiling (100% accuracy) at all such clusters and at all ages. LIB performed slightly better on clusters within syllables aged 6;8 (72,4% vs. 66,6%) but this pattern was reversed at ages 7;9 and 8;6 (7;9: 95,2% vs. 68,97%; 8;6: 90,5% vs. 79,3%).

Finally, LIB's performance on the English nonword repetition task displayed considerable fluctuation with regard to the precise consonant clusters he mispronounced at each sitting. Certain clusters containing a

plosive and a liquid or an approximant (tj, gr, kj) posed consistent difficulties for LIB at all ages. Others (e.g.: kl, gl) he appeared to have acquired by the age of 7;9 but then mispronounced again aged 8;6. He therefore does not appear to have acquired this type of consonant clusters fully by the age of 8;6. Clusters containing one plosive and one liquid were the only ones TDB mispronounced until the age of 8;6. They therefore appear to be consonant clusters which are acquired considerably late by both typically and atypically developing English-Polish bilingual children.

To sum up, four major findings emerged from the qualitative analysis of the English nonword repetition task. Firstly, length and complexity of nonwords appear to differentiate well between Bi-TD and Bi-LI. Secondly, both children performed better on clusters spanning syllable boundaries from the age of 7;9 onward. Thirdly, LIB exhibited a fluctuating phonological development as he mispronounced consonant clusters at age 8;6 that he had pronounced correctly aged 7;9. Finally, both children displayed difficulties with consonant clusters containing one plosive and one liquid, suggesting that these are acquired last by both typically and atypically developing English-Polish bilingual children.

***Polish Nonword Repetition Task*:** The analysis of the Polish version of the nonword repetition task revealed that length and complexity of nonwords differentiated well between TDB and LIB. TDB performed LIB on all three and four-syllable words at all ages. Aged 4;8, TDB repeated three of the thirteen three-syllable and five of the eighteen four-syllable nonwords accurately. In contrast, LIB was not able to repeat a single three-syllable word accurately and only one four-syllable word. The largest gap between TDB's and LIB's performance was observed for four-syllable words aged 6;8, when TDB repeated four times as many nonwords accurately as LIB (12 vs. 3). Aged 8;6 the gap was still substantial, mainly due to TDB's performance close to ceiling (12/13 3-syllable nonwords, 15/18 4-syllable nonwords). LIB's performance, on the other hand, was comparable to TDB's score aged 6;8 on both three- and four-syllable nonwords (TDB 6;8: 6/13 3-syllable; 12/18 4-syllable, LIB

8;6: 6/13 3-syllable; 11/18 4-syllable). In sum, these results indicate that nonword length may dinstinguish well between Bi-TD and Bi-LI in both English and Polish.

The analysis of consonant cluster production revealed two major trends. Firstly, both children performed worse on clusters containing Polish consonant than clusters not containing any Polish consonants at all ages, apart from TDB aged 8;6, when he produced all Polish consonant clusters accurately. Secondly, TDB outperformed LIB on both Polish and other consonant clusters at all ages, apart from 6;8, when LIB produced more Polish consonant clusters accurately than TDB (72,7% vs. 59%).

TDB showed a clear preference for cross-syllable consonant clusters, which he produced with 100% accuracy from 6;8 onward. A similar preference could not be found for LIB, who produced consonant clusters within and across syllables with roughly the same accuracy.

A total consonant cluster score combining Polish and other consonant clusters within and across syllable boundaries revealed that TDB produced such clusters more accurately than LIB at all ages (4;8: 59,6% vs. 24,6%, 5;6: 64,3% vs. 33,2%, 6;8: 79% vs. 52,6%, 7;9: 91,2% vs. 68,4%, 8;6: 96,5% vs. 87, 2%). This indicates that TDB acquired consonant clusters earlier and more accurately than LIB in both languages.

In addition to consonant clusters, TDB's and LIB's production of isolated Polish consonants (w, ʂ, ɕ, t͡ʂ, t͡ɕ, ʐ, ʑ, d͡ʐ, d͡ʑ) was assessed. This analysis showed that LIB produced more Polish consonant clusters correctly aged 4;8 than TDB (82,6% vs. 65,2%). Neither of them had acquired the Polish consonant /t͡ʂ/ accurately in word central positions at this stage. However, both pronounced it correctly in word intial positions. Both occasionally substituted the voiceless retroflex affricate by the voiceless dental affricate /t̪͡s̪/. In addition, TDB substituted /t͡ʂ/ by the voiceless dental /t/ or the voiced retroflex fricative [ʐ], while LIB substituted it by a consonant cluster combining the voiceless dental fricative and affricate /*s*t̪͡s̪/ or the voiced labial plosive /b/. Aged 4;8 TDB further mispronounced word central ʐ, d͡ʐ, ʂ; word final ɕ and word final w], substituting voiced and voiceless (alveo-)palatal fricatives by

dental fricatives and the velar approximant by an alveo-palatal approximant. LIB further simplified the voiced alveo-palatal fricative /d͡ʑ/ to a voiced dental fricative /z̪/ in word central positions.

By 6;8, TDB's pronunciation of Polish consonants improved drastically to an accuracy of 91,3%. At this age, TDB had acquired the pronunciation of the voiceless retroflex /t͡ʂ/ and only simplified the voiced alveo-palatal fricative /d͡ʑ/ to a voiced dental fricative /z̪/ in word central positions and substituted the velar approximant /w/ by the velar fricative /x/, also in word central positions. In contrast, LIB's pronunciation of Polish consonants had decreased to an accuracy of 74%. In addition to still mispronouncing the voiceless retroflex /t͡ʂ/ and the voiced alvealo-palatal fricative /d͡ʑ/ in word central positions, he also substituted the voiceless retroflex fricative /ʂ/ by the affricate /t͡ʂ/ in word central but not word initial positions and the alveolo-palatal voiceless affricate /t͡ɕ/ by the alvealo-palatal voiceless fricative /ɕ/ or the dental voiced affricate /d̪͡z̪/ in word central but not word initial or word final positions.

Aged 8;6, TDB appeared to have fully acquired the repertoire of Polish consonants, while LIB still stubstituted the velar approximant /w/ for the open mid-back nasal vowel /ɔ̃/ in word final but not word central positions and the alvealo-palatal fricative /ɕ/ by the velar fricative /x/ in word final but not word initial or central positions.

In essence, as predicted by Marecka et al.'s (2015) data, both bilingual children had particular difficulties with alvealo-palatal fricatives (ɕ, t͡ɕ, d͡ʑ) and Polish retroflex sibilants (ʂ, t͡ʂ, z̪, d͡z̪) until the age of 6;8 but by 8;6 TDB seemed to have had fully acquired the whole repertoire of Polish consonants, while LIB still displayed some inaccuracies. Based on this analysis it can be argued that the accurate pronunciation of Polish consonants in early English-Polish bilinguals appears to be a persistent problem until later ages and should therefore not be used for the distinction between typically and atypically developing children.

In order to answer the question whether the two children acquired Polish consonant clusters and consonants in the same order, the number of overlapping erroneous clusters was calculated and compared. According to

this analysis, 24 of the 32 erroneous clusters produced by TDB also posed a difficulty to LIB at the age of 4;8, who mispronounced a total of 45 consonants and clusters. This number decreased steadily over time in parallel to the total number of erroneous forms produced by both children. This finding suggests that TDB's and LIB's Polish phonological development was partly parallel.

An analysis of TDB's and LIB's pronunciation of Polish nasal vowels /ɔ̃, ɛ̃/ revealed that TDB had already largely acquired these sounds by the age of 4;8, while LIB had only fully acquired them by the age of 8;6. It therefore seems like LIB acquired the accurate pronunciation of Polish nasal vowels significantly later than TDB, suggesting that this feature may differ substantially between English-Polish bilingual children with and without language impairment.

Finally, an analysis of vowel reduction showed occasional reduction of vowels in Polish for both children at all ages (e.g.: *czekamawie – czykamawie*). This finding is in line with Marecka et al. (2015) and suggests cross-linguistic influence from English.

In sum, the qualitative analysis of TDB's and LIB's performance on the English and Polish nonword repetition tasks suggests that length and complexity of nonwords appear to distinguish well between Bi-TD and Bi-LI at all ages and in both languages. This difference became particularly apparent in 4-syllable English nonwords and Polish nonwords with three or more syllables. Furthermore, a compound score combining all consonant clusters in each language revealed a clear advantage for TDB.

Moreover, LIB seemed to display a more fluctuating phonological development than TDB in both languages, whose pronunciation improved in a more linear fashion. Regarding TDB's and LIB's pronunciation of consonant clusters on the Polish nonword repetition task, it became clear that both children performed better on clusters that did not contain any Polish consonants until the age of 7;9. Furthermore, both children displayed problems with alvealo-palatal fricatives (ɕ, t͡ɕ, d͡ʑ), Polish retroflex sibilants (ʂ, t͡ʂ, z̻, d͡z̻) until the age of 6;8 and vowel reduction across all ages. Finally, TDB appears to have acquired Polish nasal vowels aged 4;8, while LIB only

fully acquired them by the age of 8;6. These results hence suggest that length and phonological complexity of nonwords differentiate best between Bi-TD and Bi-LI, that the phonological development may only overlap partly in these two groups and that both children's pronunciation is influenced by their bilingual status.

Beyond the nonword. In order to verify whether the results obtained from the qualitative nonword analysis were an accurate depiction of TDB's and LIB's phonological development, their pronunciation on the MAIN narratives was analysed and compared to the nonword results. On a whole, this analysis revealed parallels with the NWR tasks as TDB and LIB mispronounced fewer sounds in English than in Polish at all ages. Moreover, the fluctuation in phonological development, which was observed in the NWR tasks, also became apparent from the narratives. While no mispronunciations of English words could be noted for TDB aged 4;8, 5;6, 6;8 or 8;6, he simplified the sibilant-plosive cluster /sp/ to /p/ and inversed the plosive-sibilant cluster /ts/ to /st/ aged 7;9. No mispronunciations of English sounds were observed for LIB aged 4;8 but at 5;6 he inversed the plosive-sibilant */ts/* to */st/* aged, at 6;8 he substituted the voiceless velar plosive /k/ and the voiceless dental fricative /θ/ for their alveolar counterpart /t/ and /s/ and aged 7;9 he simplified the consonant clusters /nt/, /rds/ and /kw/ to the final consonants. By the age of 8;6 neither child mispronounced any English clusters or sounds in the narrative tasks.

The analysis of their Polish pronunciation corresponds to Marecka et al.'s (2015) findings in relation to English-Polish bilinguals and their phonological development. Both children mispronounced Polish consonants and consonant clusters until the age of 7;9 and LIB still exhibited occasional difficulties with consonant clusters with and without Polish consonants by the age of 8;6, when he simplified /ɕtɕ/ to /ɕ/, /xt͡ʂ/ to /ʂ/ and /str/ to /st/.

At earlier ages, both children showed substantial difficulties in their Polish pronunciation, which were mainly concerned with Polish consonant and cluster pronunciation. Aged 4;8 both children substituted the Polish

consonants /ʑ/ for /z/, /ɕ/ for /s/ and mispronounced the consonant cluster /xt͡ʂ/, which TDB simplified to /t͡ʂ/ and LIB substituted for /d͡ʐ/. While both children simplified consonant clusters and substituted Polish nouns, only LIB substituted the alveolar trill /r/ for /l/ and the voiced alveolar fricative /z/ for its voiceless counterpart.

By the age of 5;6 both children still exhibited difficulties with /ʑ/, /xt͡ʂ/ and /ɕ/ but by the age of 6;8 TDB had acquired /xt͡ʂ/ while LIB remained to show difficulties with this cluster until the age of 8;6. Both children appear to have had acquired the Polish sounds /ʑ/ and /ɕ/ by the age of 7;9, which is also when TDB only exhibited difficulties with Polish consonant clusters but not other clusters or single Polish consonants. In contrast, LIB still mispronounced clusters with and without Polish consonants (e.g.: /ɕtɕ/ →/ɕ/ /zr/ -→ /zj/, /zn/ → /n/ or /tk/ → /t/) and single Polish sounds (e.g.: /tɕ/ → /k/). This was still the case at the age of 8;6, when TDB pronounced all Polish and English sounds correctly, while LIB occasionally mispronounced clusters with and without Polish consonants (e.g.: /ɕtɕ/ →/ɕ/, /xt͡ʂ/ → /ʂ/) but did not produce any erroneous forms of single Polish consonants.

On a whole, the analysis of pronunciation development on the basis of TDB's and LIB's MAIN narratives revealed the following parallels and differences. Firstly, both children appear to have acquired English pronunciation earlier than Polish pronunciation. Their nonword repetition scores and the subsequent qualitative analysis also confirmed this finding. They further showed some fluctuation in ther phonological development, which was particularly apparent in their English stories, where both children mispronounced consonant clusters at the age of 7;9, which they had previously produced accurately. Finally, the analysis of their Polish pronunciation development confirms Marecka's et al.'s (2015) findings as both children showed substantial difficulties in the acquisition of Polish consonants until the age of 6;8 and Polish consonant clusters until 7;9. Regarding the difference between TDB and LIB's phonological development, it seems like bilingual children without language impairment acquire the accurate pronunciation in both their languages at a faster rate than children with

language impairment, who may have persistent problems in the pronunciation of particularly complex clusters, even beyond the age of 8;6. It needs to be noted, however, that inaccurate pronunciation of complex consonant clusters did not distinguish between TDB and LIB before the age of 7;9. Therefore, mispronunciation at younger ages needs to be treated with caution in bilingual children if misdiagnosis is to be prevented.

Verbal Recall: In addition to the NWR task presented above, TDB and LIB were also assessed using the Verbal Recall Task (Polišenská, 2012), in order to determine the influence of prosody, lexis, semantics and syntactic structure on their ability to recall structures of varying length. With this test TDB's and LIB's ability to recall well-formed sentences with normal and list-prosody, semantically implausible sentences, ungrammatical sentences with sentence prosody, pseudosentence with content words replaced by nonwords, pseudosentence with function words replaced by nonwords and pseudosentence with all words replaced by nonwords was assessed. The ungrammatical sentence with list prosody (E) and list of nonwords conditions (H), which were assessed in Polišenská's (2012) original publication, had been removed in this newer version of the test and were hence not assessed in the present study. As the test is only available in English and Czech, children were only assessed in English. The results in spans (i.e.: maximum length of structure that the child was able to recall correctly → memory span) are presented in table 4.

Condition	**TDB**	**LIB**
A (well-formed sentence)	9	8.5
B (well-formed sentence with list-prosody)	9	6
C (semantically implausible sentence)	6.5	6
D (ungrammatical)	5.5	4
F (pseudosentence with content words replaced by nonwords)	4	4
G (pseudosentence with all nonwords)	4.5	2.5
I (pseudosentence with function words replaced by nonwords)	4	2.5

Table 4 Results Verbal Recall Task (Polišenská, 2012)

The results provided in table 4 indicate that TDB performed at ceiling for the well-formed sentence conditions with normal and list prosody. TDB

outperformed LIB in conditions A, B, C, D, G and I and both children performed comparably on condition F. In order to analyse whether their results were influenced by their bilingual status and/or LIB's language impairment, they were compared to the data provided in Polisenska's (2012) study and are given in figure 29.

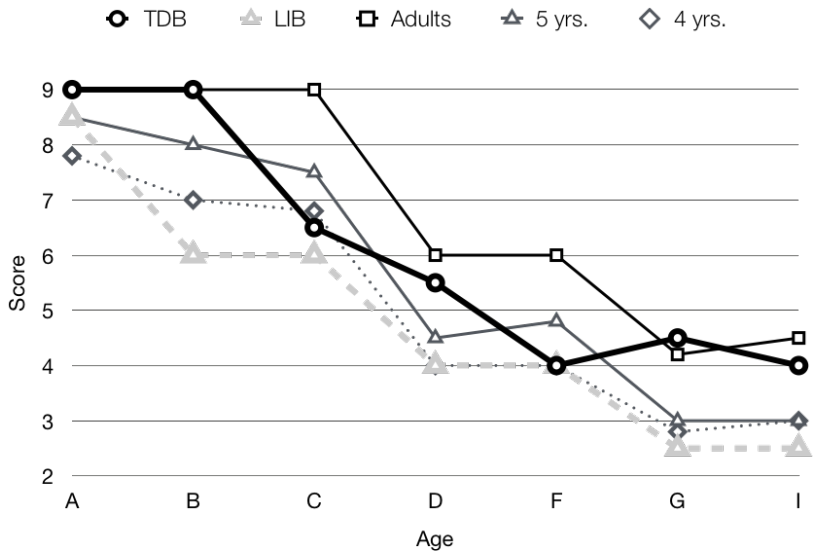


Figure 29 Results from Verbal Recall compared to Polisenska's (2012) participants

This graph shows TDB's and LIB's results in comparison to monolingual English-speaking 4-year-olds, 5-year-olds and adults. As an overall trend it becomes clear that TDB's and LIB's verbal recall span decreased between conditions A, containing the most lexical, semantic, prosodic and syntactic cues, to condition I.

Based on the analysis provided in Polišenská (2012), differences between various conditions were calculated in order to determine the role of prosody, lexis, semantics, lexicality of content vs. function words, function word position vs. familiarity, grammaticality of strings and position vs. familiarty of content words in TDB's and LIB's auditory processing. The results were compared to the monolingual English-speaking children from Polišenská's (2012) study and results are given in table 5.

Comparison of Conditions	Mono-E (4 & 5 year olds)	TDB 8;6	LIB 8;6	Comparison of Results
AxD (grammaticality)	**3.66** (1.10)	3.5	4.5	TDB & LIB = mono LIB > TDB
AxG (lexicality)	**5.17** (1.38)	4.5	6	TDB & LIB = mono LIB > TDB
AxC (semantics)	**0.96** (1.19)	2.5	2.5	TDB & LIB > mono TDB = LIB
FxI (lexic. cont. vs. func. words)	**1.34** (1.03)	0	1.5	mono > TDB mono = LIB LIB > TDB
DxI (func. word pos.vs. fam.)	**1.34** (0.99)	1.5	1.5	mono & TDB = mono LIB = TDB
AxB (prosody)	**0.51** (1.08)	0	1.5	mono > TDB mono < LIB LIB > TDB
DxF (pos. vs. fam. of cont. words)	0.00 (1.08)	1.5	0	mono < TDB mono = LIB TDB > LIB

Table 5 Comparison of Conditions Verbal Recall Task

This analysis shows that TDB and LIB appear to rely on grammaticality and lexicality similarly to monolingual children, however LIB more so than TDB. Both TDB and LIB seem to rely more on semantics than monolingual children. The lexicality of content words vs. function words appears to play a comparable role in sentence processing for monolingual children and LIB but not TDB. Prosody, however, seems to have a larger effect on LIB than it does on monolingual children. Due to TDB's performance at ceiling, no meaningful conclusion can be drawn regarding the role of prosody in his sentence processing. Finally, the position vs. familiarity of content words showed no significant effect for the English-speaking children in Polišenská's (2012) study nor for LIB but appeared to play a role in TDB's verball recall ability.

The verball recall tasks appears to differentiate rather well between Bi-TD and Bi-LI in all but two conditions (C and F). The results further indicate some differences and similarities in the verbal recall skills of monolingual and bilingual children with and without language impairment. All children seem to rely similarly on grammaticality and lexicality. TDB and LIB appear to rely more on semantics than monolingual children. In addition, LIB appears to rely more heavily on prosodic features than TDB or monolingual children. TDB, on the other hand, seems to draw to a larger extent on the familiarity of content words than LIB or monolingual children.

On a whole, the results from the verbal recall task suggest that phonological representations may be weaker for TDB due to his bilingualism and that he has good phonological short term memory but does not get the same support from stored function words. Furthermore, lexical phonology appears to be less robust when it is not supported by semantics.

In contrast, LIB relies heavily on prosody and benefits from familiar function words. In terms of stored knowledge, LIB preforms similarly to 4-year-old English monolinguals and a substantial gap in short-term memory between LIB and TDB could be observed.

9.1.2 Lexical Development

In this section TDB's and LIB's productive and receptive lexical development in English and Polish will be described. First their passive vocabulary scores will be presented, before their active lexical knowledge will be discussed.

Receptive Vocabulary Scores

LIB's and TDB's receptive vocabulary scores aged 4;8, 5;6, 6;8, 7;9 and 8;6 in relation to age norms are presented in figure 30. In this graph, the curve represents the distribution of scores in the norming sample. TDB's English scores are represented by green circles and his Polish scores by green squares at each testing point. In parallel, LIB's scores are represented by grey triangles for English and grey stars for Polish. It needs to be noted, however, that norms for the OTS-R, the Polish receptive vocabulary task, are only available until the age of 6;11. Therefore, the scores at the last two data collection points were compared to these younger monolingual norms.

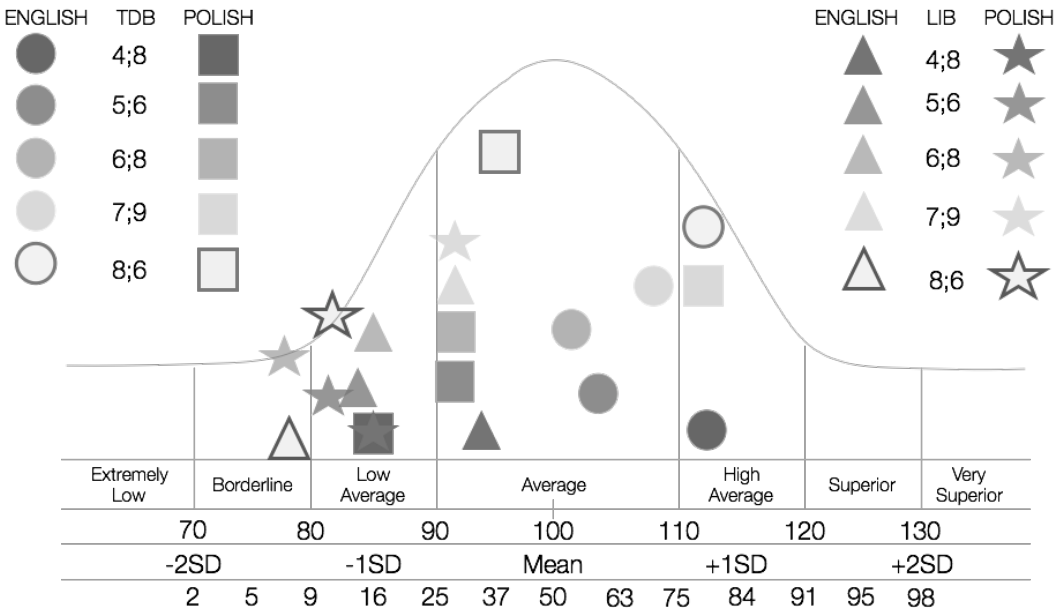


Figure 30 Receptive Lexical Scores in relation to age norms

Figure 30 shows that TDB performed within or slightly above monolingual English norms at all ages, while LIB's EVT-2 score lay within or slightly below the mean at the first four data collection points and then dropped to a "borderline" score, 1.5 SD below the mean, at age 8;6.

TDB and LIB's scores on the Polish receptive vocabulary task both lay within the low average range aged 4;8 (20^{th} & 19^{th} %ile). Aged 5;6 and 6;8 TDB scored in the 31^{st} percentile and therefore in the average range, while LIB's score was in the lower average range (12^{th} & 9^{th} %ile). A comparison of their scores, to the norms for 6;11 year-old monolingual Polish-speaking children revealed that TDB scored slightly above and within the mean of younger peers aged 7;9 and 8;6 (73^{rd} & 37^{th} %ile), while LIB scored in the average range aged 7;9 but below the mean aged 8;6 (31^{st} & 13^{th} %ile).

The difference between TDB's and LIB's BPVS-3 scores amounted to 1.5 SD aged 4;8, 5;6, 6;8 and 7;9 and widened to 2 SD aged 8;6. Their scores on the OTS-R, on the other hand, overlapped aged 4;8 and 5;6, before the difference increased to slightly above 1SD aged 6;8 and even further to two SD at ages 7;9 and 8;6. Fig. 31 shows their longitudinal development of receptive lexis in percentiles.

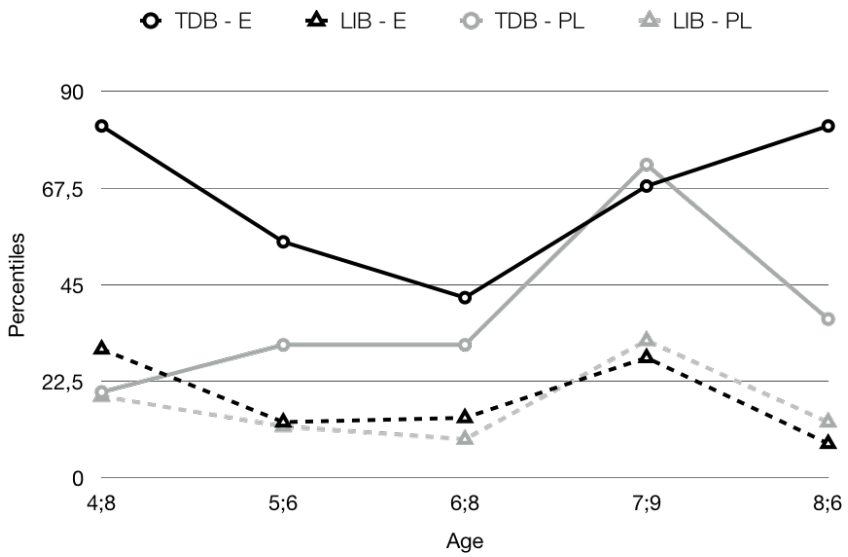


Figure 31 longitudinal BPVS-2 & OTS-R scores: percentiles

Apart from a persistent gap between TDB and LIB's receptive English vocabulary scores, figure 31 also shows continuous fluctuation in both children's receptive lexis scores for both languages, in relation to age norms. TDB and LIB's BPVS-3 scores decreased by precisely the same amount of percentile points (-27) between the ages of 4;8 and 5;6, when LIB's score remained stable, while TDB's receptive vocabulary score decreased further (-13) until the age of 6;8. Between the ages of 6;8 and 7;9 LIB's and TDB's BPVS-3 scores increased in relation to age norms but more so for TDB (+26) than for LIB (+14). Finally, TDB's and LIB's receptive English lexical development showed a reverse trend, with TDB's score gaining another fourteen percentile points in relation to monolingual English norms, reaching the 82nd percentile. LIB's score, on the other hand, decreased drastically from the 28th to the 8th percentile between the ages of 7;9 and 8;6.

Their development of Polish receptive vocabulary shows a similarly fluctuating course. While TDB and LIB scored roughly within the same percentile (20th &19th) aged 4;8, TDB scored within the 31st percentile aged 5;6 and 6;8. In contrast, LIB's performance dropped to the 12th percentile aged 5;6 and the 9th percentile aged 6;8. When compared to younger (6;11) norms aged 7;9, TDB performed slightly above average (73rd %ile) and LIB within the mean (32nd %ile). Finally, aged 8;6 the twins' performance on the

Polish receptive vocabulary task had decreased and they scored in the 37th and 13th percentile of norms based on the performance of 6;11 year old monolingual Polish-speaking children.

In order to determine whether their performance also decreased in absolute terms, fig. 32 provides TDB and LIB's performance on the BPVS-3 and the OTS-R in raw scores. The raw scores confirm that TDB and LIB's Polish receptive vocabulary decreased between the ages of 7;9 and 8;6. TDB knew a total of nine fewer words aged 8;6 than aged 7;9, while LIB lost 19 words in the same time frame. While both their Polish receptive vocabulary decreased between the ages of 7;9 and 8;6, TDB's raw score on the BPVS-3 increased by fourteen points, while LIB's receptive English raw score decreased by four words.

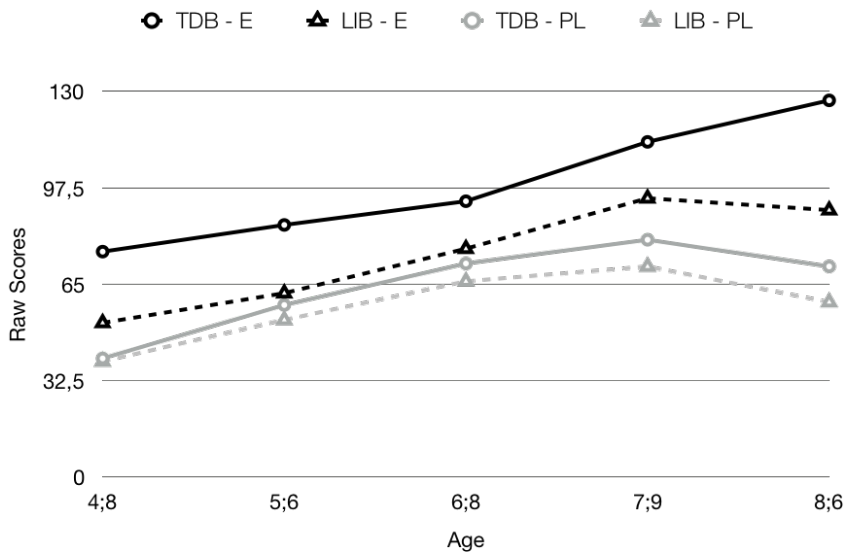


Figure 32 BPVS-2 & OTS-R: raw scores

The graph further shows that the gap between TDB and LIB's Polish receptive vocabulary is substantially smaller than between their English receptive vocabulary scores. Starting out with a very comparable raw score of 40 and 39 on the OTS-R aged 4;8, the gap gradually increased to twelve points aged 8;6. Their English receptive vocabulary scores, however, show a slightly different trend. Aged 4;8 the gap between TDB and LIB's English receptive vocabulary score amounted to 24 points, which decreased marginally to twenty three aged 5;6 and further to sixteen points aged 6;8. At

7;9 the gap had widened to nineteen points and finally to 37 points aged 8;6. In other words, the gap between TDB and LIB's Polish receptive vocabulary scores increased gradually over time, while the difference in their English receptive lexical scores decreased slightly between the ages 5;6 and 6;8 before it increased again. Aged 8;6 the gap between their English and their Polish scores was substantially larger than aged 4;8.

Overall, this graph further indicates that both children knew more words in English than in Polish at all ages but the gap between their receptive vocabulary in each language differed. The gap between TDB's English and Polish receptive vocabulary scores was consistently larger than between LIB's two scores. The difference between TDB's English and Polish receptive lexis scores amounted to 36 points aged 4;8 as opposed to 13 points for LIB. For both participants this gap decreased to 27 and 9 points respectively aged 5;6. At 6;8 the gap between their English and Polish scores had decreased further to 21 for TDB but increased to 11 points for LIB. By age 7;9 the difference between their language scores had widened to 33 for TDB and 23 for LIB and even further to 56 and 31 respectively aged 8;6.

It is also evident that LIB's English score approximated TDB's Polish score aged 5;6 and 6;8 before LIB's BPVS-3 score increased more steeply than TDB's Polish score, which led to a widening of the gap from 5 to 14 (7;9) and 19 (8;6) points.

Productive Vocabulary Scores

LIB's and TDB's productive vocabulary scores aged 4;8, 5;6, 6;8, 7;9 and 8;6 in relation to age norms are presented in figure 33. It needs to be noted, however, that norms for the ZNO, the Polish productive vocabulary task, are only available until the age of 6;11. Therefore, the scores at the last two data collection points were compared to these younger monolingual norms.

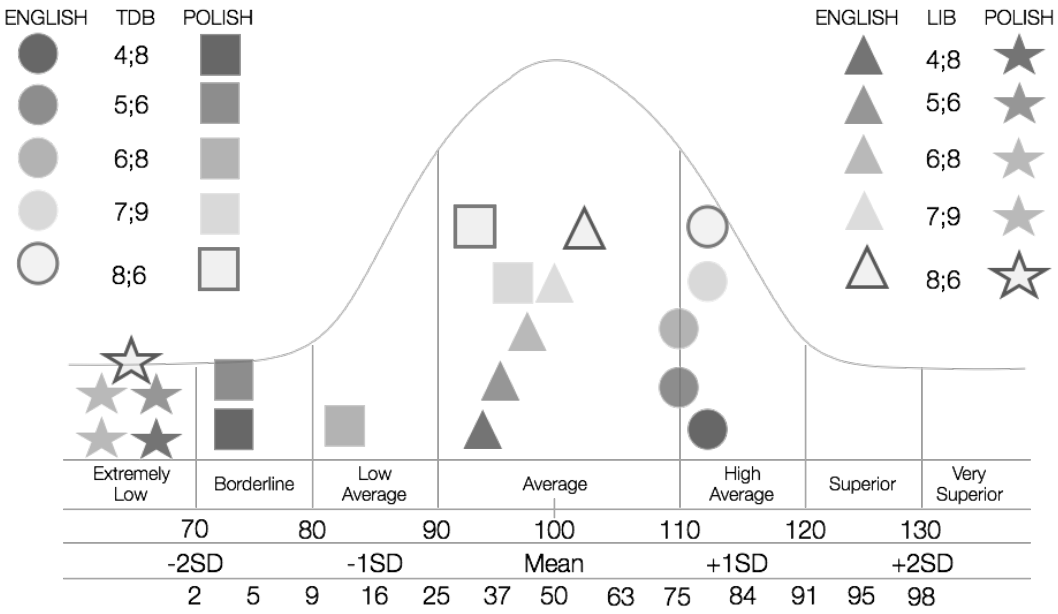


Figure 33 EVT-2 & ZNO: age norms

Figure 33 shows that TDB and LIB's EVT-2 results lay within (LIB) or slightly above (TDB) the mean at all ages. This stands in contrast with their results on the ZNO. On the Polish productive lexical task, LIB scores in the extremely low range at all ages (below -2 SD), even when compared to younger controls (6;11) aged 7;9 and 8;6. TDB, on the other hand, achieved a "borderline" (below –1.5 SD) score aged 4;8 and 5;6, a low average score (-1 SD) aged 6;8 and scored within the mean of younger (6;11) monolingual Polish-speaking children aged 7;9 and 8;6.

The difference between TDB and LIB's English productive lexis score was not signifcant (i.e.: >1.5 SD) at any one point, which stands in contrast with their Polish results. Aged 4;8 and 5;6, their results did not differ significantly. However, aged 6;8, TDB performed 1.5 SD above LIB, and even 2SD above, aged 7;9 and 8;6. Fig. 34 illustrates their longitudinal development of productive lexis in percentiles.

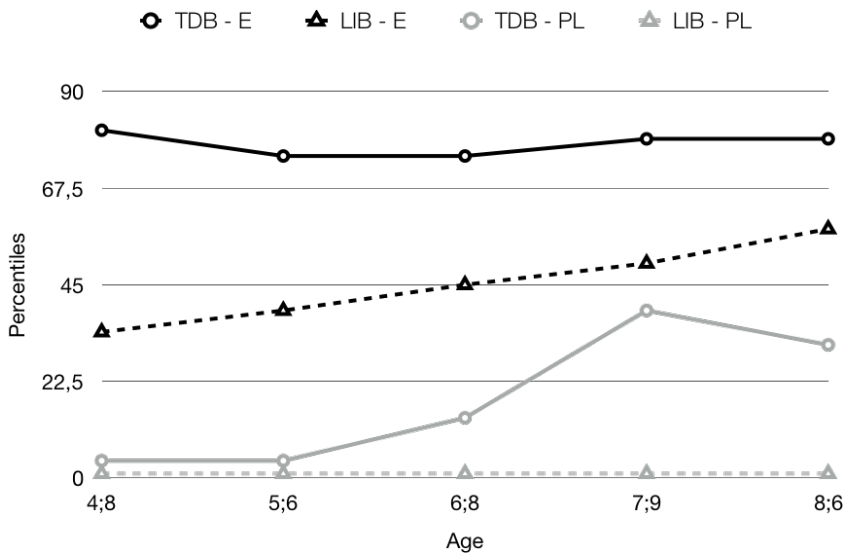


Figure 34 longitudinal EVT-2 & ZNO: percentiles

As an overall trend it becomes clear that both children perform better on the EVT-2 than the ZNO, when compared to age norms (or a younger control group for the Polish test aged 7;9 and 8;6). It is also apparent that TDB clearly outperformed LIB, even though both performed within or slightly above the mean.

Apart from a persistant gap in TDB and LIB's productive English lexical score, figure 34 also indicates a slightly differentiated development profile in relation to their monolingual peers. While LIB's score increased gradually (34th – 39th – 45th – 50th – 58th %ile) and in a linear fashion over the five time points, TDB's performance fluctuated more when compared to monolingual norms. TDB scored in the 81st percentile aged 4;8, before his performance decreased to the 75th percentile aged 5;6, where it stagnated until 6;8, before it increased to the 79th percentile aged 7;9, where it levelled off.

Their Polish productive lexis showed a different course of development. LIB peformed consistently in the 1st percentile of monolingual Polish norms, even when compared to younger peers (6;11) aged 7;9 and 8;6. TDB, on the other hand performed 3 percentile points above LIB aged 4;8, where he stagnated until 5;6, before his score drastically increases to the 14th percentile aged 6;8. When compared to younger age norms (6;11), TDB performed in the 39th percentile aged 7;9 but aged 8;6 his performance had dropped to the 31st percentile of younger monolingual peers.

In order to determine whether TDB's score also decreased in absolute terms aged 8;6, figure 35 provides their data in raw scores.

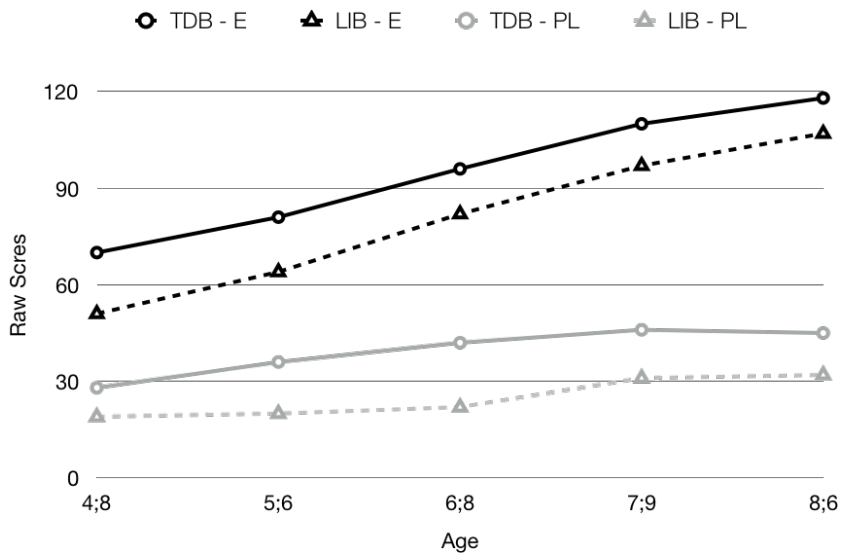


Figure 35 EVT-2 & ZNO: Raw Scores

The raw scores indicate that TDB's productive vocabulary did not decline as drastically as the percentile score may suggest. Indeed, he only knew one fewer word aged 8;6 than aged 7;9, which resulted in a score of minus 8 percentile points.

The graph further shows differences in the gap between TDB's and LIB's English and Polish productive lexis scores. On the EVT-2, the gap between TDB and LIB decreased gradually from 18 (4;8) to 11 (8;6). In contrast, the difference between their scores on the ZNO increased from 9, aged 4;8, to 16, aged 5;6 and finally 20, aged 6;8. Aged 7;9 it had decreased to 15 and aged 8;6 the difference amounted to thirteen words. In other words, the gap between TDB's and LIB's score decreased gradually on the EVT-2 but fluctuated on the ZNO.

As the ZNO and the EVT-2 contain a different number of items and follow different testing procedures, where all fifty items of the ZNO are administered as opposed to determining a ceiling item on the EVT-2, it was decided to calculate percentage correct items to describe the relationship between LIB's and TDB's two languages. This analysis was deemed more suitable as the EVT-2 contains significantly more words than the ZNO and therefore a

comparison of raw scores alone does not describe the whole picture. Percentage correct for the EVT-2 were calculated by multiplying the EVT-2 score by 100 and dividing it by the ceiling item. For the ZNO, the score was also multiplied by 100 but divided by the total number of items (50) on the test as all children are administered all items on the test. Fig. 36 contains the results of this analysis.

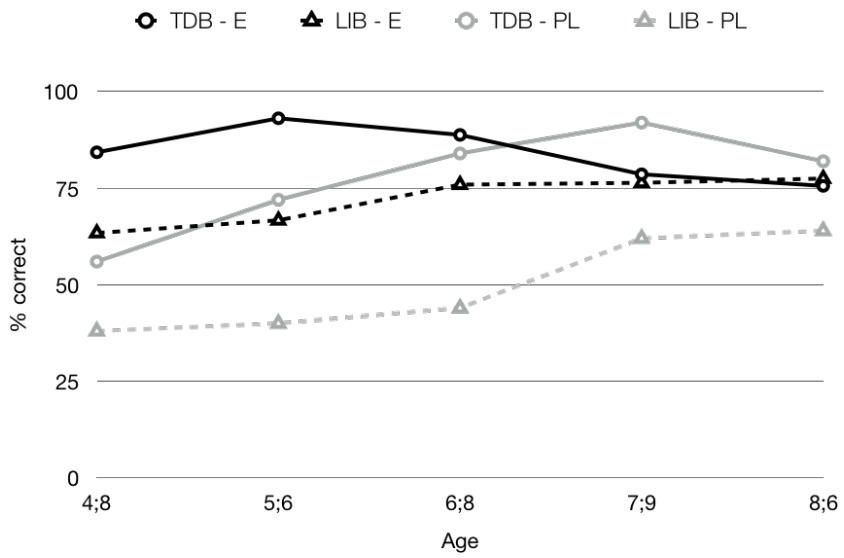


Figure 36 EVT-2 & ZNO: percent correct

Figure 36 indicates clear differences between TDB's and LIB's productive lexical development. While LIB consistently knew relatively more words in English than in Polish, the picture is less clear with TDB. Aged 4;8 and 5;6 TDB knew relatively more words on the EVT-2 than the ZNO (84.3%/93% vs. 56%/72%). Aged 6;8 this difference levelled out (88.8% vs. 84%), before the gap widened again in favour of Polish aged 7;9 (92% vs. 78,6%) and finally equaled out aged 8;6 (76% vs. 82%). In contrast, the gap between LIB's English and Polish active vocabulary increased from 25,4% aged 4;8 to 26,7% aged 5;6 and 31.9% aged 6;8, before it decreased to 14,4% aged 7;9 and 13,5% aged 8;6.

Translation Equivalents

Domain-specificity of bilingual language knowledge has been discussed at length in previous sections of this thesis. In order to get an impression of how many translation equivalents the two bilingual children in this study know, and whether there are any significant differences between TDB and LIB, the *Renfrew Word Finding Vocabulary Test* (1995) was translated into Polish by the author of this study and administered in both languages aged 7;9. The results are presented in figure 37.

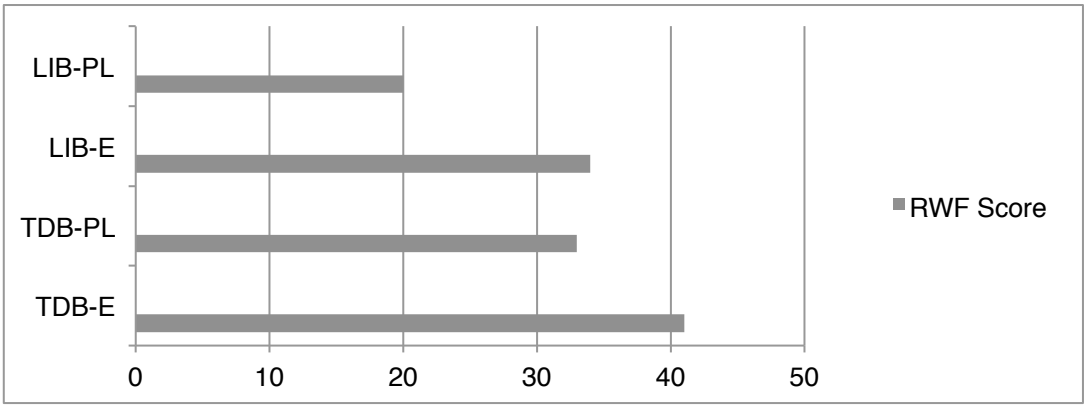


Figure 37 Results on Word Finding Vocabulary Test & Polish Translation

The results indicate two trends. Firstly, TDB outerformed LIB in both English and Polish. Secondly, both children performed substantially better in English than in Polish on this test. Regarding their knowledge of translation equivalents it became apparent that 30 of the 33 Polish words TDB knew were translation equivalents. Three words he only knew in Polish but not in English (*kotwica – ‚anchor', francuski klucz – ‚spanner', antena – ‚aerial'*) and ten words (*finger, scarecrow, camel, watering can, caterpillar, necklace, sleeve, violin, bow, binoculars and beehive*) he only knew in English but not in Polish.

LIB knew eighteen translation equivalents, two words (*śruba – 'screw', antena – 'aerial'*) only in Polish and sixteen words only in English (*cup, finger, kangaroo, scarecrow, owl, arrow, camel, drill, violin, bow, pineapple, lighthouse, parachute, magnet, igloo, microphone*). One of the words they knew exclusively in Polish overlapped between TDB and LIB (*antena*), in contrast to three (*finger, scarecrow, camel*) in English. A semantic analysis

suggests that the words TDB and LIB only knew in Polish, such as aerial and spanner, are more likely to occur in the home domain, while the English terms span a wider range of contexts. This result suggests that domain-specificity of bilingual vocabulary knowledge affects both typically and atypically developing bilingual children.

One parallel tendency in regard to word frequency could be observed in both children. While all of the words they knew exclusively in Polish had a low-mid frequency, the words they only knew in English were spread all over the list and included words of high and low frequency. For English, this frequency analysis was based on the Renfrew word list itself, where words are ordered according to frequency. For Polish, word frequency was calculated using the LABTEX-PL tool, which is based on film subtitles.

Type-Token-Ratio (TTR)

TTR was calculated using CLAN. For the Polish narratives, TTR was calculated using the *freq* command and then verified and adjusted accordingly due to the lack of a Polish grammar in the CHILDES programme (i.e.: when inflected words were counted as separate tokens by the programme, these mistakes were corrected manually). The results are presented in fig. 38.

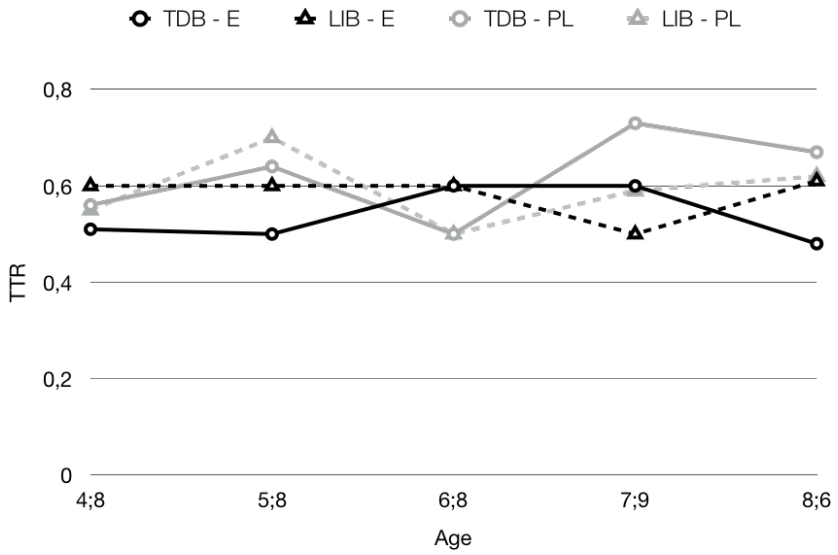


Figure 38 MAIN TTR

The type-token analysis of the MAIN narrative task revealed the following tendencies. Overall, the difference between TDB and LIB never exceeded more than 0.1 at any time and for either language. Therefore, the following observations have to be treated with caution and it needs to be noted that differences in their TTR were minimal at any given time point.

It is nevertheless noteworthy that LIB outperformed TDB on the English narration task aged 4;8, 5;6 and 8;6. Aged 6;8 they had a similar TTR (0.6) while aged 7;9 TDB outperformed LIB in English (0.6 vs. 0.5). For Polish, a slightly different picture emerged. TDB and LIB's TTR were very comparable at all ages apart from the age of 7;9 where the gap between TDB's and LIB's type-token ratio was more substantial (0.6 vs. 0.7). LIB outperforming TDB at three time-points in English and their comparable results in Polish could potentially be explained by a lack of motivation in TDB, or increased motivation in LIB.

Based on the finding that people with aphasia made fewer errors than their healthy peers on certain language tests, Dressler argues that individuals with language impairment may try to compensate for their language difficulties in test situations as they may perceive tests to be therapeutic (personal communication, June 11, 2016). This could potentially explain the lack of difference between TDB and LIB with regard to the TTR in their MAIN narratives.

Regarding the relationship between their two languages, the following observations emerged from the TTR analysis. Aged 4;8 their TTR in both languages was comparable for both children while aged 5;6 the TTR in their Polish narratives was larger than in their English stories. This pattern had reversed for both children by the age of 6;8 but aged 7;9 their Polish TTR was again larger. At the last data collection point aged 8;6, the TTR in LIB's English and Polish stories was similar (0.6), while TDB's Polish story had a higher TTR than his English narrative (0.67 vs. 0.48).

An analysis of TTR change over time revealed that both children's Polish TTR fluctuated more than the TTR in their English narratives. This was calculated by analysing the difference in TTR between any given one time

point and the next. This calculation did not reveal a bigger difference than 0.1 for either child in English and for LIB the TTR even stagnated between the ages of 4;8 and 6;8. In contrast, LIB's Polish TTR decreased from 0.7 to 0.5 between the ages of 5;6 and 6;8 while TDB's Polish TTR increased by 0.2 between the ages of 6;8 and 7;9.

Based on these results, TTR on the MAIN narrative task did not appear to differentiate reliably between TDB and LIB in either of their languages. As these results stand in contrast with their vocabulary scores, which were consistently higher for TDB than LIB, the TTR in the stories they produced based on the worldess pictures books *Rainstorm, Question* and *Walrus* aged 7;9 were calculated in order to exclude a test artefact. Again CLAN was used to calculated TTR and adjustments were made for the Polish versions wherever necessary. The results are presented in figure 39.

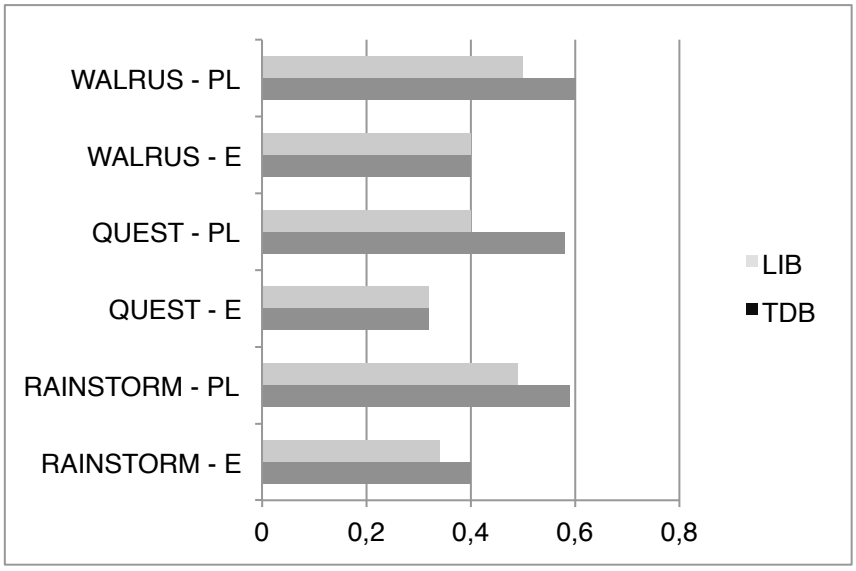


Figure 39 TTR Walrus, Quest & Rainstorm

The TTR analysis in these stories told aged 7;9 correspond to the results obtained from the MAIN narrative task at the same age. Firstly, the TTR in both children's Polish stories was higher than in their English stories. Secondly, the difference between TDB's and LIB's TTR was more substantial in all Polish stories than the English narratives. There was no difference in their English *Walrus* and *Quest* narratives and only a marginal difference in their English *Rainstorm* narration (0.06) with regard to TTR. In contrast, the

difference in their Polish *Walrus* and *Rainstorm* narratives amounted to roughly 0.1 and nearly 0.2 for the Polish *Quest* story.

Overall, this comparison of four different narrative tools confirms the robustness of this form of elicitation as results are largely replicated across both languages at the age of 7;9, when these measures where employed. This indicates that results obtained on the MAIN narrative task at all other ages are also likely to be an accurate reflection of TDB's and LIB's lexical complexity during narrative production. Based on these results TTR does not appear to be reliable measure for the distinction of typical and atypical bilingual development due to the relatively small differences between the two children across all ages and the inconsistency of their scores in relation to one another.

Overall, this analysis illustrated four things. Firstly, TDB and LIB had a larger English than Polish vocabulary aged 7;9. Secondly, TDB had a larger overall vocabulary than LIB. Thirdly, their vocabulary knowledge in both languages only overlapped partly, indicating the domain-specificity of bilingual language knowledge. Finally, measures of vocabulary were less reliable in the distinction of TDB and LIB.

9.1.3 Morphological and Syntactic Development

In this section TDB's and LIB's morphosyntactic development will be described. First, their results on the English and Polish version of the TROG test will be presented, before their scores on the Sentence Repetition task will be analysed. Finally, these insights will be compared to narrative and spontaneous speech data.

Receptive Morphology and Syntax: TROG-2 & TROG-PL.

This section discusses TDB's and LIB's results on the TROG-2 test and the Polish adaptation. First, their scores on the English version will be presented in relation to monolingual English norms. This analysis will be followed by a comparison of their English and their Polish scores.

Unfortunately, no standardised scores are available for the Polish adaptation of the test, therefore their results will solely be compared with each other and across their two languages.

Figure 40 provides an illustration of TDB's and LIB's scores on the TROG-2 test in relation to age norms. The graph clearly shows that TDB performs within or above monolingual English norms at all ages, while LIB performed in the low average to borderline 25th percentile.

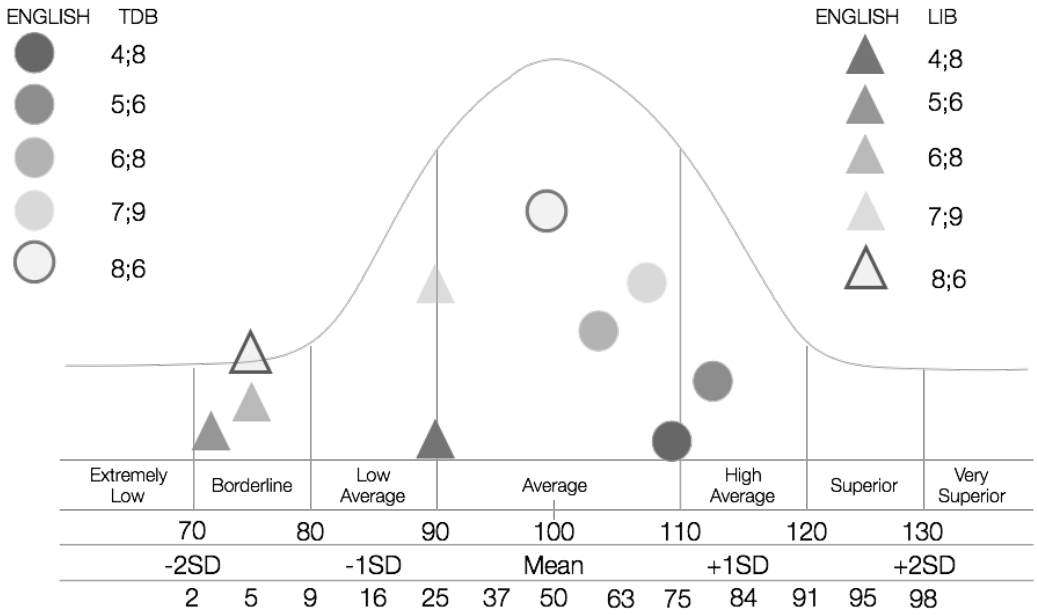


Figure 40 TROG-2: age norms

The difference between TDB's and LIB's scores on the TROG-2 amounted to nearly 2 SD aged 5;6 and 1.5 SD aged 6;8 and 8;6. Therefore, the difference between LIB and TDB's scores on the English TROG was significant at ages 5;6, 6;8 and 8;6 but not aged 4;8 and 7;9. Fig. 41 further illustrates TDB's and LIB's receptive morphosyntactic development in relation to age norms.

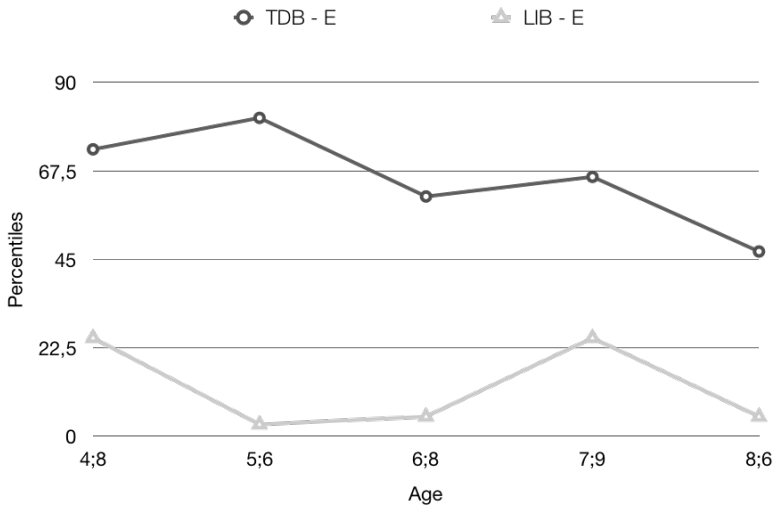


Figure 41 longitudinal TROG-2 scores: percentiles

This graph indicates fluctuation in TDB's and LIB's morphosyntactic development in relation to age norms. TDB performed on the 75th percentile aged 4;8, the 81st percentile aged 5;6, the 61st percentile aged 6;8, then improved slightly in relation to monolingual norms aged 7;9, when he scored in the 66th percentile and finally his performance in relation to age norms declined again and he scored in the 47th percentile aged 8;6.

LIB's performance showed a reverse trend between the ages of 4;8 and 5;6, when he scored in the 25th and 3rd percentile respectively. In contrast to TDB, LIB's performance stayed relatively stable between the ages of 5;6 and 6;8, when he scored in the 5th percentile. In parallel to TDB's performance, LIB's score also improved in relation to age norms between the ages of 6;8 and 7;9 but LIB's score showed a steeper increase, from the 5th to the 21st percentile. Aged 8;6 LIB's score plumetted again and he scored in the 5th percentile.

In order to compare TDB's and LIB's performance in absolute terms, their scores on the TROG-2 as well as its Polish adaptation are given in fig. 42. The graph depicts their performance in sets correct, as suggested by the TROG-2 manual. One set consists of four items with the same grammatical structure. The advantage of scoring sets correct as opposed to items correct is that participants need to score above chance level and, therefore, it can be assumed that they have actually acquired the grammatical structure.

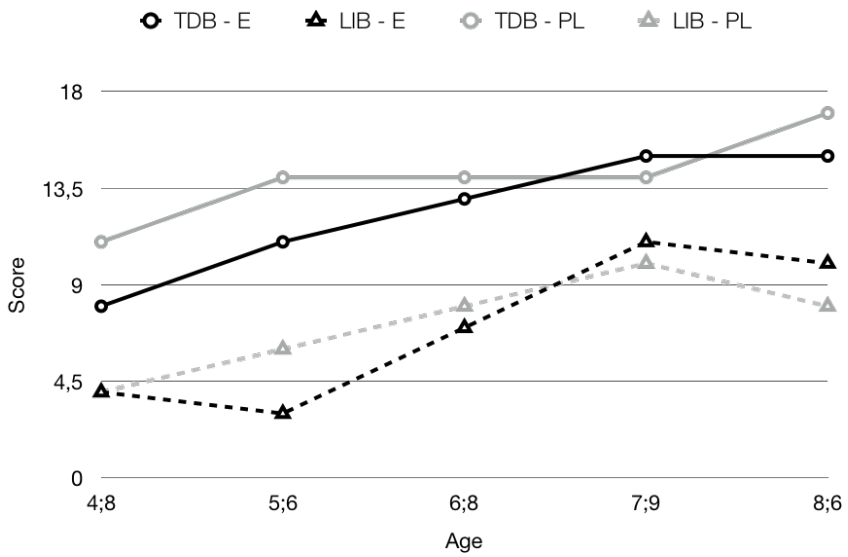


Figure 42 TROG-2 & TROG-PL: sets correct

Fig. 42 shows that TDB also outperformed LIB at all ages on the Polish adaptation of the TROG-2 test. The gap in sets between TDB's and LIB's TROG-2 score amounted to four sets aged 4;8 and doubled to eight sets aged 5;6, before it decreased to a difference of six sets aged 6;8 and even further to four sets aged 7;9, before increasing again slightly to five aged 8;6.

In Polish, the difference in their performance was nearly twice as large as in English aged 4;8 and amounted to seven sets. At 5;6 years 6;8 and 7;9, the gap between TDB's and LIB's performance was identical in their two languages (eight, six and four sets respectively). Aged 8;6, the gap between TDB's and LIB's performance on the Polish adaptation of the TROG test increased again substantially to nine sets.

TDB and LIB differed substantially in regard to their language dominance aged 4;8. While TDB clearly scored higher on the Polish than the English version of the TROG, LIB scored equally in both languages. Between the ages of 5;6 and 7;9 TDB and LIB displayed a parallel course of development. They both performed better in Polish than in English until the age of 6;8 when their English performance surpassed their Polish score. Aged 8;6, however, TDB's and LIB's morphosyntactic development showed different trends. TDB's Polish score further improved to seventeen correct sets and his English performance stagnated at fifteen sets. In contrast, LIB's performance decreased by one set in English and two sets in Polish. Overall, this resulted

in a higher English score for LIB aged 8;6 (10 vs. 8 sets) but a higher Polish score for TDB (17 vs. 15 sets).

However, the gap between their two languages was comparable aged 8;6, which reflects their performance between the ages of 5;6 and 8;6. Aged 4;8 the difference in sets correct between TDB's English and Polish score amounted to three set but there was no difference in LIB's English and Polish scores at the same age. Aged 5;6, 6;8, 7;9 and 8;6 the difference between the scores in their two languages were identical with three, one, one and two sets.

Qualitative Analysis

Blocks A, D and F

Based on participants' performance on blocks A, D and F it can be determined whether they have got general comprehension problems, trouble remembering words or difficulties integrating information from different parts of a sentence. If participants fail these blocks, it cannot be assumed that their difficulties with other items can be assigned to grammatical difficulties. Overall, neither LIB nor TDB had noteworthy trouble responding to blocks A, D or F. TDB only made one error on block D aged 6;8 and LIB made one error on block F aged 4;7 and one error on blocks D and F aged 5;6. Based on these isolated occurrences, it cannot be concluded that either TDB or LIB have systematic comprehension or processing difficulties. The TROG-2 test assesses participants' understanding of the following constructions. Grammatical structures are arranged in ascending order according to their difficulty. Examples are provided in table 6.

Bl.	Grammatical Structure	Example English	Example Polish
A	Two elements	The boy is running.	Baran biegnie.
B	Negative	The girl is not jumping.	Pan nie siedzi.
C	Reverse in and on	The box is in the cup.	Filiżanka jest w pudełku.
D	Three elements	The boy jumps over the box.	Dziewczynka pcha pudełko.
E	Reversible SVO	The dog is looking at the boy.	Kot patrzy na chłopca,
F	Four elements.	The cat sees the box and the knife.	Koń widzi filiżankę i książkę.
G	Relative clauses in subjects	The dog that is standing looks at the man.	Pan, który je, patrzy na chłopca.
H	Not only X but also Y	The box is not only big but also blue.	Ołówek jest nie tylko długi. Ale także czerwony.
I	Reversible above and below	The pencil is above the flower	Kwiat jest nad kaczką.
J	Comparative/absolute	The box is bigger than the cup.	Kaczka jest większa niż piłka.
K	Reversible passive	The girl is chased by the sheep.	Krowa jest goniona przez dziewczynkę.
L	Zero anaphor	The lady is looking at the elephant and is running.	Pan patrzy na konia i biegnie.
M	Pronoun gender/number	She is pushing them.	Oni go niosą.
N	Pronoun is binding	The boy sees that the man is pointing at him.	Pan widzi, że chłopiec pokazuje na niego.
O	Neither nor	The man is neither pointing nor sitting.	Dziewczynka ani nie pokazuje ani nie biegnie.
P	X but not Y	The box but not the shoe is red.	Filiżanka jest czerwona a widelec nie.
Q	Postmodified subject	The girl chasing the horse is big.	Słoń pchający chłopca jest duży.
R	Singular/plural inflection	The cats look at the flower.	Krowy są pod drzewem.
S	Relative clause in object.	The dog chases the girl that is jumping.	Dziewczynka goni psa, który skacze.
T	Centre-embeded sentence.		Baran, na którego patrzy dziewczynka, biegnie.

Table 6 Examples of TROG-2 sets

Aged 4;8 TDB and LIB correctly responded to blocks A, B, D and E in English and blocks A, B and F in Polish. Additionally, TDB also chose the correct items in blocks F, J, K and M in English and C, E, G, J, K, M, O and P in Polish. In contrast to TDB, LIB also understood sentences with three elements (block D) correctly in Polish.

Aged 5;6 TDB and LIB both replied correctly to blocks A, B and E in English and A, B, F, M and N in Polish. TDB also picked the correct items in blocks C, D, F, G, H, J, K and M in English and E, G, H, J, K, O, P and Q in Polish. In contrast to TDB, LIB responded accurately to block D in Polish.

Aged 6;8, both TDB and LIB replied correctly to blocks A, B, E, F, I and J in English and blocks A, B, C, E, F, M and N in Polish. Additionally, TDB

choose the correct items in blocks C, H, K, O, P, R and S in English and G, H, J, K, O, P and Q in Polish. In contrast to TDB, LIB responded accurately to block D in English and Polish.

Aged 7;9 TDB and LIB both choose the correct items in blocks A, B, C, D, E, F, G, I, J, K and M in English and blocks A, B, C, D, F, G, J, O and P in Polish. Furthermore, TDB accurately replied to blocks H, O, P and R in English and blocks H, I, M, N and Q in Polish. In contrast to TDB, LIB also replied correctly to block E in Polish.

Aged 8;6 years TDB and LIB accurately replied to blocks A, C, D, E, F, G, H, J, K and M in English and blocks A, B, C, D, E, F, J and O in Polish. TDB also replied correctly to blocks B, I, N, O and R in English and blocks G, H, I, K, M, N, P, Q and R in Polish.

This analysis highlights some crucial issues. Firstly, grammatical acquisition does not appear to be linear. The data indicates that grammatical structures, which were used at one point, did not necessarily remain in the system. When scrutinising TDB's responses over time, it becomes clear that he did not understand relative clauses in English aged 4;8, appeared to understand them by the age of 5;6 but did respond to them correctly by the age of 6;8. A similar pattern can be observed for his understanding of sentences containing three elements in English. Aged 4;8 and 5;6, he chose the correct items for this syntactic structure but aged 6;8 he was unable to reply accurately to sentences containing three elements. Aged 7;9 and 8;6 he accurately responded to sentences with three elements. Similarly, TDB's understanding of pronouns fluctuated. While he accurately replied to constructions from block M aged 4;8, 5;6, 7;9 and 8;6, he did not do so aged 6;8.

For Polish, similar fluctuation could be observed. While TDB appeared to have understood the reversible passive in Polish at the age of 5;6, he did not reply accurately to this construction aged 7;9.

LIB's receptive grammatical development also shows patterns of vaccilation. Aged 4;8 LIB appeared to have acquired structures with three elements in English but aged 5;6 he was not able to respond accurately to this

sentence type. The same observation can be made for *reversible above and below*, which LIB understood aged 7;9 but not aged 8;6. In Polish, LIB replied accurately to blocks M (pronoun gender/number) and N (pronoun is binding) aged 5;6 and 6;8 but not aged 7;9 and 8;6. The same is true for blocks G (relative clauses in subjects) and P (X but not Y), which he understood correctly aged 7;9 but not aged 8;6.

Quantitative differences between TDB's and LIB's receptive grammatical knowledge in English and Polish were described above. A qualitative analysis of the data further confirmed this finding as it showed that the structures TDB and LIB know in each of their languages in his two languages did not always overlap.

For example, TDB had (temporarily) acquired sentences with three elements by the age of 4;8 in English, but only aged 7;9 in Polish. He had acquired *reversible above and below* by the age of 6;8 in English but only aged 7;9 in Polish. TDB understood relative clauses in Polish aged 4;8 but only acquired this structure by the age of 5;6 in English. TDB also understood *neither nor* and *X but not Y* sentences accurately aged 4;8 in Polish but only acquired this structure aged 7;9 in English. Aged 8;6 he was not able to reply correctly to *X but not Y* structures in English but Polish.

Furthermore, TDB acquired postmodified subjects by the age of 5;6 in Polish but only aged 7;9 in English. It also appears as if he did not fully acquire the structure in English because he was unable to respond to it correctly aged 8;6 but understood it consistently in Polish. Even when comparing his receptive grammatical understanding at ages 6;8 and 7;9, when he replied correctly to roughly the same number of sets in English (13 – 15) and Polish (14 – 14), qualitative differences are apparent. By age 6;8 he had acquired *reversible above and below, singular/plural inflection and relative clause in object* in English but not Polish. He had, however, acquired *pronoun is binding, neither nor, X but not Y* and *postmodified subjects* in Polish but not in English.

Aged 7;9 TDB replied accurately to *reversed SVO* in English but not Polish, despite the fact that he had understood this structure accurately in

both languages aged 5;6. Furthermore, he understood the *comparative, superlative* and *singular/plural inflections* correctly in English aged 7;9 but not in Polish, even though he responded accurately to comparatives and superlatives in Polish aged 6;8. In Polish, but not English, he understood *pronoun is binding* and *postmodified subjects* aged 7;9.

Similar differences between English and Polish receptive grammatical knowledge could be observed for LIB. He was able to accurately reply to *pronouns gender/number* and *pronoun is binding structures* by the age of 5;6 in Polish but only acquired *pronouns gender/number* aged 7;9 in English. He had not acquired *pronoun is binding structures* accurately in English by the end of this study. This difference becomes even clearer when comparing quantitative and qualitative analyses. Even though LIB's receptive grammatical knowledge in English and Polish was fairly balanced aged 4;8, 6;8 and 7;9, the grammatical structures he understood in his two languages did not fully overlap. Aged 4;8, he knew reversible SVO in English but not Polish and in turn replied accurately to structures with four elements in Polish but not English.

At 6;8, LIB understood reversible *above and below* and *comparative/absolute* in English but not Polish. In turn, he replied correctly to *pronouns gender/number* and *pronoun is binding* in Polish but not English. Aged 7;9, he still had not acquired *reversible above and below* in Polish but understood this structure in English. He understood *reversible passives*, *reversible above and below* and pronouns/gender number in English but not Polish. Even though LIB understood *pronouns/gender* in Polish aged 5;6 and 6;8. The constructions LIB understood in Polish but not English aged 7;9 were *relative clauses in subjects, neither nor* and *X but not Y*.

Regarding the order of acquisition of grammatical structures, differences between LIB and TDB can be observed. They largely overlap for the easier constructions (until sentences with four elements – block F). Beyond sentences with four elements, TDB followed a more linear development, largely acquiring the constructions in ascending order of difficulty. Such a course of development is in line with the monolingual English norms the

TROG-2 was standardised on, as items were arranged according to the number of mistakes participants made at different ages. In contrast, LIB displayed a more chaotic grammatical development. While TDB never skipped more than three blocks in his receptive grammatical development, LIB skipped six (between blocks F and M) aged 5;6 and 6;8.

Overall, the analysis of TDB's and LIB's results on the English and Polish versions of the TROG-2 test indicate three major tendencies. Firstly, bilingual receptive grammar development appears to be prone to fluctuation, in that grammatical structures that are acquired at one point do not necessarily remain in the system. Secondly, neither TDB's and LIB's receptive grammar knowledge in English and Polish overlapped more for easier than for more complex items. Finally, the order in which TDB and LIB acquired grammatical structures in both their languages was more similar for grammatically easier than for more complex constructions. This was due to TDB following a more linear course of development than LIB, particularly in Polish.

Productive Morphosyntax: SR-E & SR-PL

This section is devoted to the description of TDB's and LIB's results on the English and Polish sentence repetition tasks. For the first data collection point at 4;8, only data from TDB is available as LIB was unable to complete the test. Figure 43 depicts LIB's and TDB's scores on the sentence repetition tasks over time.

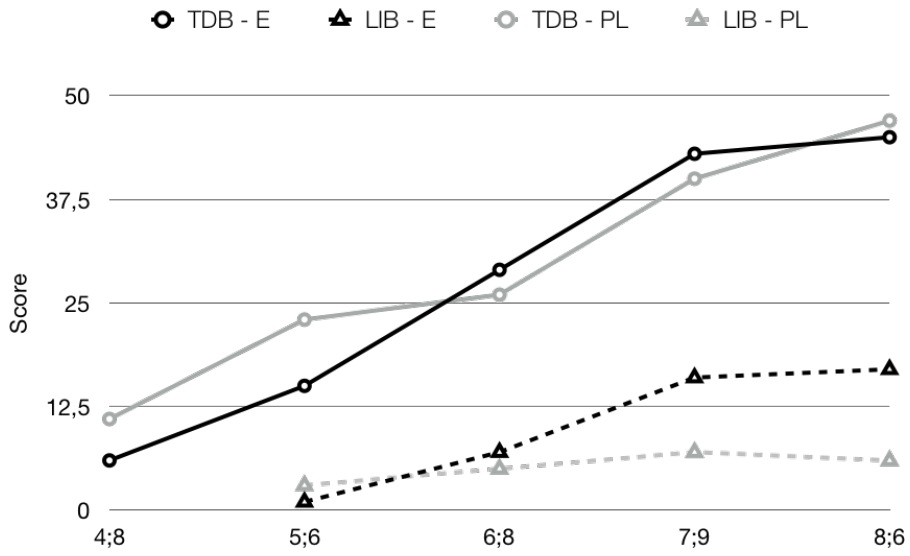


Figure 43 SR-E & SR-PL: scores

This graph clearly shows that TDB outperformed LIB on both the English and the Polish version of the sentence repetition task at all ages. Aged 4;8 LIB was unable to complete the sentence repetition task, resulting in discontinuation of the task. TDB, on the other hand, completed the task and repeated six English and eleven Polish sentences correctly. Aged 5;6, LIB repeated one English and three Polish sentences accurately, while TDB imitated 15 English and 23 Polish sentences correctly.

One year later, at 6;8, TDB accurately repeated 26 Polish and 29 English sentences, as opposed to seven English and five Polish sentences that were correctly repeated by LIB. Aged 7;9 both children improved further. TDB scored 43 in English and 40 in Polish, while LIB repeated 16 English and 7 Polish sentences correctly. Finally, aged 8;6, TDB and LIB both improved in English, so that TDB scored 45 and LIB 17, but only TDB could further improve his Polish score to 47. LIB, on the other hand, only repeated six Polish sentences accurately aged 8;6.

In both languages, the gap between TDB's and LIB's scores increased steadily between the ages of 5;6 and 8;6 but more so in Polish than in English. The difference between TDB's and LIB's English scores rose from 14 to 22, 27 and finally 28, resulting in a total difference of 14 sentences between time point two and time point five. The gap between their Polish scores, on the other hand, increased from 20 to 21, 33 and finally 41, resulting in a total augmentation of 21 sentences between the ages of 5;6 and 8;6.

Regarding the morphological and syntactic development in their two languages, two differences need to be noted. Firstly, the relationship between their English and Polish morphosyntactic development showed reverse trends. While the gap between TDB's English and Polish performance decreased over time, from eight aged 4;8 to two aged 6;8, LIB's morphosyntactic development displayed an opposite trajectory. Aged 5;6 and 6;8 the difference between LIB's scores in English and Polish amounted to two, while by the age of 8;6 this gap had increased to eleven sentences. Moreover, TDB's two languages developed in parallel but LIB's English morphosyntactic ability displayed a steeper developmental trajectory than his

Polish. This difference becomes particularly apparent in the fact that TDB started out with a higher Polish score aged 4;8 and 5;6 but aged 6;8 and 7;9 he scored slightly higher on the English task and finally, aged 8;6 he scored marginally better on the Polish task. In contrast, LIB only scored higher on the Polish sentence repetition task aged 5;6 and from 6;8 onwards, he scored increasingly higher on the English than the Polish version of the test.

Qualitative Analysis

The first qualitative analysis of the sentence repetition task was concerned with grammaticality. The aim was to determine how many of the sentences TDB and LIB produced in this task were grammatically correct, albeit not being exact replicas of the target sentences. Fig. 44 illustrates TDB's and LIB's performance on the sentence repetition task according to grammaticality.

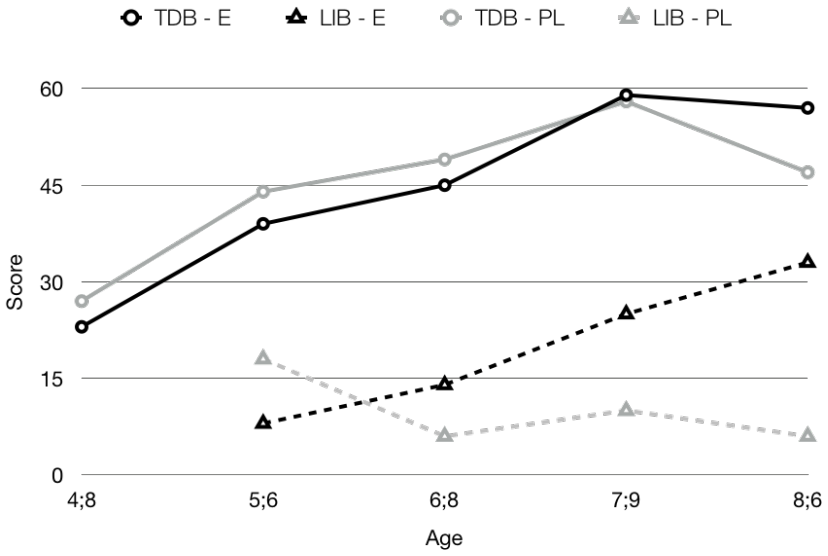


Figure 44 SR-E & SR-PL: grammaticality

This graph clearly shows that TDB produced substantially more grammatically correct sentences than LIB in both languages and at all ages during the SR task. It also becomes apparent that the overall number of grammatically accurate English sentences uttered by LIB and TDB during this task increased steadily until the age of 7;9, when TDB performed at ceiling (i.e.: 60). For LIB grammatical accuracy increased further, to 33 sentences aged 8;6.

This stands in contrast to their Polish performance. The number of accurate Polish sentences increased until the age of 7;9 for TDB, before it decreased from 58 to 47 sentences aged 8;6. For LIB, on the other hand, the number of grammatically correct Polish sentences decreased between the ages of 5;6 and 6;8 and further between 7;9 and 8;6.

A direct comparison of their grammaticality scores over time shows that LIB produced roughly as many grammatically correct English sentences aged 8;6, as TDB aged 5;6 (TDB: 39 vs. LIB: 33). In Polish, LIB never approached TDB's level of grammaticality, even when his highest score is compared to TDB's lowest score.

An in-depth error analysis further revealed substantial differences between the two children in regard to their grammatical development and the types of errors they made during the sentence repetition task. When scrutinising TDB's and LIB's responses, it becomes clear that aged 5;6 LIB mainly repeated final words correctly (30 in English and 23 in Polish) while beginnings were either unintelligible or incomplete. As transcripts are only an abstraction of the spoken word, audio files were consulted after this pattern had been discovered. The following analysis confirmed that he stressed sentence final words very prominently, while he slurred beginnings or uttered them very quickly. Despite the unintelligibility, LIB did imitate the correct intonation of the target sentences. TDB did not display a similar error pattern.

By the age of 6;8 intelligibility improved for LIB and in addition to sentence final words, LIB also repeated sentence initial words correctly. Again, this tendency is particularly prominent on the audio recordings as LIB stressed the beginnings and endings of sentences while the remaining words were difficult to understand. TDB did not display a similar preference for particular components of the syntactic construction.

By age 7;9 these differences in intonation patterns between TDB and LIB had largely disappeared, however TDB's articulation remained more accurate and therefore more intelligible until the end of this study.

In addition to a difference in intonation and articulation patterns, some variation in their morphosyntactic development emerged from this error

analysis, the narrative and the spontaneous speech data.

Plural. The sentence repetition task and the narrative/spontaneous speech data show some discrepancies regarding TDB's and LIB's noun plural acquisition in English and Polish. While the sentence repetition tasks would suggest that TDB had already fully acquired the English plural by the age of 4;8, the narrative data shows that he overregularised incorrect plural forms aged 5;6 (*fishes*) and 7;9 (*sheeps*). By the age of 8;6 no erroneous English plural forms could be found, which suggests that TDB had acquired these forms by the last test session.

In contrast to TDB, LIB still produced erroneous plural forms by the age of 8;6 on the sentence repetition task and the narratives/spontaneous speech. However, similar to TDB, the sentence repetition task and the more spontaneous data show some discrepancies. On the English sentence repetition task, LIB produced two inaccurate plural forms aged 5;6, one aged 6;8, aged 7;9 he produced all plural forms correctly but aged 8;6 he again used one incorrect plural form. In contrast to the sentence repetition task, LIB's narratives aged 7;9 show that he still produced inaccurate or overregularised plurals (*fishes, a mice*) at this age. The latter may be due to ‚mouse' possibly being a plural-dominant word for children. Together, this data implies that LIB had not yet fully acquired the English noun plural by the age of 8;6.

In Polish, a similar picture emerges from a comparison of the sentence repetition tasks and the narrative measures and spontaneous speech data. According to the sentence repetition task, TDB had acquired the plural by the age of 6;8, while LIB had only fully acquired it by the age of 8;6. However, the narrative data showed that TDB still produced an erroneous Polish plural form aged 7;9 (*dwie ptaszek* instead of *dwa ptaszki – ‚two birds'*). It needs to be borne in mind, however, that the expression of plural after numerals is a difficult and idiosyncratic problem in Slavic languages and therefore should not be classified as a general plural error. By the age of 8;6 TDB did not produce any erroneous noun plural forms in Polish anymore (neither general

nor after numerals).

Based on these insights, the following conclusions can be drawn regarding TDB's and LIB's noun plural acquisition. While the sentence repetition task appears to accurately reflect LIB's plural acquisition, the same cannot be said for TDB, who made more errors in the narrative and the spontaneous speech than the formal test. Furthermore, a difference in the rate at which TDB and LIB acquired English noun plurals could be observed. TDB did not produce any erroneous English plural forms by the age of 7;9 which is true for both the sentence repetition task and the narrative and spontaneous speech data. In contrast, LIB continued to produce erroneous noun plural forms at the age of 8;6 in the formal test and his spontaneous speech.

For Polish, the contrast between TDB's and LIB's acquisition of noun plurals did not seem as clear. While TDB made fewer errors in his Polish noun plural production at the age of 7;9 than LIB, both children had only fully acquired this grammatical feature by the age of 8;6. It therefore appears that in English-Polish bilinguals growing up in the UK, English noun plural production may potentially be a more reliable indicator of language impairment than Polish plural.

Finite verb forms. On the English sentence repetition task, TDB omitted some finite inflectional suffixes (3rd person singular *–s*) aged 4;8 but by the age of 5;6 he appears to have had acquired this grammatical feature. LIB, on the other hand still produced erroneous forms by the age of 8;6. While the number of omitted finite verb forms decreased over time, he still omitted verb inflections aged 8;6. These results from the sentence repetition task correspond to the narrative and spontaneous speech data. While TDB still omitted finite inflectional suffixes in English (e.g.: *he get*) aged 4;8, he did not produce any such erroneous forms in the subsequent testing sessions or recorded conversations. In contrast, LIB still omitted English inflectional verb endings by the age of 7;9 in his narratives and during spontaneous speech (e.g.: 4;8: *bird eat*, 5;6: *he run*, 6;8: *he climb*, 7;9: *his mum understand*) but not aged 8;6.

The correct use of tense was yet another distinctive factor between TDB and LIB. It was already briefly mentioned in the discussion on grammaticality of sentence repetition tasks that TDB's tense errors in English were mainly due to the omission of auxiliaries, which resulted in a different tense than the one in the target sentences (e.g.: past simple for past perfect) but nevertheless in grammatically accurate sentences. Similarly, TDB would substitute present for past tense forms or vice versa in the sentence repetition task. Such substitutions are typical for language acquisition.

Until the age of 7;9, LIB either omitted regular past tense endings or auxiliaries, without changing the main verb accordingly, which would result in grammatically incorrect sentences. However, in parallel, he also started to display a similar pattern of auxiliary omission aged 7;9 that could first be observed in TDB aged 4;8. By the age of 8;6 LIB did not produce any incorrect tense forms in English during the sentence repetition task anymore but replaced past for present tense or past progressive with past simple.

In other words, TDB did not make any tense errors on the sentence repetition task at any point in time but he omitted auxiliaries or substituted tenses. In contrast to LIB, TDB's tense alterations resulted in grammatically accurate sentences. LIB omitted regular past tense *–ed* or auxiliaries until the age of 7;9 but also started to display similar error patterns to TDB from this age onward.

The analysis of narrative and spontaneous speech data further revealed that TDB started to use overgeneralised past tense *–ed* from the age of 5;6 onward (e.g.: *bited*) and continued to do so until the age of 7;9 (e.g.: *drawed*). In contrast, LIB started to produce overgeneralised past tense forms from 6;8, which occured in parallel with omitted verb inflections (e.g.: *he bited, he climb*). This finding highlights another discrepancy between the sentence repetition task and narrative data and implies that LIB may have started to acquire the regular past tense form nearly one year earlier than the sentence repetition task would suggest. Regarding the difference between the two children, the results suggest that TDB started to overgeneralise regular past tense inflection earlier than LIB (5;6 vs. 6;8) and that LIB produced these

overgeneralised forms in parallel with omitted verb inflections until the age of 8;6.

In Polish, TDB's and LIB's tense production also differed. Aged 5;6, TDB replaced some past tense forms with future forms (e.g.: *zostały zbadane – będą badane*; '*they were examined' – 'they will be examined'*) by substituting the auxiliary verb and amending the main verb accordingly. LIB, on the other hand, either omitted verbs entirely (e.g.: *one były schowane za firanką → one za firanka – 'they were hidden behing the curtain' → 'they behind curtain'*). This may be due to worse phonological working memory, leading to the omission of verbs. LIB also changed future to present tense (e.g.: *Antek będzie musiał czytać bajkę → Antek musi czytać bajkę – 'Antek will need to read a book' → 'Antek needs to read a book'*). By 6;8 TDB had largely acquired Polish tense forms, while LIB still replaced future with present forms aged 8;6 (e.g.: *On nie będzie umiał upiec ciasta z makiem → On nie umie erm robić ciast* – 'He will not know how to bake a cake with poppyseeds' → '*He does not know how to make a cake'*).

Moreover, Polish verb aspect posed considerable difficulties to both children until the age of 7;9, which became apparent from their narrative and spontaneous speech data. Both children tended to overuse the imperfective aspect in Polish (e.g.: 7;9: TDB: *znaleźli → znajdowali* 'they found' *zaczeła → zaczynała* ‚she started' LIB: narysowali → rysowali ‚they drew'). As both children exhibited substantial difficulties with this grammatical feature, errors in Polish verbal aspect production should be treated with caution in English-Polish bilingual children, even at older ages, in order to prevent misdiagnosis of language impairment in this group.

In addition, LIB still produced erroneous gender forms, that is he did not mark verbs accurately for the female gender by the age of 8;6. He omitted the marked feminine suffix and replaced it by the grammatically and semantically unmarked masculine. TDB, on the other hand, replaced personal pronouns but then marked accordingly for gender (e.g.: 8;6: *Ala wpadła → Ala wpadł, '*Ala fell'*; kucharka zjadła → kucharka zjadł* 'the cook ate'*; Maja zobaczyła → Maja zobaczył* 'Maja saw'). Based on this finding, it can be assumed that LIB

had not fully acquired Polish verb inflection by the age of 8;6. The findings from the sentence repetition task largely correspond to the narratives and spontaneous speech data. Aged 8;6 LIB still did not consistently mark accurately for gender (e.g.: *7;9: widział malutkiego* koza ‚saw small-m goat-f', 8;6: *mama widział/dał* 'mum-f saw-m') while TDB only did not do so until the age of 6;8 (e.g.: 5;6 TDB: *tata pomogła* 'dad helped-f'). While the children differed with regard to their rate of acquisition, both children replaced the marked feminine suffix by the unmarked masculine form, suggesting a paralel development. These findings therefore indicate that TDB acquired gender marking at a faster rate than LIB but, at the same time, that inaccurate verb gender marking may potentially only distinguish between older English-Polish bilinguals with and without language impairment.

Case inflection. Polish utterances in the sentence repetition tasks also revealed a lack of or erroneous noun inflection for both children. While the affected child made more omission than commission errors aged 4;8 and 5;6, the inverse could be observed in his brother. The typically developing twin showed 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.

By the age of 6;8, TDB did not produce any inaccurate noun inflections in the sentence repetition task anymore. LIB did not omit any noun inflections anymore but produced erroneous forms instead (e.g.: *grzybów [target case: Gen. Pl.]* → *grzybu [produced case: inexistent inflectional suffix]* 'mushroom'*; kubek [target form: Nom. Sing.]* → *kubki [produced form: Nom. Pl.]* ‚mug') aged 6;8, 7;9 and 8;6. While the second example given above (kubek → kubki) appears to be a plural for singular substitution at first glance, it is actually an inaccurately inflected genetive case in the context of the sentence produced by LIB. The target sentence and LIB's answer are provided below in order to illustrate this example further:

Example LIB sentence repetition task 6;8
Target sentence: On trzymał kubek, do którega wlewa sok.
He was holding the cup into which he was pouring the juice.
Produced sentence: On (…) on wlewa sok do kubki.
He pours the juice into the cup.

The example above illustrates that the structure of LIB's sentence would have required the target word *kubek* to stand in the genitive singular. However, instead of producing the accurate inflectional suffix *–a*, LIB produced the genetive plural suffix *–i*. This indicates that LIB had not fully acquired Polish noun inflection at the last testing session. However, the use of erroneous inflectional suffixes at older ages indicates that LIB's metalinguistic awareness was improving.

The analysis of narrative and spontaneous speech data gave more insight into TDB's and LIB's acquisition of Polish case inflection. The transcripts were scrutinised for accurate, erroneous or lacking case inflections at all ages and the results are summarised in table 7.

Case	4;8		5;6		6;8		7;9		8;6	
	TDB	LIB	TDB	LIB	TDB	LIB	TDB	LIB	TDB	LIB
					Singular					
Nom.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.	≈	≈	≈	≈	✓	✓	✓	≈	✓	≈
Dat.	×	/	✓	/	/	×	✓	/	✓	≈
Acc.	✓	✓	✓	✓	✓	✓	✓	≈	✓	≈
Instr.	/	/	/	/	/	/	≈	×	✓	≈
Loc.	✓	/	✓	/	✓	✓	✓	≈	✓	≈
Voc.	/	/	/	/	/	/	/	/	/	/
					Plural					
Nom.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gen.	/	/	/	/	✓	✓	≈	×	≈	×
Dat.	×	/	/	/	/	×	✓	/	✓	×
Acc.	✓	/	✓	✓	✓	✓	✓	✓	✓	≈
Instr.	/	/	/	/	/	/	/	/	✓	/
Loc.	/	/	/	✓	/	/	/	/	✓	×
Voc.	/	/	/	/	/	/	/	/	/	/

✓ = acquired ≈ = partly acquired × = not acquired / = no occurence

Table 7 Polish Nouns Inflection Development

When analysing the results presented in table 6, it needs to be borne in

mind that the analysis of the first three data collection points is solely based on TDB's and LIB's MAIN narrations and re-narrations, which are rather short and may hence not be a complete reflection of their grammatical abilities. Despite their shortness the MAIN narratives provide ample opportunity to describe relationships between subjects, objects and their location using a wide range of singular and plural forms. The sample texts for the re-narration condition, which contain all cases apart from the vocative plural, confirm this. Therefore, the MAIN narrations and re-narrations were included in this analysis despite their shortness. For the last two data collection points (7;9 & 8;6), spontaneous speech recordings and their narratives based on the three wordless picture books as well as the picture description were included in addition to the MAIN narratives.

Overall, table 6 shows that TDB and LIB produced an increasing number of Polish noun inflections over time. Aged 4;8 both used the nominative and accusative singular and the nominative plural accurately. In addition, TDB already produced the locative singular and the accusative plural correctly. Moreover, both children used the genetive singular accurately in personal pronouns (e.g.: *jego piłkę, jego ogon*) but not negations (e.g.: już nie robił **to** → tego). The latter may possibly be the result of cross-linguistic influence from English. LIB did not use any constructions requiring the singular or plural dative aged 4;8. TDB, on the other hand, used two dative contructions, one singular and one plural, but in the singular he omitted the masculine personal pronoun (examples below) while he used the wrong (genitive) noun inflection in the masculine plural.

Example TDB Dative:
*TDB: mama dała jedzenie
mum gave food
*TDB: a potem kot juz [: już] nie robił to [: tego] ptask**ów** [: ptaszkom]
then the cat wasn't doing that to the birds anymore

Aged 5;6, TDB used feminine and masculine personal pronouns in the dative singular accurately and LIB started to use the masculine locative plural correctly (*na krzaki* 'on the bushes') but it is unclear whether this knowledge expanded to other forms, as he code-switched where the feminine singular

locative would have been required (w **bag@s** → w torb**ie**).

By the age of 6;8 TDB and LIB had acquired the genetive singular and plural accurately. At this age, LIB omitted personal pronouns in the masculine singular and plural dative (example below).

Example LIB personal pronouns omission:
*LIB: i potem kot (.) poszedł na górę &uh [/] poszedł na górę drzewa i (.) uh (.) mama wróciła i **dała jedzenie**.
*And then the cat went on the top oft he tree and the mum came back and **gave food**.*
*LIB: ale potem uh [/] ale potem **mama pomogła** i potem kot siał [: chciał] znowu na górę ale pies to widział i złapał kota za ogon
*but then **mum helped** and then the cat wanted back up but the dog saw that and caught the cat's tail*

Even though TDB did not produce any inaccurate Polish noun inflections on the Polish sentence repetition task anymore by the age of 6;8, he still occasionally made errors in his narratives and spontaneous speech at the age of 7;9. In particular, TDB still occasionally inflected words with stems ending in *–k* inaccurately. This was found for feminine and masculine words and for plural and singular alike. In the plural, he overgeneralised the regular masculine and neutral genetive plural case inflections to feminine words, where the unnatural genitive zero plural would have been required (e.g.: *tęczę magicznych kredków [: kredek]* rainbow of magic crayons'*)*. This is a common mistake for children acquiring Slavic languages. TDB also occasionally overgeneralised the singular locative ending to the singular genetive (e.g.: *do atlantykie [: atlantyku]).* This suggests that words with stems ending in *–k* appear to pose persistent problems even to typically developing bilingual English-Polish children. In addition, TDB was also found to occasionally choose the wrong case where a preposition could require either accusative or locative depending on the meaning (e.g.: *pod fotel* vs. *pod fotelem* – moving under the armchair vs. under the armchair).

LIB also produced inaccurate plural inflections aged 7;9 but with the difference that he did not inflect for case while TDB overgeneralised regular case inflections (e.g.: 7;9: TDB: *tych *kredków*, LIB: *te kredki*). In addition, LIB made errors with the singular feminine accusative (e.g.: *znalazł żółty kredka [: żółt**ą** kredk**ę**]* 'found a yellow crayon') for words with stems ending in *–k* and

masculine locative (e.g: przy starym mostem [: moście] ‘at the old bridge’). In the latter example, the locative would have been required but LIB used the instrumental instead. TDB did not make any mistakes with the accusative or locative singular at this age.

Finally, aged 8;6, TDB had largely acquired Polish case morphology with the exception of occasional inaccuracies in his use of the genetive plural, again with stems ending in *-k*. LIB, on the other hand, still showed difficulties with the genetive, dative, accusative and locative singular and the genetive, dative, accusative and locative plural. This was true for words with stems ending in non palatalised or non palatal consonants and *–k*. Examples below.

Example Erroneous Case Inflections LIB:

Genitive singular:	*LIB: i potem skaczył [: skoczył] i chap (..) złapał prawie jeden piskląta. [: pisklęto] *And then he jumped and chap nearly caught one chick*
Dative singular:	**LIB: po tym **czasu** [: czasie] pies powiedział mmh (.) to może być smaczne.* *After this time dog said mmh this can be good*
Accusative singular:	**LIB: jak mama wróciła to widział **kot** [: kota].* *when mum came back she saw cat*
Dative plural:	*LIB: i potem er mama dał robaczek do er małe **piskląta** [: małym piskląteom] *and then mum gave bug to small chicks*
Accusative plural:	*LIB: zobaczył **ptaci** [: ptaków] *he saw birds*

Overall the analysis of TDB’s and LIB’s noun inflection acquisition suggests that they largely acquired Polish noun acquisition in the same order but at different rates. This becomes particularly apparent at the age of 8;6 when TDB had acquired the vast majority of case inflections, while LIB was still using a large part of inflectional morphemes inconsistently. This suggests that case morphology may be more reliable in the distinction of older English-Polish bilinguals with and without language impairment.

Determiners. A clear difference between TDB and LIB also became apparent in their use of English determiners in the English sentence repetition task. While TDB still omitted them aged 4;8, he used them accurately by the age of 5;6. LIB, on the other hand, still occasionally omitted English determiners by the age of 8;6. Similar to finite verb forms, the overall number

of omissions decreased over time but they still occured by the end of this study. Similar to the English plural forms, LIB did not make any errors with English determiners aged 7;9 but omitted one aged 8;6. In Polish, neither of the two children omitted or substituted determiners in the sentence repetition task at any point of the data collection.

In contrast to the sentence repetition task, the narrative and spontaneous speech data only revealed occasional omissions of a determiner by LIB aged until the age of 7;9. Examples are given below.

Example determiner omission LIB 6;8 & 7;9

*LIB (6;8):	(..) a playful dog was (.) trying to cat(ch) a mi(ce) (..) and the mice ran **into tree**.
*LIB (7;9):	**and apple** next to the roses and a icecream.
*LIB (7;9):	he go(t) a gold badge (..) <an(d) he> [//] an(d) the **policeman has idea** (.) to make a pool for Wally.

Based on this analysis the omission of determiners in sentence repetition tasks appears to be a possible distinctive characteristic between typical and atypical English-Polish bilingualism after the age of 5;6.

Pronouns. In the English sentence repetition task, TDB substituted personal pronouns aged 4;8 and omitted and substituted them aged 5;6. He did not make any mistakes in the use of personal pronouns aged 6;8 and 7;9 but substituted them again twice aged 8;6. A slightly different pattern emerged for LIB. He also omitted and substituted personal pronouns aged 5;6, 6;8, 7;9 and 8;6 but the number of errors he made peaked at the age of 7;9, when TDB did not produce a single erroneous form.

In Polish, TDB made errors with personal pronouns until the age of 6;8 (e.g.: *5;6: go → jej* ‚him' → ‚her' *; ona → oni;* ‚she' → ‚they' *; 6;8: one → ona* ‚they' → ‚she'*; ona → mama;* ‚she' → ‚mum') but seemed to have had fully acquired them by the age of 7;9. LIB, on the other hand, still produced erroneous personal pronouns or omitted them entirely by the age of 8;6 (e.g.: 5;6: *oni → on* ‚they' → ‚he'*, 7;9: one były → były* 'they were' → 'were'*, 8;6: one → oni* 'they (fem.)' → 'they (masc.)*'*.

In their spontaneous speech and their narrative production, English

reflexive pronouns posed a particular difficulty to both children until the age of 7;9. Examples are given below:

Examples of reflexive pronouns production TDB & LIB aged 7;9
*TDB (7;9): he was proud of **hisself**.
*LIB (7;9): he protect **theirself**.

In Polish, TDB produced plural possessive pronouns inaccurately at the age of 4;8 but had acquired the correct form by the age of 5;6. LIB still occasionally misassigned the wrong gender to personal pronouns by the age of 7;9. Examples are given below:

Examples of possessive and personal pronoun production aged 4;8, 5;6 and 7;9
*TDB (4;8): i **jej** [: ich] mama poleciała.
and their mum flew away.
*LIB (5;6): i lis złapał **go** [: ją].
and the fox caucht him [: her].
*LIB (7;9): było [//] kiedyś było [: był] ru rudy kot (..) który był motylka [: motylek] na kszaku (.) i kot ciał [: chciał] złapać **ją** [: go].
there once was a ginger cat who saw butterfly on a bush and the cat wanted to catch her [: him].
*LIB (7;9): chłopiec nie miał (.) pomysł [: pomysłu] jak złapać **jego** [: ją].
the boy didn't know how to catch him [: her].

These results hence indicate that the omission and substitution of pronouns during sentence repetition tasks may potentially distinguish between typically and atypically developing English-Polish bilingual children at older ages. This is particularly apparent for the Polish task, which also corresponds to the narrative and spontaneous speech data as TDB did not produce any inaccurate pronouns beyond the age of 5;6 while LIB did. For English, this difference is slightly less evident and particularly erroneous reflexive pronoun production should not be wrongly associated with language impairment, even at older ages.

Prepositions. LIB omitted the Polish monophonemic preposition *w* 'in' during Polish sentence repetition task until the age of 8;6 (e.g.: *6;8: w pokoju → pokoju, w plecaku → plecaku, 7;9: w twoim pokoju → twoim pokoju, 8;6: w sklepie → sklepie*). For TDB, on the other hand, no omission of this preposition was observed. The omission of the Polish preposition *w* 'in'

therefore appears to be a persistent difficulty for LIB but not TDB.

The narrative and spontaneous speech data confirmed that LIB's omission and substitution of pronouns was only an issue in Polish but not in English and only for LIB and not TDB. However, in the narrative and spontaneous speech such omissions and substitutions only occurred very rarely. Two examples of substitutions are given below:

Preposition substitution LIB
*LIB (5;6): koza mała koza i [/] i [/] i chciała wejść **na** [: do] wodę [: wody].
the small goat wanted to go on the water [: into the water].
*LIB (7;9): i potem biegali przy [//] **przy** [: na] tym starym mostem [: moście].
and then they ran next to [: on] the old bridge.

Altogether the findings on preposition production and development suggest that this may be predominantly an area of difficulty for English-Polish bilingual children with language impairment. However, it needs to be borne in mind that even in atypically developing children such substitutions and omissions may only occur rarely and may hence only become apparent in larger data sets.

Simplification of sentences. It was already discussed that TDB and LIB differed with regard to their articulation of the target sentences in sentence repetition tasks and this difference became further apparent in diverging omission patterns in both languages. While TDB simplified sentences aged 4;8 and 5;6, producing structures with one instead of two objects, he only produced one such simplification aged 7;9 but not aged 6;8 or 8;6. LIB, on the other hand, omitted objects in double object constructions at all ages. Neither child omitted objects in single-objectconstructions (i.e: in connection with transitive verbs) in either English or Polish at any testing point.

Relative Clauses. Relative clauses posed a significant difficulty to both children at all ages and in both languages during the sentence repetition task but they displayed different error patterns. Relative clauses in the English sentence repetition tasks are introduced by the relative subject and object

pronoun *that*. Neither relative clause is introduced with a preposition. In Polish, one relative clause is introduced by the preposition *do* ‚to' while the remaining clauses are introduced by relative subject and object pronouns.

LIB was not able to accurately repeat any of the target sentences containing relative clauses until the age of 8;6. TDB, on the other hand, reproduced them with increased accuracy over time. Until the age of 6;8 neither TDB nor LIB were able to correctly repeat any of the items containing relative clauses in either English or Polish. Aged 7;9 TDB repeated three complex sentences with relative clauses entirely accurately and displayed a pattern of subject-object inversion for some of the remaining sentences. Two of the sentences he repeated accurately contained relative object pronouns and one a relative subject pronoun. In two further sentences, TDB repeated the syntactic structure correctly but substituted one agent and one determiner for a personal pronoun.

LIB also inversed subjects and objects and replaced the introducing *that* by *what* or *who*. The substitution of *that* by *what* was also observed in TDB's answers aged 5;6 but not at later testing points. Examples of sentences produced by TDB and LIB aged 7;9 are given below.

Example relative sentences English SR task 7;9
subject-object inversion
Target (45): it was the boy that the man splashed in the sea.
TDB: it was the boy that splashed the man in the sea.
LIB: it was the man who splashed the boy in the sea.
Target (46): the swan that the deer chased knocked over the plant.
TDB: the swan that chased the deer knocked over the plant.
Target (55): it was the carpet that was cleaned by the dustman.
LIB: it was the carpet who cleaned the dustman.

substitution
Target (44): he should wash the baby that the child is patting.
TDB: he should wash the baby that she was patting.
Target (56): it was hiss on that the fireman saved from the house.
TDB: it was the son that the fireman saved from his house.
Target (42): the children enjoyed the sweets that they tasted.
LIB: the children enjoyed the sweets what they tasted.
Target (54): the bee that the man swallowed had hurt him.
LIB: the bee what the man swallowed had hurt him.

Finally, aged 8;6 TDB repeated two more sentences with relative clauses correctly, reversed subject and object in three sentences and substituted an agent in one more. In contrast, LIB omitted relative clauses in two sentences,

substituted *that* by *when* or *who* in two structures and was unable to repeat any of the remaining sentences containing relative clauses.

In Polish, by the age of 6;8, TDB produced relative sentences with relative pronouns in the nominative case (i.e. który/która) accurately. However, he still did not produce relative clauses with an inflected relative pronoun accurately (e.g.: *na którym* 'on which' → *do którego* 'to whom') at the age of 8;6. In contrast, LIB only produced one sentence containing a relative pronoun in the nominative case correctly at the age of 8;6 but no sentences containing inflected relative pronouns, which he all substituted with the nominative case.

Overall, these findings suggest that sentences containing relative clauses are of substantial difficulty for bilingual children with language impairment beyond the age of 8;6. Bilingual children with typical development, on the other hand, gradually start to use them gaccurately by the age of 7;9.

In essence, the findings from the sentence repetition tasks suggest that overall rates of grammaticality may be a reliable indicator of bilingual language impairment. Moreover, articulation and intonation patterns cearly differentiated between the two children, particularly at younger ages when LIB mainly reproduced sentence final words. Noun plural distinguished well between the two children at all ages, apart from 7;9 when LIB did not make a single mistake with this grammatical features. Regarding finite verb forms it became clear that LIB acquired them at a slower rate but started to display similar error patterns to TDB by the age of 7;9. LIB also omitted objects in double object sentences until the age of 8;6, as opposed to 5;6 for TDB. TDB and LIB both substituted words at all ages but the number tendentially increased for LIB and decreased for TDB. Finally, relative clauses represented a challenge for both children but LIB still had not acquired them by the age of 8;6, while TDB displayed increasing mastery of this structure by the age of 7;9.

Mean Length of Utterance (MLU) - Narratives

Mean length of utterance in words was calculated using CLAN. The results are presented in fig. 45. Two noteworthy patterns emerged from the MLU analysis. Firstly, TDB consistently outperformed LIB in both languages and at all time points, apart from the first Polish session aged 4;8.

Secondly, TDB's and LIB's MLU development followed a parallel course. TDB's and LIB's English mean length of utterance increased steadily until the age of 6;8 before it plummeted to a comparable mean length for both children (TDB: 6.5, LIB: 5.9) at the age of 7;9. Finally, their MLU had increased again considerably at the age of 8;6 and amounted to 12.9 for TDB and 7.9 for LIB. It is not quite clear what caused the considerable decrease in MLU in both children at the age of 7;9. Possibly, TDB and LIB did not find the MAIN picture story particularly stimulating at this age. While this would not be in line with the substantial increase in story length observed at the same time, their considerably higher MLU in the Quest story, a more challenging wordless picture book, would be in line with this hypothesis.

This parallel pattern of development could also be observed for their Polish MLU between the ages of 5;6 and 8;6. Their MLU increased steadily until the age of 7;9, where it stagnated.

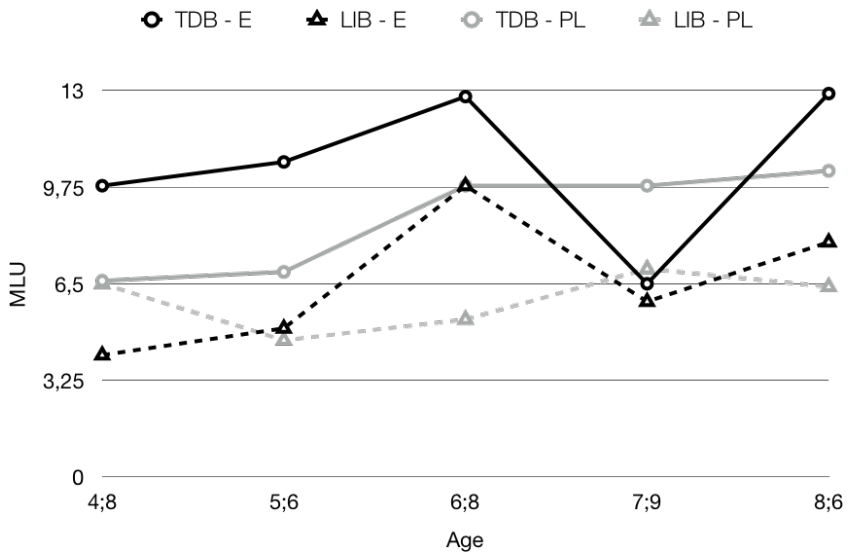


Figure 45 MAIN MLU

Regarding the relationship between TDB's and LIB's two languages, slightly divergent patterns emerged for the two children. TDB's English MLU was larger at all ages apart from 7;9. In contrast, LIB had a MLU of 6.5 in Polish but 4.1 in English aged 4;8. Aged 5;6 his MLU in both languages was comparable (E: 5, PL: 4.6). At the age of 6;8, LIB's English MLU was nearly twice as large as his Polish MLU (E: 9.8, PL: 5.3). In the following year, LIB's English MLU had decreased to 5.9, while his Polish MLU had increased to 7.0. This pattern had reversed by the age of 8;6 (E: 12.9, PL: 10.3). In essence, in contrast to story length, the relationship between English and Polish was more stable in TDB than in LIB. Overall, MLU differentiated well between the two children at all ages and in both languages, apart from 4;8 in Polish and 7;9 in English.

The longitudinal analysis provided above was complemented by a cross-sectional analysis of MLU in the stories told on the basis of three wordless picture books (Walrus, Quest, Rainstorm). Results are presented in fig. 46.

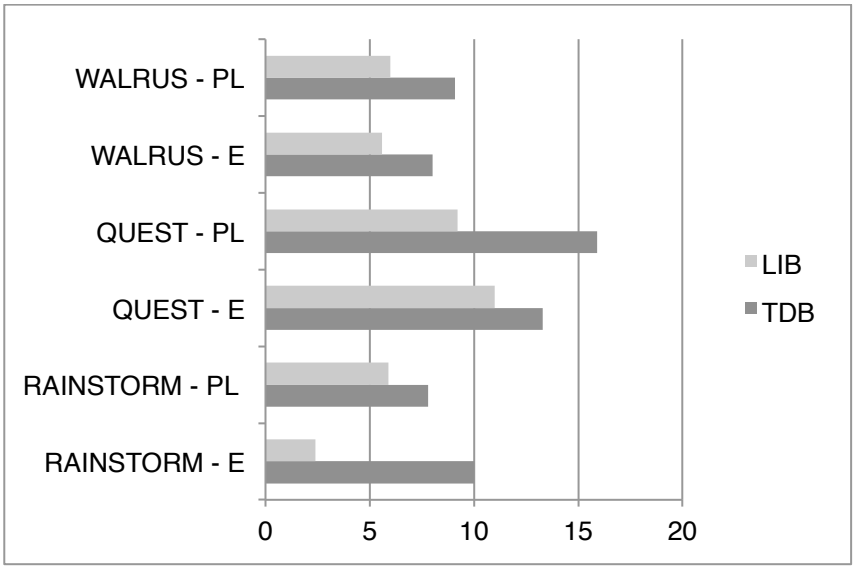


Figure 46 MLU Walrus, Quest, Rainstorm

The MLU analyses of Walrus, Quest and Rainstorm confirm the results from the MAIN assessment aged 7;9 in that TDB's MLU was longer in all stories and both languages. While the difference on the Polish MAIN narrative was only marginal aged 7;9, it consistently amounted to at least 1 on the other tasks.

Despite this slight difference between the MAIN and the remaining

narratives, the sum of the longitudinal and cross-sectional analyses of MLU suggests that this measure is reliable across all ages and both languages in the disctinction between typically developing bilingualism and bilingual language impairment.

Mean Length of Utterance (MLU) – Spontaneous Speech

In order to determine utterance complexity, MLU was calculated using CLAN for each transcript and subsequently averaged across all transcripts.

Child-Language	no./utterances	MLU
TDB-E	596	5.9
TDB-PL	1852	4.3
LIB-E	310	4.7
LIB-PL	861	3.3

Table 8 MLU Spontaneous Speech

Two trends emerged from the analysis. Firstly, TDB's MLU in both languages was on average one word longer than LIB's (E: 5.9 vs. 4.7; PL: 4.3 vs. 3.3). This difference in MLU was visible in all transcripts but ranged from 0.4 in some recordings to 4.1 in others. Based on these results it therefore seems like TDB produced tendentially longer and therefore more complex utterances than LIB across both languages. While TDB and LIB differed in their overall complexity of utterances, they both had a longer MLU in English than in Polish. This difference in their two languages amounted to an average of roughly 1.5 words for both children. In essence, both children displayed a parallel development of utterance complexity in that they produced longer utterances in English than in Polish. However, they differed in their overall MLU with TDB producing longer utterances than LIB in both languages.

9.2 Discourse Ability

The participants' discourse ability was assessed using the *Multilingual Assessment Instrument for Narratives* (Gagarina et al., 2012). The macrostructure of their narratives was analysed by calculating story length, story structure and complexity using the scoring sheets provided in the manual.

9.2.1 Story Length

Story length in words was calculated for all spontaneous narratives produced by the two children in CLAN. The results are presented in fig. 47.

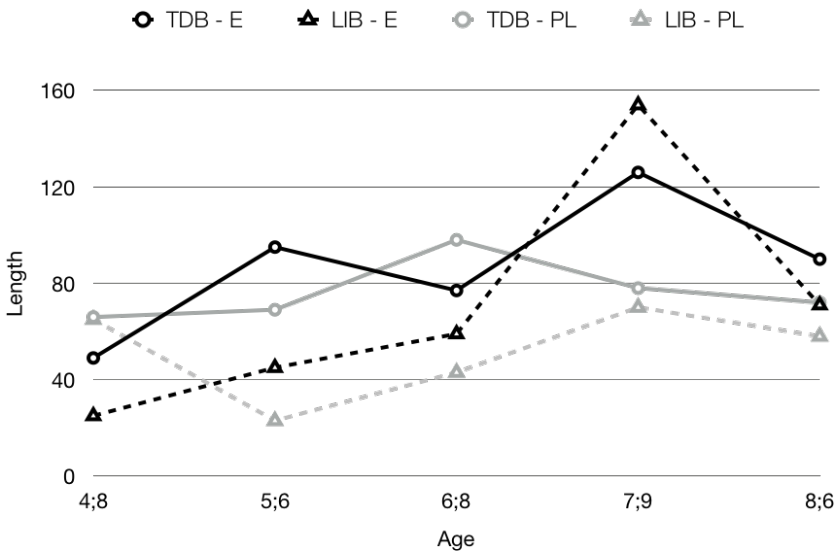


Figure 47 Story Length MAIN Narrative Task

The graph indicates that TDB told longer stories in English at all ages but 7;9. At this age, TDB commented that "*you can't really put a lot of detail into this story*", suggesting that he may not have been sufficiently challenged. This would be in line with him telling a shorter story at the age of 8;6. In Polish, TDB and LIB told a story of similar length (66 vs. 69 words) at the age of 4;8 but TDB told longer stories than LIB at all subsequent data collection points.

Regarding the relationship between TDB's and LIB's two languages, a different pattern emerges for the two children. While LIB consistently told longer stories in English, from the age of 5;6 onwards, the relationship

between TDB's two languages fluctuated. However, TDB's Polish and English stories differed in length by an average of 20 words at all ages, apart from the age of 7;9, when his English story was substantially longer than his Polish narrative (difference of 38 words). The gap between LIB's two languages was also most substantial at this age, when his English narrative was more than twice the length of his Polish story (158 vs. 70 words). Aged 8;6 both children told stories of comparable length in both their languages.

Story length on the MAIN narrative task was compared to the stories elicited using the wordless picture books *Rainstorm, Walrus* and *Quest* aged 7;9. Results are given in figure 48.

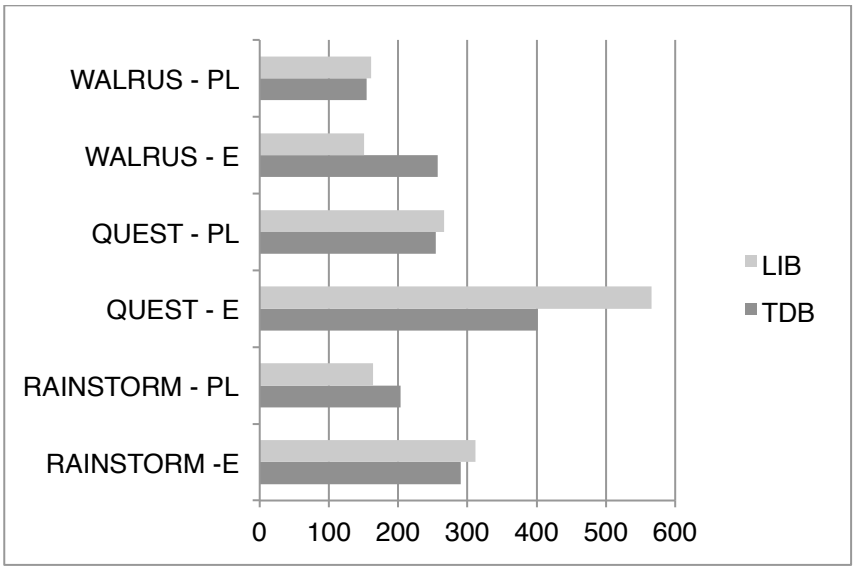


Figure 48 Story Length Walrus, Quest, Rainstorm

The analysis of story length on narratives based on the three wordless picture books correspond partly to results from the MAIN narrative task in that TDB's and LIB's Polish narratives were substantially shorter than their English stories. This became particularly apparent from *Quest* and *Rainstorm.* TDB's Polish *Walrus* was also substantially shorter than the English counterpart, while LIB told stories of equal length in both languages. It further became apparent that TDB's and LIB's stories were of comparable length with the exception of TDB's English *Walrus* story, which was longer than LIB's, and LIB's English *Quest*, which was longer than TDB's narrative.

The cross-sectional analysis of narratives produced by the two children aged 7;9 therefore largely confirm the results obtained using the MAIN

elicitation task, particularly where the relationship between English and Polish in the two participants is concerned. Based on the analysis provided here, story length appears to differentiate better between typically and atypically developing bilingualism at younger ages.

9.2.2 Story Structure

Story structure was assessed using the scoring sheets provided in the MAIN manual. Each story is divided into three episodes, which in turn consist of an internal state term as initiation, a goal, an attempt and an outcome and an internal state term as reaction. In total, participants can gain seventeen points for story structure. The number of story elements was counted for both children and each story in both languages. Results are presented in fig. 49.

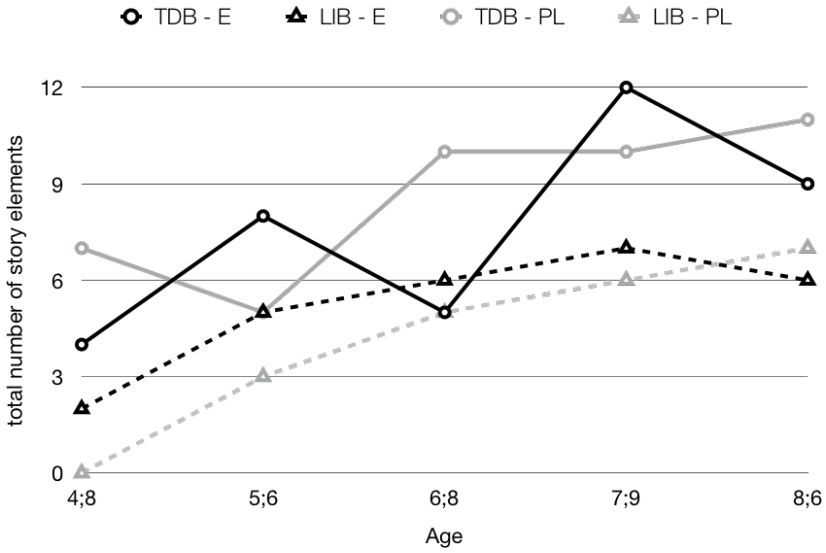


Figure 49 MAIN Story Structure

The analysis of story structures revealed that TDB outperformed LIB in Polish macrostructure at all ages and in English story structure at every age apart from 6;8. Moreover, the macrostructural development diverged between the two children. LIB displayed a very linear development and the number of macrostructural elements he mentioned during his narratives increased steadily in his two languages until the age of 7;9, before it increased more in Polish but decreased slightly (from 7 to 6) in English.

In contrast, TDB's macrostructural development fluctuated substantially. In English, the number of story elements he mentioned in his narratives

increased from four to eight between the ages of 4;8 and 5;6, before it decreased to five aged 6;8 and rose to twelve aged 7;9. Finally, aged 8;6 TDB mentioned 9 of the 17 elements in his English narrative. In Polish, TDB displayed a mirrored pattern. Whenever, the number of story elements had increased in his English stories, it had decreased in his Polish narratives (4 – 8 – 5 – 12 – 9 vs. 7 – 5 - 10 – 10 – 11), apart from the age of 7;9 when it stagnated at 10.

Overall, LIB's use of macrostructural elements developed in a linear manner and in parallel in his two languages, while TDB displayed more fluctation and his use of story elements in English and Polish appears to have developed in reaction to one another.

9.2.3 Story Complexity

Story complexity was calculated by analysing how many AO (attempt-outcome), single G (goal), GA (goal-attempt)/GO (goal-outcome) or full GAO (goal-outcome-attempt) sequences the children used in their narratives. Results are presented in fig. 50.

TDB outperformed LIB with regard to story complexity in English aged 4;8, 5;6 and 6;8 and at all ages but 5;6 in Polish. Additionally, LIB displayed a more linear development in both languages as the number of sequences he described in his stories increased in both languages until the age of 7;9 and then rose further to 3 sequences in Polish but decreased back to one sequence in English.

The level of story complexity in English and Polish differed between the two participants. LIB displayed a parallel development in English and Polish that was merely staggered for Polish. In contrast, the story complexity in TDB's English narratives fluctuated between one and two sequences, but was fairly consistent at three sequences for Polish at all ages but 5;6.

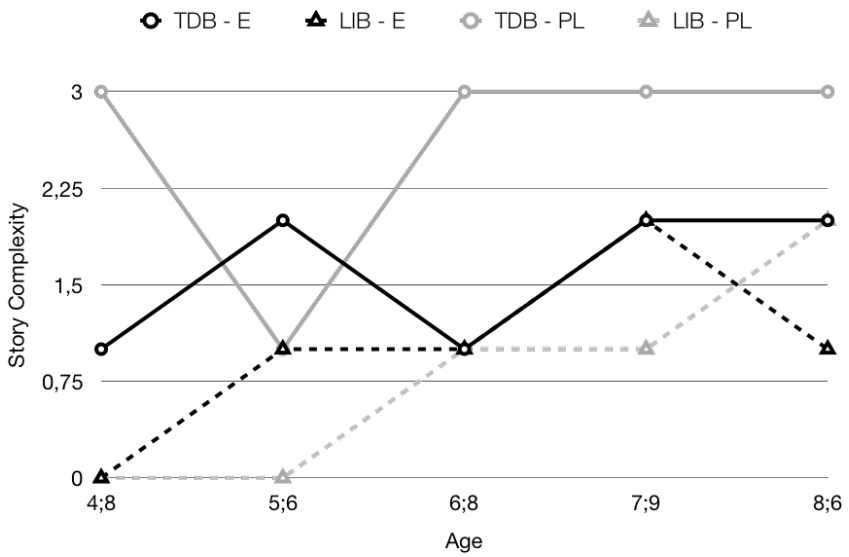


Figure 50 MAIN Story Complexity

A striking difference between TDB and LIB became apparent when the number of complete GAO sequences was analysed for both languages. This analysis revealed that TDB used two full GAO sequences, one in English aged 7;9 and one in Polish aged 8;6. LIB, on the other hand, did not use a single complete GAO sequence in any of his narratives.

To sum up, the children differed substantially with regard to story complexity. This difference was particularly apparent in Polish narratives, where TDB produced at least one more sequence than TDB at all ages. For English, the difference in their performance was particularly apparent at the ages of 4;8, 5;6 and 8;6. The participants also differed in their overall development of story complexity, which was linear but staggered for LIB in both languages but fluctuating in English and mostly consistent in Polish for TDB.

9.3 Interactional Ability

This section presents an analysis of TDB's and LIB's interactional ability. Based on Blackwell et al.'s review (2014) quantity and complexity of language and dialogue participation in form of questions was measured. MLU and the number of questions in transcripts of spontaneous speech recordings were calculated using CLAN. The percentage of questions in relation to overall number of utterances was calculated and results averaged out across all

transcripts. The results are presented in table 8 and discussed in more detail below.

Child-Language	no./utterances	% questions
TDB-E	596	9.7%
TDB-PL	1852	14.8%
LIB-E	310	8.7%
LIB-PL	861	10%

Table 9 no/utterances, MLU & % questions Spontaneous Speech

9.3.1 Quantity of Utterances

The analysis of spontaneous speech data revealed two trends regarding the quantity of utterances produced by TDB and LIB in their two languages. Firstly, TDB spoke more than LIB in both languages (E: 596 vs. 310 utterances; PL: 1852 vs. 861). Secondly, both children appear to speak more in English than in Polish. It needs to be noted, however, that the Polish recordings stem from conversations with their parents, while the English recordings stem largely from conversations with a less familiar conversation partner (i.e.: the author of this paper). This difference may have influenced the results. Either way the difference between the overall number of utterances produced by TDB and LIB is substantial.

9.3.2 Questions

After the total number of questions in a transcript was determined using CLAN, the ratio between questions and number of utterances was calculated across all transcripts in each language. Similarly to the quantity and complexity of utterances, the analysis of questions revealed two major trends. Firstly, both children produced more questions in Polish than in English. Secondly, TDB produced marginally more questions than LIB. In Polish, this difference amounted to 4.8%, and in English to 1%. These results may indicate a small trend toward TDB producing more questions than LIB. However due to the small difference, these results need to be interpreted with caution.

9.3.3 Turn-Taking

This section investigates how TDB and LIB answer their interlocutors' questions and whether any differences could be observed between the two children. Transcripts of spontaneous and elicited speech were analysed and coded for 1) occurrence of an answer 2) exhaustivity of these answers.

The first analysis did not reveal any remarkable differences between the two children. Both children generally acknowledged and answered questions which were directed to them. However, some differences could be observed regarding the type and exhaustivity of answers. Firstly, LIB showed a tendency to provide more minimally verbal answers, requiring more effort from his interlocutors in form of follow-up questions to receive a more detailed answer to their question. One such example is given below.

Example Exhaustivity of LIB's answers
*MOT: a kto jeszcze grał?
And who else played?
*LIB: 0 &=groans.
*INV: wszystkie dziewczynki mają długie włosy w szkole?
Do all children have long hair at school?
*LIB: hunhunh.
*MOT: kto nie ma długich włosów?
Who hasn't got long hair?
*LIB: 0 &=groans.
*MOT: (...) kto nie ma długich włosów?
Who hasn't got long hair?
*LIB: 0 &=groans.
*MOT: Ewa?
*LIB: hunhunh.
*MOT: Scarlet?
*LIB: hunhunh.

This example from a conversation recorded at the age of 7;9 clearly shows that even though LIB was obviously aware of turn-taking procedures, which becomes evident from his reactions to his mother's and the investigator's questions, his answers were not exhaustive and sometimes did not answer the question at hand. In other words, LIB conformed to turn-taking rules because he responded to his interlocutors' questions but these replies were not very informative.

For example, in his first, third and fourth utterance LIB appears to voice his dissatisfaction with the requirement to answer his mother's question, which

she in turn repeats. LIB's second answer while appropriate to the closed question the investigator asked, is minimal and therefore requires his mother to ask additional questions in order to elicit a more informative response. A further example illustrating the lack of exhaustivity in LIB's answers is given below.

Example: exhaustivity LIB 7;9
*MOT: która to jest Julia?
Which one is Julia?
*LIB: no wiesz.
You know.
*MOT: nie wiem.
I don't know.
*MOT: blondynka czy brunetka.
has she got blond or brown hair?
*LIB: blondynka.
blond.

Once more this excerpt shows that LIB adheres to turn-taking rules by reacting to question which are directed at him. However, the lack of information in his first utterance requires his interlocutor, in this case his mother, to ask follow-up questions in order to elicit a more informative response. While LIB's first utterance in this excerpt violates Grice's maxims of communication, his last utterance conforms to all four of them despite its brevity. It is as short as it could possibly be but provides all necessary information, truthful, which is confirmed by his father at a later point in the conversation (**FAT: tam nie ma brunetek w klasie <nie zauważyłaś> [>]? – there aren't any girls with brown hair in his class, haven't you notices?),* relevant to the question his mother asked and it avoids confusion or abscurity.

LIB's interactional behaviour is very similar in his two languages, which is shown in the excerpt below.

Example LIB interactional ability 7;9 English
*INV: (...) whas that the first time you went to Legoland?
*LIB: &=head:no.
*INV: no?
*LIB: (..) my tens [: tenth] time.
*INV: ten times already?
*INV: so what's your favourite part about Legoland?
*LIB: the rollercoasters.
*INV: all the rollercoasters or one specific one?
*LIB: +^ yeah.
*LIB: one specific.
*INV: what is the specific one like?
*LIB: er (..) well (.) there's a castle.

This example illustrates once more that LIB indeed replies to all questions, which are addressed directly at him in a dyadic conversation. However, due to the brevity of his answers, his interlocutors are often required to ask follow-up questions to elicit further information. In the example above, LIB's third utterance shows such a case. Even though LIB answers the investigator's question about his favourite part of Legoland accurately, he does not provide any additional information to continue the conversation, which leads to the investigator asking a follow-up question. Again, the answer to the follow-up question is very minimal in nature, leading to the interlocutor asking an open question to elicit further information. LIB's answer to this, his final utterance in the example above, respects turn-taking rules and is an accurate answer to the investigator's question. However, it is not exhaustive and does not invite a continuation of the conversation.

While TDB and LIB were not found to differ in their general responsiveness to questions, TDB's answers were often more exhaustive, providing more additional information. Two such examples are given below.

Example interactional ability TDB 7;9

*INV: what are you doing during the &e er the summer holidays „ do you know?
*TDB: (...) er (..) I don't know I don't know if I'm (..) well I know that I'm going to my communion.
*TDB: I don't know if I'm +,
*INV: +< you're going to your communion?
*TDB: yeah in May.
*INV: in May.
*INV: great.
*INV: so (.) are you all prepared?
*INV: and ready to go?
*TDB: +< yeah.
*INV: what did you have to prepare?
*TDB: er I had to learn prayers.
*TDB: Polish.
*INV: mmhm.
*TDB: +< the poems are Polish.
*INV: do you go to two communions then?
*INV: how does it work?
*TDB: +< no.
*TDB: because I don't have to go to the English communion but without the Polish communion I can't go to Polish school but if I don't go to the English communinion I can still go.
*TDB: I can still go there.

The excerpt shows that TDB's answers are tendentially longer than LIB's, which corresponds to his longer MLU in the spontaneous speech data (see above). In addition to the length, their answers also differ qualitatively. For example, in TDB's third utterance he provides additional information to the investigator's question regarding his communion. Rather than simply answering the investigator's close question with a single word, he provides additional information about the time of year when he will attend his first holy communion. The same is true for the investigator's question about his preparation, where TDB clarifies that the prayers he had to learn were in Polish. By doing so, TDB provided a new opportunity to continue the conversation, which was ceized by the investigator to ask a follow-up question. In turn, TDB answered this question exhaustively, explaining in detail the organisational aspects of his communion. In order to further illustrate the increased exhaustivity of TDB's answers, another example is provided below.

Example exhaustivity TDB 7;9

*INV: and er Alex mentioned something about er a boat trip.
*TDB: yeah we're going to yeah oh yeah we're going to Creatia@c.
*INV: to Croatia?
*TDB: +^ yeah in August.
*INV: great!
*INV: so how (i)s that gonna work?
*TDB: and we're going with our friend Ignacy.
*INV: mmhm.
*INV: just just your friend?
*TDB: yeah just no [x 4].
*INV: +< is he taking his parents as well?
*TDB: yeah yeah his parents as well.
*INV: &=laughs.
*TDB: Jarek says there (i)s one room where there's like (..) four or two beds.
*INV: mmhm.
*TDB: because (.) the parents are in one room and the kids are in another room.
*TDB: so like (.) maybe I will be on the mattrass and Ignacy and Alex will on the bed or (.) Ignacy on the mattrass and Alex and me on the bed or Alex on the mattrass and me +/.
*INV: or you can swap around.

Once more, TDB provided additional information regarding the time of their trip in his second utterance and continued to give further details about the people accompanying him in his following replies. By doing so, he took

agency and introduced a new focus of the conversation and thereby created fresh opportunities for his interlocutor to ask questions and hence continue the interaction.

The same pattern could be observed for TDB's Polish interaction and one example is given below.

Example TDB exhaustivity Polish
*INV: i dalej?
And further?
*TDB: nie mam trzy.
I don't have three.
*INV: jak to nie masz?
What do you mean you don't have one?
*INV: dalej.
Go on.
*TDB: nie mam &=laughs.
I don't have anything.
*TDB: mogę położyć tą piątkę która nie pasuje.
I can put down this five which does not fit.
*INV: mmh nie (.) ale możesz położyć piątke która pasuje.
No but you can put down a five that does fit.
*TDB: tak (.) ale nie mam piątki ktorej [: która] pasuje właśnie.
Yes but I don't have a five that fits.
*INV: mhmm.

TDB's third utterance in the example above corresponds to the English data as he extends his answer provided in the utterance before and by doing so creates an opportunity for his interlocutor to react to this new suggestion. This shows that TDB actively cooperates with his interlocutors by introducing new topics they can engage with.

All in all these excerpts suggest that even though TDB and LIB do not differ substantially in their overall responsiveness to questions, TDB appears to take more agency in dialogues by introducing and maintaining topics and thereby exhibiting more topic control.

In essence, the examples provided here illustrate that LIB is well aware of turn-taking rules and generally adheres to them by acknowledging his interlocutors' questions and reacting to them. However, his replies have been found to lack exhaustivity, requiring additional effort from his interlocutors to elicit an informative response. Despite LIB's tendency to provide minimal responses, these largely adhere to Grice's maxims of quantity, quality, relation and manner.

Similar to LIB, TDB also adheres to turn-taking rules and generally replies to all questions directed at him. However, TDB's answers tend to be more exhaustive than LIB's responses, which more commonly violate Grice'sm maxims and de Beaugrande and Dressler's (1981) principle of efficiency.

Overall the results presented in this section suggest that typically and atypically developing bilingual English-Polish children differ in certain but not all aspects of their interactional abilities. Children with language impairment appear to be aware of turn-taking rules. However, they violate de Beaugrande and Dressler's (1981) principle of efficiency more commonly and their answers are likely to be less exhaustive. This suggests that they may show less agency and topic control in interactions, demanding increased effort from their interlocutors to maintain conversations.

9.4 Sociocultural Ability

Sociocultural ability were assessed in two ways. On the one hand, TDB's and LIB's Theory of Mind skills were assessed using two different tests. On the other hand, TDB and LIB's mother filled in the *Social Communication Questionnaire* (SCQ). Together, these methods provide a general overview of their social skills and an in-depth analysis of Theory of Mind. In this section, the findings of the two different Theory of Mind tests are presented before results from the Social Communication Questionnaire are discussed.

9.4.1 Theory of Mind

TDB and LIB were assessed using the Reflection on Thinking Task (Bialecka-Pikul, 2012) aged 4;8 and 6;8. According to the testing procedure, they were only tested in their dominant language at the time. The results on the Reflection on Thinking Task indicate a substantial difference in the Theory of Mind (ToM) development between TDB and LIB.

TDB scored 11 points aged 4;8, and responded accurately to first-order belief, unexpected identity and interpretation. LIB, on the other hand, was unable to respond correctly to any of the items. Aged 6;8 TDB scored 33

points, and therefore nearly at ceiling, responding accurately to appearance-reality, first-order belief, unexpected identity, interpretation, emotions resulting from false belief, seeing-knowing relationships and belief resulting from it and second-order belief.

In contrast, LIB scored 13 points. A qualitative analysis revealed that LIB displayed particular problems with first-order belief, the understanding of emotion resulting from false belief, the understanding of seeing-knowing relationship, and second-order belief resulting from it. Unfortunately, results from the Bi-SLI-PL project, which employed the Reflection on Thinking Task were not yet available at the completion of the current study, which is why TDB's and LIB's could only be compared to each other.

Theory of Mind tasks are often criticised for being very dependent on language and therefore unable to disentangle language difficulties from the actual ability to understand Theory of Mind. Therefore, a ToM task scale accounting for possible language difficulties was developed especially for this twin case study (for details see section 8. 3. 4.). TDB and LIB were assessed using the English version of the ToM scale aged 6;8. In order to determine whether the test language has any influence on their performance, they were assessed once more aged 7;9 in both English and Polish with parallel versions of the test. Results are presented in fig. 51.

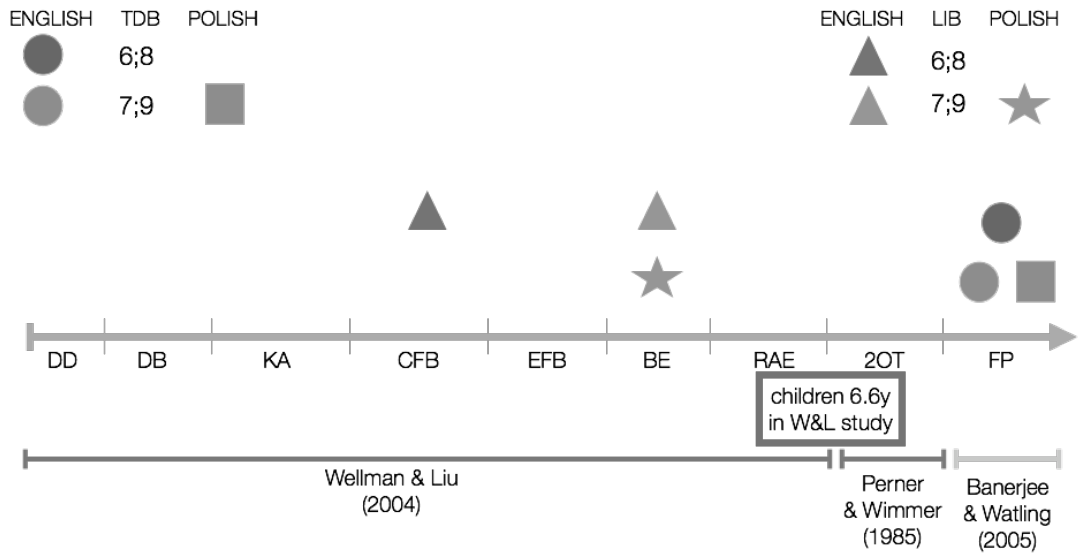


Figure 51 Results Extended ToM Scale

The results on the Extended Theory of Mind scale developed for this study confirm the results from the Reflection on Thinking task, showing that TDB outperformed LIB at all ages and in both languages. To be more precise, TDB already performed at ceiling aged 6;8, replying accurately to diverse desire, diverse belief, knowledge access, contents false belief, explicit false belief, belief-emotion, real-apparent emotion, second order thinking and faux pas. LIB, on the other hand, had difficulties replying to explicit false belief, belief emotion, real-apparent emotion and second-order thinking. However, he replied accurately to the faux-pas task. By the age of 7;9, LIB's ToM had improved and he replied accurately to explicit false belief and belief-emotion in addition to the previously acquired ToM skills.

Due to TDB's performance at ceiling, it is unclear whether TDB and LIB acquired ToM in the same order. This question is particularly relevant in relation to LIB's performance on the faux pas task aged 6;8. According to Banerjee and Watling (2005), 8-to-9-year-olds respond more accurately to this task than 5-to-6-year-olds. Therefore it is striking that LIB answered this task correctly but not explicit false belief, belief-emotion, real-apparent emotion and second order thinking, which should preceed the acquisition of faux pas understanding according to Wellmann and Liu's (2004) and Perner and Wimmer's (1985) studies. The relatively late acquisition of faux-pas in middle childhood is further confirmed by Pearson (Pearson, 2010) who found 7-year-olds to struggle with the understanding of intent in faux pas tasks. One possible explanation is that LIB may benefit from a bilingual advantage in the faux-pas task but not other ToM skills. This would be supported by the fact that TDB also performed better on the faux-pas task than would be expected for his age.

One could argue that the faux-pas task uses less complex language than the remaining skills but as the whole test was developed with particular attention to lexical frequency and syntactic complexity, linguistic complexity is probably not the sole factor influencing LIB's performance. His accurate replies to control questions provide further evidence for his general understanding but difficulty to interpret the stories. LIB may therefore benefit

from the faux-pas task testing more direct causal relationships, which may possibly put less strain on his working memory and therefore allow LIB to benefit from a bilingual advantage despite his language impairment.

However, as the participants in Banerjee and Watling's (2005) and Pearson's (2010) study were monolingual and a literature search for studies investigating faux-pas in bilingualism did not reveal any results, it is unclear whether this ability benefits from a bilingual status or whether this result is a test artefact.

In any case, TDB appeared to show a bilingual advantage as he outperformed monolingual peers from Wellmann & Liu (2005) and Perner & Wimmer's (1985) studies on second-order thinking, which is in line with research assigning advanced ToM skills to bilingual children (see section 5. 5. for a discussion).

Finally, testing language did not seem to influence either child as TDB and LIB performed similarly in English and Polish, which is yet another indication that the difference between TDB and LIB is not likely to solely be influenced by their language abilities.

9.4.2 Internal State Terms (IST)

The total number of internal state terms in tokens was calculated. Results are provided in fig. 52.

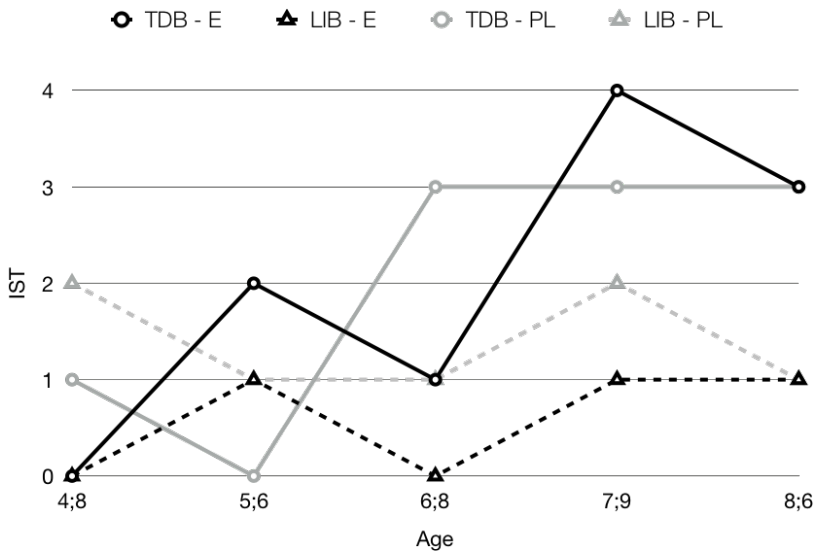


Figure 52 MAIN Internal State Terms

The graph shows that TDB used more *Internal State Terms* in English at all ages but 4;8. In Polish, LIB outperformed TDB in his use of IST aged 4;8 and 5;6 but from 6;8 onward, this pattern reversed. In contrast to story structure and complexity, both children displayed considerable levels of fluctuation in their use of IST in both languages.

In addition to the quantity of internal state terms, the type was analysed. Based on the MAIN manual, IST were categorised into perceptual state terms (e.g. see, hear), physiological state terms (e.g.: thirsty, hungry), consciousness terms (e.g.: alive, awake), emotion terms (e.g.: sad, happy), mental verbs (e.g.: want, think) and linguistic verbs (e.g.: say, tell).

The analysis revealed that the variety of internal state terms increased with age for both children. Aged 4;8 and 5;6 both children used only mental verbs. Aged 6;8, TDB used one physical state term in his English narrative and three perceptual state terms in his Polish story. At the same age, LIB used on linguistic verb in his Polish narrative.

Aged 7;9, TDB employed two perceptual state terms and two emotional terms in his English story and one linguistic verb and two perceptual terms in his Polish narrative. LIB also used on perceptual term in his English narrative but no emotional term. However, in his Polish story he used one emotional term and one perceptual state term but unlike LIB he did not use a linguistic verb. Finally, aged 8;6, TDB used two perceptual terms and one emotional term in both his English and his Polish narrative, while LIB only used one perceptual term per language. Neither TDB nor LIB used consciousness terms at any age.

Overall this analysis revealed that TDB did not only use more IST overall but also a wider variety. Therefore, the use of IST may help in the distinction of typically developing English-Polish bilingual children and their peers with language impairment.

9.4.3 Social Communication

TDB's and LIB's social communication abilities were assessed using the Social Communication Questionnaire in its current and its lifetime version. As this study is a longitudinal investigation of TDB's and LIB's communicative abilities, the aim of assessing them with both version of the test, was to determine any potential differences in their social communication skills over time. The overall results on both questionnaires are presented in table 9 and discussed below.

	TDB	LIB
RSID - Lifetime	1	1
RSID - Current	0	0
CD - Lifetime	3	5
CD - Current	1	4
RRSPB - Lifetime	0	3
RRSPB - Current	0	2
SCQ - Lifetime	4	9
SCQ - Current	1	6

Table 10 SCQ Lifetime & Current Results

The manual recommends to use a cut-off score of 15 or higher as an indication for a possible ASD. Clearly, both children are below this cut-off score and therefore not at risk of ASD. However, a comparison of their results shows that LIB's scores are elevated in comparison to TDB's results, which indicates that he might have some additional issues with social communication, resulting from his language impairment. In order to find out more about the exact nature of this problems, subscores in the *Reciprocal Social Interaction* domain, the *Communication* domain and the *Restricted, Repetitive, and Stereoptyped Patterns of Behaviour* domain were calculated based on the manual.

These results show that TDB and LIB had particular problems in the communication domain, which were still present for LIB at the age of 8;6, when this questionnaire was completed, but for LIB these problems had largely disappeared. The mother indicated that both children had difficulties with the correct assignment of pronouns, that they used neologisms and that they never spontaneously copied their interlocutors. In addition, LIB used odd phrases and did not talk just to be friendly. By the age of 8;6 (i.e.: in the

current version oft he SCQ), these issues had largely disappeared for TDB. LIB, on the other hand still used odd phrases and neologisms, assigned pronouns incorrectly and did not copy interlocutors. This indicates that LIB's problems in the communication domain were not only more severe but also more persistent than for TDB.

In addition to difficulties in the communication domain, the mother also reported that LIB had persistent problems in the *Restricted, Repetitive, and Stereoptyped Patterns of Behaviour* domain, while TDB did not struggle with this aspect of social communication. More prescisely, LIB displayed interests that others would find odd, was more interested in parts of toys than in their typical function and showed an unusually intense but otherwise appropriate interests. Aged 8;6, only the oddity and intensity of his interests remained.

In essence, the results presented in this section indicate that TDB and LIB differ in their understanding of *Theory of Mind* as it was assessed with two ToM tasks. Furthermore, the results oft he *Social Communication Questionnaire* indicate that even though neither child is at risk of ASD, some differences in their social communication could be observed. These differences were particularly apparent in the Communication and the Restricted, Repetitive, and Stereoptyped Patterns of Behaviour domains. While the communication domain was affected to a comparable extent at younger ages, LIB displayed more persistent difficulties in this area of communication. By the age of 8;6 he still assigned pronouns incorrectly, used odd phrases and neologisms, which corresponds to findings from the narrative tasks, which will be discussed in more detail in the following section.

Additionally, the two children differed persistently in their type and intensity of interests. In sum, these results indicate that TDB and LIB differ in their sociocultural abilities. As increased ToM ability in bilingual children is usually assigned to their necessity of switching between their two languages according to the conversational context, it is likely that LIB's lower ToM could lead to inappropriate code-switching in monolingual contexts. This hypothesis is confirmed in findings from lexical and narrative tasks, which will also be presented in the following section. Furthermore, LIB's use of neologisms or

odd phrases is likely to have a negative impact on his communicative ability.

Finally, the fact that he did not initiate conversations at earlier ages is in line with findings by Bishop et al. (2000) suggesting that children with language impairment initiate fewer conversations than their typically developing peers. It therefore seems like the sociocultural domain of dynamic communicative ability is also persistently affected by language impairment.

9.5 Strategic Ability

Strategic abilities were assessed using three narrative tasks (Rainstorm, Walrus, Quest) and the picture description task MAMOKO in English and Polish aged 6;8 and 7;9. Recordings and transcripts were scrutinised for code-switches, circumlocutions, approximations, avoidance, message abandonment and neologisms. This section is organised according to these categories and overall results are presented in table 10.

Strategy	**TDB-E**	**TDB-PL**	**LIB-E**	**LIB-PL**
Circumlocution	16 (43%)	9 (40,9%)	6 (13.6%)	6 (17%)
Approximation	6 (16%)	3 (13,6%)	7 (15.9%)	2 (5.7%)
Substitution	Ø	Ø	7 (15.9%)	1 (2,9%)
Neologism	Ø	Ø	2 (4.5%)	4 (11,4%)
Code-switching	Ø	Ø	1 (2.5%)	4 (11,4%)
Avoidance	15 (40.5%)	10 (45.5%)	21 (47,7%)	17 (48,6%)
Message Abandonment	Ø	Ø	Ø	1 (2,9%)
Total	**37**	**22**	**44**	**35**
	59		**79**	

Table 11 Communication Strategies According to Type

The results presented in table 9 indicate some differences but also remarkable parallels in TDB's and LIB's overall use of communication strategies. Firstly, LIB used a total of twenty more communication strategies than TDB across their two languages. However, both children used more strategies in English than in Polish (TDB: 37 vs. 22; LIB: 44 > 35). In addition some qualitative differences in their use of communication strategies became apparent and will be presented in the following sections.

9.5.1 Circumlocution

The results from the three narrative and the picture description tasks and assessing TDB's and LIB's strategic abilities, indicate a substantial difference

in their use of circumlocution. In English, 43% of TDB's communication strategies were circumlocutions, as opposed to only 13.6% of LIB's English strategies. In Polish, a comparable difference could be observed. While 40.9% of TDB's Polish strategies were circumlocutions, only 17% of LIB's were. Therefore, the difference between TDB's and LIB's use of circumlocation to prevent a breakdown in communication became apparent in both English and Polish.

9.5.2 Approximation

This section discusses TDB's and LIB's use of approximation, that is the use of words that are semantically-related to the target word despite not being entirely accurate (e.g.: pencil for crayon). The analysis revealed that TDB and LIB used approximations very similarly. Both used more approximations in English than Polish (TDB: 6 vs. 3; LIB: 7 vs. 2) and they even employed roughly the same number of approximations across the three stories and in both their languages.

9.5.3 Substitution

In contrast to approximations, substitutions are semantically unrelated to the target items (e.g.: cabin for chest). While no major differences could be observed for approximations, TDB's and LIB's use of substitutions diverged substantially, particularly for the English tasks. TDB did not use a single substitution in either English or Polish but LIB used seven substitutions in English (15,9%) and one substitution in Polish (2,9%). This divergence suggests that TDB and LIB may differ in their English semantic processing. This would be in line with findings showing that children with language impairment differ from typically developing children in semantic depth (see section 6. 5.).

The difference in TDB's and LIB's use of approximation and substitution also became apparent in the sentence repetition tasks. Both children substituted or invented subjects, objects and verbs at all ages and in both

languages. In English aged 4;8 TDB substituted two verbs, two nouns and added one direct object. Aged 5;6 TDB replaced five verbs, three nouns and used one neologism (*drinkman* for *milkman*). TDB replaced the majority of verbs (4 out of 5) with verbs of a comparable semantic depth (e.g.: hide for draw), despite different meaning and largely maintained the syntactic structure of the target sentence. The two exceptions are one passive sentence, where TDB omitted the agent and one sentence containing a relative clause, which was also omitted by TDB. This stands in contrast to LIB, who substituted fewer words aged 5;6 (two nouns) but who changed the syntactic structure of the target sentence.

In Polish, TDB substituted six verbs, one preposition and two nouns. Similar to his English responses, TDB's substitutions were semantically related to the target items (e.g.: *przebrany* → *ubierany* ‚dressed up' → ‚dressed' [overgeneralised form], *zanieszone* → *zawieżone* 'taken by foot' → ‚taken by form of transport'). In contrast to TDB, LIB omitted five and only substituted three verbs (e.g.: *patrzą* → *oglądają* 'look' → 'watch'*, zabierz* → *weź* 'take' → 'take' [fam.]). While LIB's choice of substitutions was similar to TDB's in that they were all semantically related to the target item, the real difference between TDB and LIB lies in LIB's omissions, wich were not observed in TDB.

Aged 6;8 TDB and LIB substituted a similar amount of words (1 verb and four nouns) in English. Once again, TDB reproduced the syntactic structure of the target sentences in all but one item. LIB, on the other hand, produced grammatically inaccurate sentences.

Another interesting difference between TDB and LIB that emerged at the age of 6;8 is concerned with the addition of information that was not featured in the target sentences, in order to create more complex structures. TDB added additional information in form of adverbs of time, manner or place to the English sentences. A similar alteration of the target structure could not be observed for LIB. In Polish, TDB substituted two verbs, one preposition and five nouns, which were again semantically related to the target items. LIB substituted eight verbs and four nouns and omitted five verbs and two

prepositions. Only two LIB's substitutions were semantically related to the target item (*jechać → iść* 'drive' → 'go'*, mówić → powiedzieć* 'talk' → 'say'). The remaining substituations were either unrelated (e.g.: *jadł → był ‚ate' → ‚was', wynieść → jedzie* ‚take out → ‚drive'), oppositions (*szukała → znaleść* ‚search' → 'find') or of lower semantic complexity (e.g.: *upiec → robić* bake → make).

By the age of 7;9, the number of substitutions had increased for LIB but decreased for TDB in English. TDB only replaced three nouns, two of which were synonyms of the target item (e.g.: *dad for father*). In contrast, LIB substituted items in eight sentences. The substituted items were three verbs and five nouns. Moreover, LIB added an adjective to one of the target structures and one of the substitutions was a synonym. Their error patterns hence diverge on three levels aged 7;9. Firstly, LIB substituted substantially more items than TDB. Secondly, the majority of the words TDB replaced were synonyms of the target words, as opposed to semantically unrelated words in LIB's case. Finally, TDB did no longer add any additional information to the target sentences at the age of 7;9, but LIB did so in one instance.

In Polish, TDB substituted seven verbs, one preposition and one noun with words that were all semantically related to the target items (e.g.: *wlać → wrzucić* 'pour into' → 'throw into'*, za którą pobiegł pies → którą gonił pies* 'after which the dog was running' → 'who the dog was chasing'). LIB substituted eleven verbs and two nouns. One verb was semantically related to the target (*wynieść → wyrzucić* 'take out' → 'throw out') and another was related in the stem and in inflection, but only loosely semantically related (*rozwalony → zawalony* 'destroyed' → 'swamped'*)*. It needs to be noted that the second substitution changes the meaning of the sentence from "the wall was destroyed" to "the wall was covered" and can therefore not be regarded as an accurate semantic substitution for the target item. At 7;9 a further pattern emerged in LIB's responses as he provided three neologisms replacing target items in the Polish sentence repetition task (*nosić 'carry'→ *przyniochujć, odganiał 'chase away' → *poganialną, kąpany 'bathed' → *kąpiony*). LIB also substituted four prepositions (*przez → w* 'through' → 'in'

za → *pod* 'behind' → 'under') and omitted three, differentiating him from TDB, who did not omit a single verb or preposition.

Finally, at the last testing point aged 8;6, the number of substitutions had decreased to two for TDB (one verb and one noun) and four (two verbs and two nouns) for LIB in English. One substitution by LIB is particularly remarkable as it involves the omission of an agent in a passive sentence, resulting in the same simplified structure produced by TDB aged 5;6. In Polish, TDB replaced four verbs, one personal pronoun and one noun.Two verbs were semantically related (*wypił kompot* → *zjadł kompot* ‚drank compote' → ‚ate compote' *, zabrała* → *miała* ‚took' → ‚had'), while the other two altered the meaning of the target sentence substantially (*rozwalony* → *przechylony* ‚destroyed' → ‚tilted'*; wlewa* → *trzyma* ‚pour's → ‚holds'). The substitution of the personal pronouns resulted in a wrong assignment of gender and the nouns replacement is a repetition of the first object in the sentence rather than a semantically related substitution.

LIB substituted ten verbs in Polish aged 7;9. One verb was semantically related to the target but had a lower semantic complexity (*ugotowała* → *zrobiła* 'cooked' → 'made'). Two verbs shared the same root as the target item but the substitution of the prefix resulted in meaning alteration (*zaniesiona* → *zniesione* 'taken' → 'taken downstairs'*, rozwalony* → *zawalony* 'destroyed' → 'swamped/covered'). One verb was semantically entirely unrelated to the target item or the context of the sentence (*kupiły* → *bawili* 'bought' → 'played'). The remaining verbs were mispronounced and hence resulted in phonetically related but meaningless neologisms (e.g.: *dziobał* 'picked' → **dział, wlewa* 'pours into' → **wla, pomalować* 'paint' → **polamować*). LIB also omitted three propositions (*w* 'in'*, przy* 'next to'*, z* 'with'), three personal pronouns (*oni* 'they'*, ona* 'she', *nami* 'us' [Dat.]) and two verbs (*chciał/a* 'wanted-f/m').

9.5.4 Neologisms

Words that could not be classified as mispronunciations, derivations or translations of target items, were counted as neologisms (e.g.: *latarnia*

morska → *wieżnica* 'lighthouse'). TDB and LIB differed remarkably in their use of neologisms. TDB did not invent a single word in either English or Polish, while LIB used two neologisms in English and four in Polish. This relates once more to the data obtained from the sentence repetition task, which shows only one use of neologism in TDB's answers aged 5;6 but not beyond that. It therefore seems like LIB may be more likely to employ neologisms than TDB, which also corresponds to his mother's answers to the *Social Communication Questionnaire*, where she noted LIB's use of neologisms.

9.5.5 Code-switching

Similar to their use of neologisms, TDB and LIB also differed in their code-switching behaviour. It should be noted that while code-switching is typical bilingual beahaviour in conversation with each other and a normal stage of bilingual development (see section 5 for more details), the tasks at hand were administered in monolingual test settings. They were administered in the context of other tests assessing their skills in one language and it was clear to both children that only one language was assessed at a time. Therefore, the differences in TDB's and LIB's code-switching behaviour in the three narrative tasks assessing communication strategies, is particularly striking. TDB did not switch from either English to Polish or vice versa but LIB used one Polish word in his English task (*deski* ‚slats') and four English words in his Polish narration (e.g.: nosorożec → 'rhino'). All of LIB's code-switches were direct translations of the target items as they were depicted in the picture books.

This difference in their code-switching behaviour is in line with observations from the naming tasks. TDB's and LIB's code-switching behaviour on ZNO and EVT-2 differed substantially. Both children switched to English during the Polish naming task aged 4;8. LIB did so slightly more frequently than TDB (6 vs. 4 times). In contrast, TDB did not code-switch a single time during the EVT-2 aged 4;8 and LIB only once. From 5;6 onward, not a single instance of code-switching could be observed for TDB on either the Polish or the English naming task. For LIB, however, the number of code-switches on the ZNO increased rapidly to 13 aged 5;6 and further to 18 aged

6;8. Aged 7;9 LIB did not code-switch at all but aged 8;6 he again provided two English terms during the Polish naming task. In sum, these results indicate a substantial difference between TDB's and LIB's code-switching behaviour on naming tasks until the age of 6;8. Moreover, they have also been found to diverge in their use of code-switching in the three narrative tasks used to assess strategic abilities. In both cases this difference was more apparent for the Polish than the English tasks.

9.5.6 Topic avoidance

Tarone (1977) defined topic avoidance as the deliberate choice not to name a salient but lexically difficult item due to a lack in knowledge. Tarone tested avoidance strategies by assessing whether participants named words with lower frequency in picture description tasks and the same method was chosen here. The issue with the analysis of avoidance is that it demands the analysis of something that is not there. In an attempt to assess how often TDB and LIB opted for this communication strategy, the number of omissions of pre-defined target words (see appendix) was counted and compared. The results show that TDB opted for avoidance slightly more often in Polish than in English (45.5% vs. 40.5%). LIB, on the other hand, used avoidance to a roughly similar extent in English and Polish (47,7% vs. 48,6%). When comparing TDB and LIB to each other, it emerges that LIB opted for avoidance slightly more often than TDB. For English, this difference is marginal and for Polish it amounts to 8.1%. All in all these results suggest that TDB and LIB do not diverge substantially in their employment of avoidance as a communication strategy.

9.5.7 Message abandonment

Despite only one occurrence of message abandonment in the three narratives assessing communication strategies, it is worth discussing because it relates to other data from this study. LIB was close to abandoning the WALRUS story because he did not know the Polish word for this animal. It was only after the investigator provided him with the term that he started to tell

the story, despite the fact that he had been prompted to think of another word for it or to make up a word. This behaviour shows parallels to LIB's Polish *MAIN* narration aged 4;8, where he did not know the Polish word for *goat* (‚koza') and and was not able to tell the story until the tester provided the word for him.

In sum, the results obtained from an analysis of TDB's and LIB's strategic abilities suggest that they differ in some but not all communication strategies. The most remarkable differences were observed for circumlocution, which TDB used more extensively, and code-switching, which was used by LIB but not TDB. A similar observation was made for neologisms, which were employed by LIB but not TDB, and message abandonment. Regarding approximations, the children did not differ a lot in the three narrative tasks but results from the sentence repetition task suggest that TDB may be more likely to substitute target items by semantically related words. Finally, the analysis of topic avoidance did not reveal any substantial differences between the two children.

Based on these insights it can therefore be concluded that both children use communication strategies to avoid a breakdown in communication but the type of strategy they employ appear to differ. TDB appears to use more target-language (i.e.: language of conversation) strategies, such as circumlocution while LIB uses code-switching and neologisms more regularly. Furthermore, the majority of TDB's substitutions seem to be semantically related to the target item but LIB also uses semantically unrelated terms.

9.6 Monitoring Ability

This section presents TDB's and LIB's results on tasks assessing their nonverbal skills and their executive functions. They were assessed with the *Raven Coloured Progressive Matrices* aged 4;8 and 5;6, the *Corsi Block* task and the *Wechsler* digit span aged 7;9. Together these tests assessed their verbal and non-verbal ability and short-term memory. In addition to these tests, the Behavior Rating Inventory of Executive Function (BRIEF), a parental questionnaire assessing children's executive functions was administered aged 8;6. This questionnaire provided additional data to the results obtained from the tests as the questionnaire format allows for a much broader pictures of children's executive functions. In this sections, TDB's and LIB's results on the Raven Coloured Progressive Matrices will be presented, before their scores on the Corsi Block and and digit span tasks will be discussed. Following this overview, the BRIEF results will be analysed.

9.6.1 Raven Coloured Progressive Matrices

TDB's and LIB's results on the Raven Coloured Progressive Matrices show that both children performed within the average range at both time points. Fig. 53 illustrates their performance in relation to age norms.

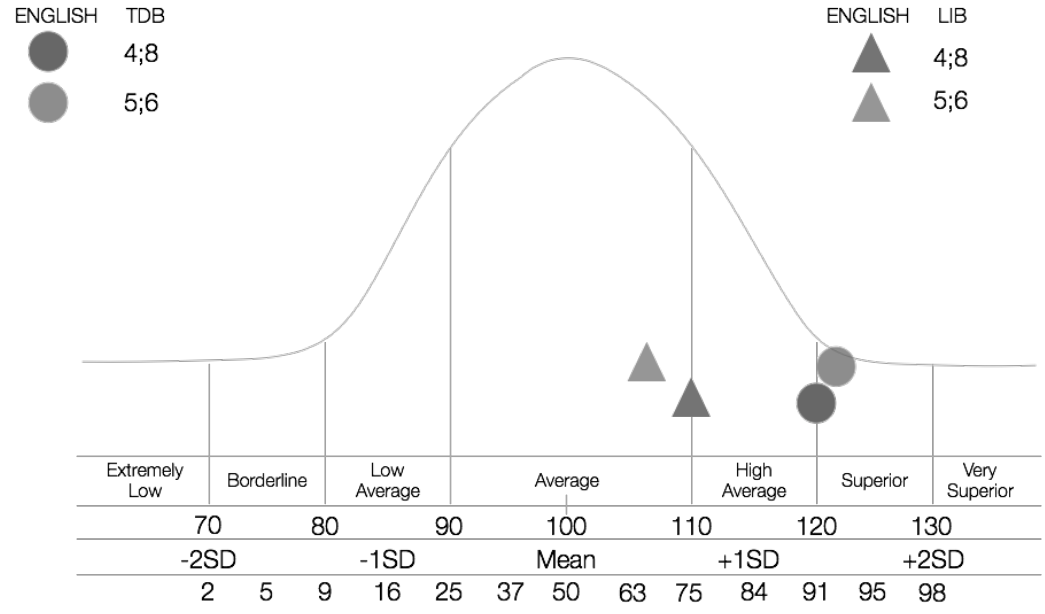


Figure 53 Raven Coloured Progressive Matrices Results

The graph shows that LIB and TDB both performed in the average range, even though TDB scored in the high average and LIB in the average range of the Raven Coloured Progressive Matrices. This corresponds to findings, which report slightly higher nonverbal abilities for typically developing children than for their peers with language impairment (see section 6. 7. for a discussion)

9.6.2 Corsi Block Task

TDB's and LIB's scores on the Corsi blocks task confirm the trend suggested from their results on the *Raven Coloured Progressive Matrices*. TDB and LIB were assessed aged 7;9 and their performance was compared to norming data from Pagulayan et al. (Farrell Pagulayan et al., 2006). Fig. 54 shows the norming data from Pagulayan and colleagues' study between the ages of 7 and 21 and compares TDB's (circle) and LIB's (triangle) score aged 7 to these age norms.

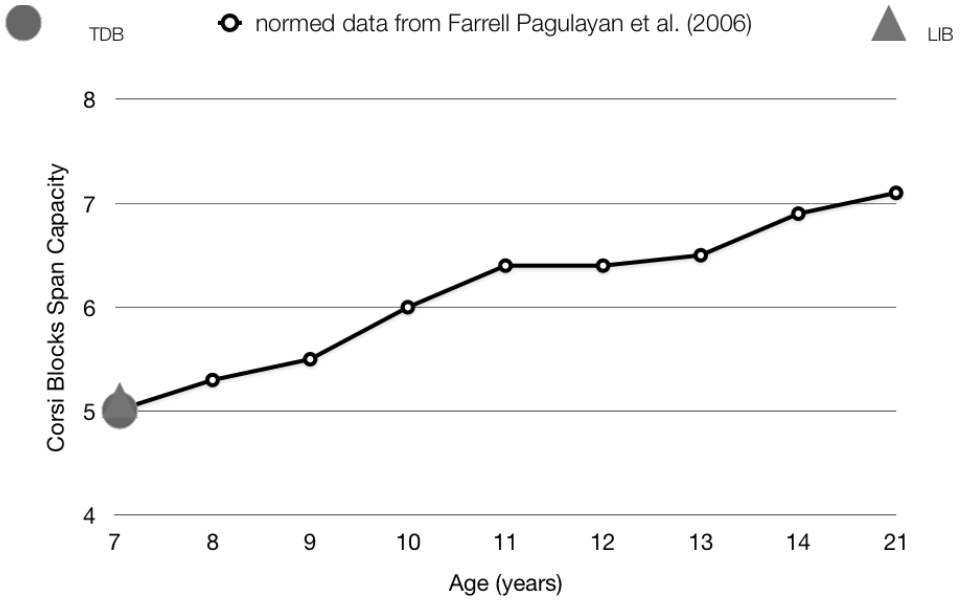


Figure 54 Corsi Block Task Results

This graph shows that TDB and LIB both have a similar forward visuo-spatial memory span of 5, which corresponds to the seven-year-old participants in Pagulayan et al.'s norming study. Therefore, their performance on the Corsi Block Task can be considered age-appropriate.

9.6.3 Wechsler Digit-Span

While TDB's and LIB's performance on the Corsi Block task overlap, their score on the Wechsler digit span task differs. Their results are summarised and compared to norming data from Brito et al. (1996) in Fig. 55. Again, the line depicts the norming data obtained by Brito and colleagues from participants aged between 5;0 and 15;11 to which TDB's (green circle) and LIB's (grey triangle) results are compared.

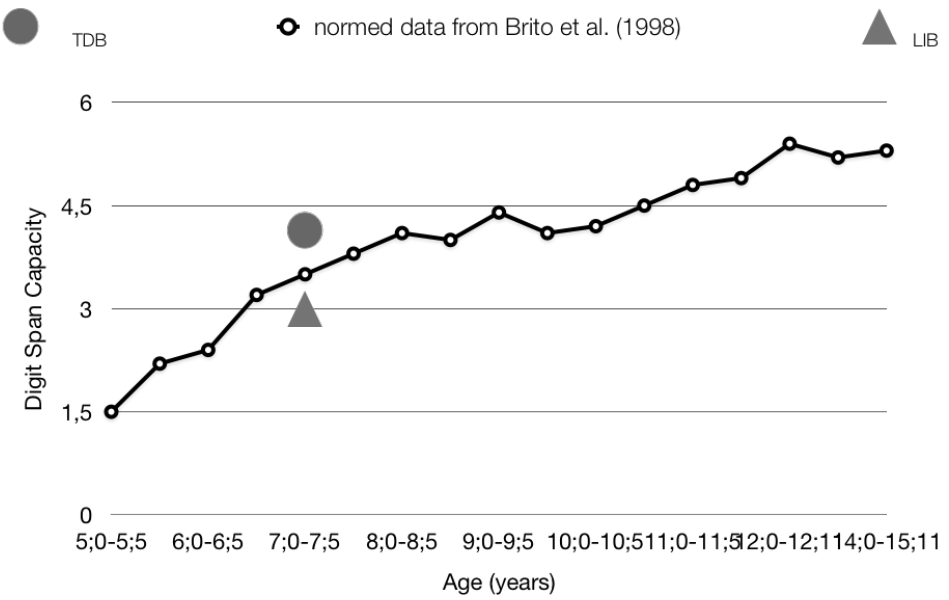


Figure 55 Wechsler Digit Span Results

Fig. 55 shows that TDB performs higher than LIB on the digit span task. Aged 7;9 TDB had a digit span of 4, while LIB had a digit span of 3. TDB therefore performed slightly above and LIB slightly below the average of 3;8 of 7;6-7;11 year-olds in Brito et al.'s norming study.

Overall, these assessments of TDB's and LIB's monitoring abilities indicate that TDB performs tendentially higher than LIB but both children score within age norms.

9.6.4 Behavior Rating Inventory of Executive Function – BRIEF

The BRIEF assesses inhibition, shift, emotional control, initiation, working memory, planning/organisation, organisation of materials and monitoring. The results are calculated based on parents' responses to a questionnaire containing 86 items. The eight categories are split into two different sub-groups, the Behavioral Regulation Index (BRI), on the one side, and the Metacognition Index (MI), on the other. The Behavioral Regulation Index covers inhibition, shit and emotional control, while the metacognition index subsumes initiation, working memory, planning/organisation, organiation of material and monitoring. The sum of the BRI and the MI is the Global Executive Composite (GEC). In this section, LIB's and TDB's results in the individual categories will be presented, before their scores on the BRI, the MI and finally the GEC will be analysed. The results are summarised in table 12 and illustrated in figure 56.

Scale/Index	Raw Score		T Score		%ile	
	TDB	LIB	TDB	LIB	TDB	LIB
Inhibit	14	15	46	49	46	48
Shift	12	13	50	53	66	74
Emotional Control	21	21	60	60	86	86
BRI	47	49	53	55	66	72
Initiate	11	13	44	50	36	62
Working Memory	13	24	43	67	33	95
Plan/Organise	14	27	37	65	10	91
Org. of Mat.	12	18	52	71	63	99
Monitor	12	15	40	50	24	54
MI	62	97	41	64	19	90
GEC (BRI + MI)	109	146	46	61	40	84

Table 12 BRIEF Results

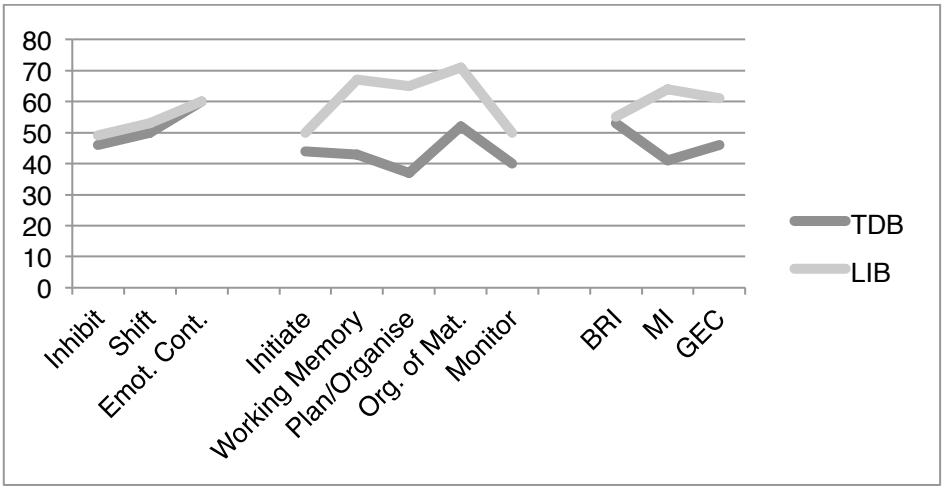


Figure 56 Results BRIEF T-scores

Before discussing these results presented in table 12 and figure 56 in more detail, it needs to be noted that higher T scores and percentiles indicate lower results in relation to age norms in this assessment.

Two trends emerge from the responses obtained to the BRIEF questionnaire. Firstly, TDB and LIB appear to be comparable with regard to their Behavior Regulation Index (BRI), which assesses more global emotions and behaviour. Both children score in the average range for inhibition and shifting and have a slightly elevated score for emotional control. Overall, this results in a T-score of 55 for LIB and 53 for TDB.

For the Metacognition Index (MI) a substantially different picture emerged. LIB scored persistently higher, and therefore worse in relation to age-norms, on all categories of metacognition. This difference is particularly striking for working memory, planning/organising and organisation of materials (WM: 43 vs. 67; P/O: 37 vs. 65; O/M: 52 vs. 71). In relation to age-norms, TDB's scores on metacognition are in the average range while LIB's score is particularly highly elevated for the three categories mentioned above. Overall, TDB's and LIB's T score diverges by 23 points (41 vs. 64), indicating a substantial differences in their metacognitive skills.

Due to this large difference in their metacognitive index, the Global Executive Composite (GEC) also diverges substantially (46 vs. 61), showing that the two children differ in their executive functions. This result is in line with research assigning lower executive functions to children with language impairment (Henry, Messer, & Nash, 2012)

In essence, the results presented in this section show that TDB and LIB differ with regard to some cognitive skills. Their results on the *Raven Coloured Progressive Matrices* showed that both children performed in or slightly above the average range, which was confirmed by the *Corsi Block* task assessing nonverbal visuo-spatial processing. The results on the verbal digit-span task showed slight differences between TDB and LIB, which may be due to a difference in verbal processing.

Finally, their results on the BRIEF showed that they did not differ in their behaviour and emotional control, where both children scored within the

average range. Their results on the monitoring index, which scrutinises executive functions required for communication, i.e.: working memory and planning, highlighted substantial differences between the two children. These differences were particularly apparent for working memory and planning/organisation as well as the organisation of material, which are essential for communication. Executive functions may therefore be a reliable indicator of language impairment and a difference in these cognitive skills may help to distinguish between typically and atypically developing bilingual children.

This would be in line with the results obtained as part of the systematic review presented in section 7. For the model of dynamic communicative ability the results presented in this section imply that more general cognitive skills, such as executive functions are indeed intertwined with language and hence communication, defending its necessary status in any model of communication.

10 Discussion

In this section the findings presented in the preceding chapter will be discussed and related to the literature presented in the introductory chapters to this thesis. The conclusion is arranged according to the six components of the *Dynamic Model of Communicative Ability* and will review all results with regard to their potential to distinguish typically developing English-Polish bilingual children from their peers with language impairment. In addition, their implications for research on bilingualism in general and bilingual language impairment in particular, in relation to dynamic systems theory, will be addressed.

10.1 Linguistic Abilities

In this section the findings on phonological, lexical, morphological and syntactic development will be discussed based on the results presented in the preceding chapter.

10.1.1 Phonetic and Phonological Development

Overall the results obtained from both nonword repetition tasks are in line with Girbau and Schwartz (2008), Windsor and colleagues (2010) and Thordardottir and Brandeker (2013), who also found nonword repetition tasks to distinguish reliably between bilingual children with and without language impairment. Furthermore, all studies found nonword length to affect children with language impairment negatively, which was also confirmed in this thesis. Thordardottir and Brandeker as well as Windsor and colleagues raised the question whether exposure correlates with performance on nonword repetition. The data obtained in this thesis suggests that performance on nonword repetition tasks increases over time and therefore with exposure to both languages.

Regarding the potential of nonword repetition tasks to distinguish between Bi-TD and Bi-LI at various ages, it was shown that the difference between the two children amounted to roughly 10 points at all ages on the Polish task. This finding suggests that the children's performance on the Polish nonword

repetition task developed in a parallel manner and that their performance on the Polish NWR task therefore distinguished reliably between the two children at all ages.

For the English NWR task a slightly different picture emerged as the gap between LIB's and TDB's score decreased substantially between the ages of 6;8 and 8;6. This might potentially be linked to increased exposure and peer contact in English at older ages. However, even at the last testing point aged 8;6, the gap in their English scores still amounted to nine points, which is similar to the average gap on the Polish task.

Therefore, the answer to the question whether exposure plays a role in nonword performance and hence whether nonword repetition can already distinguish reliably between Bi-TD and Bi-LI at younger ages appears to be yes. The Polish NWR task already distinguished reliably between Bi-TD and Bi-LI at the age of 4;8 and continued to do so. For the English task the gap between LIB's and TDB's score was more substantial at the age of 6;8 than at the following testing points, which suggests that exposure to the majority language may have a delayed effect on children with language impairment.

Overall, the results from the English and Polish NWR repetition task provide robust evidence that these assessments are also a reliable indicator of bilingual language impairment in English-Polish bilinguals and therefore add to the evidence presented by Girbau and Schwartz (2008), Windsor and colleagues (2010) and Thordardottir and Brandeker (2013), who investigated English-Spanish and English-French bilinguals respectively. This implies that nonword repetition tasks also seem to be a reliable indicator of language impairment in bilinguals speaking English in combination with Polish. Of course this finding would need to be confirmed in a larger cohort study, potentially spanning a wider range of Slavic languages in order to see how this finding holds up for other language combinations.

Apart from the distinctive potential of nonword repetition tasks, the results obtained from the phonological processing tasks also highlighted the influence of exposure on the development of phonological processing. This was shown by the fact that TDB's and LIB's score on both NWR repetition tasks

increased steadily over time. This finding is, of course, in line with dynamic systems theory, which assigns a substantial role to the interplay between a complex system and its environment. However, the results from the English NWR suggest that the interplay between the complex system that is language development and exposure may differ slightly between TDB and LIB. While TDB's score in both languages increased in a linear fashion, LIB's score on the English task increased substantially between the ages of 6;8 and 7;9 despite both children receiving a similar amount of input in both languages. This indicates that the two children might process environmental input differently, leading to distinct outcomes in their phonological development.

Apart from the environmental input, which is considered an essential aspect of dynamic complex systems, the interaction between components also became apparent from the analysis of TDB's and LIB's pronunciation. As predicted by Mareceka et al.'s (2015) study of English-Polish bilingual phonological development, both TDB and LIB showed considerable difficulties with the acquisition of Polish consonant clusters, Polish vowels and exhibited inaccurate vowel reduction in Polish. These are clearly cross-linguistic influences from English and indicate that both children's phonological systems are interacting with each other. This finding is also in line with the argumentation outlined in section five of this thesis that bilingualism will lead to a distinct linguistic profile, possibly resulting from the interaction of two languages in one overarching system. The results obtained in this study indicate that cross-linguistic interference in phonetic production may prevail into older ages even in typically developing bilingual children and therefore should not be interpreted as atypical language development but rather as a typical feature of bilingualism.

To be more precise, both children had particular difficulties with Polish only consonants until the age of 6;8 and consonant clusters containing Polish consonants until the age of 7;6. In addition, they both occasionally reduced vowels in Polish, which suggests cross-linguistic influence from English. This correponds directly to Marecka et al.'s (2015) findings, whose comparison of English-Polish bilingual children with an average age of 5;7 showed that they

exhibited particular difficulties with Polish only consonants, Polish consonant clusters and vowel reduction. This is also in line with findings on cross-linguistic influences in bilingual pronunciation, which were presented in section 5. 2. 1. of this thesis.

Therefore, while NWR performance appears to distinguish well between Bi-TD and Bi-LI, even at younger ages, complex (Polish) consonant (cluster) production only differentiated between TDB and LIB from the age of 7;9 onward. Therefore, mispronunciation in spontaneous speech at younger ages must be treated with a lot of caution if misdiagnois of typically developing bilingual children is to be prevented.

In addition to the nonword repetition task, TDB and LIB were also assessed using Polišenská's (2012) verbal recall task in order to determine the influence of prosody, lexis, semantics and syntactic structure on their ability to recall structures of varying length. The analysis comparing TDB's and LIB's results to monolingual data from Polišenská's study, revealed some intriguing findings in the context of this study. Firstly, TDB and LIB relied on grammaticality and lexicality similarly to monolinguals but LIB even more so than TDB. For both bilingual children in this study, semantics were particularly important for their phonological processing, which differentiated them from their monolingual peers. Furthermore, TDB relied more on the lexicality of content words than LIB or monolingual children. Finally, LIB relied heavily on prosody, which was the case to a lesser extent for TDB and monolingual children.

The results from the verbal recall task therefore highlight that bilingual phonological processing appears to differ qualitatively from monolingual processing. This difference became particularly apparent from TDB's and LIB's increased reliance on semantics when compared to monolingual children. This is in line with the predictions outlined in the introductory chapters to this thesis, which argued that bilingual language processing and use must differ from that of their monolingual peers because of the interaction between two (or more) components within an overarching system.

However, the verbal recall task also highlighted that bilingual children with

and without language impairment may differ with regard to the extent to which they rely on prosody when processing phonological input. The finding that LIB relied more on prosody than TDB or typically developing monolingual children suggests that prosody is particularly important for children with language impairment. This finding is further supported by LIB's performance on the sentence repetition task at younger ages, where he was only able to repeat the intonation and sentence initial/final words. It should be noted at this point that prosodic properties emerge earlier than segmental ones and therefore can be considered more basic. This suggests that segmental properties are less accessible for LIB, which is also in line with his lower NWR score and increased difficulty with (Polish) consonant clusters (see above).

Altogether the findings on the verbal recall task suggest that bilingual children with and without language impairment appear to use different compensatory mechanisms in their phonological processing.

Once more this analysis supports the argument outlined in the introductory chapters to this thesis, according to which bilingual status was expected to lead to distinct language use and processing patterns. It further seems like bilingual children with language impairment rely more heavily on prosody. This may potentially explain why they show particular difficulties with less salient features of syntax and morphology.

10.1.2 Lexical Development

The analysis of TDB's and LIB's receptive lexical development revealed that TDB outperformed LIB at all ages and in both languages apart from the first assessment aged 4;8 in Polish. However, the receptive vocabulary tests did not appear particularly reliable in the diagnosis of bilingual language impairment as LIB scored within the average or low average range in both languages and at all ages, with the exception of his English score aged 8;6 and his Polish score aged 6;8. This is in line with Verhoeven, Steenge and Weerdenburg (2011), who also did not find a significant difference between their Bi-TD and their Bi-LI group in Dutch receptive lexis. Verhoeven and

colleagues' (2012) finding of a significant difference between Bi-TD and Bi-LI in Turkish but not Dutch expressive and receptive lexis could not be confirmed in this study. On the contrary, the gap between TDB's and LIB's productive and receptive vocabularies was larger for English than Polish, where they even overlapped at the age of 4;8 for receptive and approached each other until the age of 5;6 for expressive vocabulary.

Based on these findings it is possible that receptive vocabulary tests might only distinguish between older typically and atypically developing bilingual children. As the norms of the Polish tests end at the age of 6;11, LIB's and TDB's scores could only be compared to younger monolingual Polish norms at the last two data collection points. It therefore remains unclear whether LIB's performance actually decreased further in relation to age norms, which would be suggested from his English score.

As exposure is highly correlated with vocabulary development and dynamic systems interact strongly with their environment, it is possible that typically developing bilingual children benefit more from additional exposure than their peers with language impairment. Therefore, receptive vocabulary tests should not be used to try and distinguish between typically and atypically developing children at younger ages.

The analysis of TDB's and LIB's BPVS-3 scores in percentiles revealed an interesting pattern with regard to bilingual development. The analysis showed that TDB's and LIB's percentile scored fluctuated for both English and Polish. This suggests that their receptive vocabulary did not evolve at the same pace as that of their monolingual peers. If it did, their scores would have needed to be consistently within a limited range of percentile scores. This finding was further emphasised by the fact that both TDB's and LIB's English and Polish vocabulary increased in absolute terms between the ages of 4;8 and 7;9 while it fluctuated in relation to age norms. Note that TDB's Polish and LIB's English and Polish absolute score had decreased between the age of 7;9 and 8;6, which emphasises the fluctuating nature of bilingual language development that will be discussed further in the course of this summary.

Interestingly, the receptive vocabulary of both children evolved in a largely

comparable manner in relation to age norms. This indicates that even though LIB's score in both languages was consistently lower (with the exception of his Polish score at the first data collection point), both children were influenced by their bilingual status when compared to monolingual peers. This suggests once more that bilingual language development is qualitatively different from monolingual development and that the expected vocabulary growth curves, which are based on monolingual norms, do not necessarily apply to bilingual children. It should be noted once again that TDB's and LIB's receptive vocabulary did increase in absolute terms and TDB did perform within the mean in both languages at all but one data collection point but their bilingual vocabulary development appears to differ from monolingual norms.

However, this fluctuation in relation to monolingual norms was more evident for the receptive than the productive vocabulary scores. Here TDB performed consistently between the 75th and the 80th percentile in English. LIB, on the other hand, showed slightly more fluctuation (34th-58th) but it needs to be noted that the last two data collection points were compared to younger norms. This suggests that TDB's and LIB's productive English vocabulary evolved largely in parallel to monolingual peers and both performed within or above the monolingual average range.

For Polish, LIB's performance was consistently far below monolingual age norms and he performed within the 1st percentile at all data collection points. This suggests that LIB's Polish vocabulary was developing at a substantially slower rate than that of his monolingual peers. TDB also performed in the low average and borderline range at all ages where monolingual norms were available. This suggests that the growth of their Polish productive vocabulary was influenced more substantially by their bilingual status than their English vocabulary. This correponds to the majority/minority language differentiation presented in section 5.1 of this thesis.

In order to address the question whether language impairment equally affected productive and receptive skills, TDB's and LIB's results on the two lecial tasks were compared. This analysis did not confirm Gibson and colleagues' (2014) finding of a larger gap between productive and receptive

skills for bilingual children with language impairment. The gap between TDB's and LIB's productive and receptive lexical scores were comparable and both children performed comparably on the English productive and perceptive lexical scores, which also stands in contrast to Gibson et al.'s findings. They did, however, both perform better on the Polish receptive than the productive test, which is in line with Gibson et al.'s findings.

Altogether, the findings on the productive and receptive vocabulary tasks revealed the following trends. The growth of recepetive vocabulary was more divergent from monolingual norms for both TDB and LIB in both their languages. Their English productive vocabulary, on the other hand, grew in parallel to age norms, while they consistently scored in the low to extremely low average range on the Polish task. In sum, these results emphasise the importance of exposure for vocabulary development as both children consistently had a larger English than Polish vocabulary. This highlights the additional input bilingual children get in the majority language of the country they grow up in and the interaction between exposure and language development, which was presented in the introductory chapters of this thesis with the help of dynamic systems theory.

Based on the productive vocabulary measures, which showed that TDB had a larger vocabulary than LIB in both languages (even if not significantly so), it was expected that TTR would differentiate between the two children. This hypothesis was not confirmed in the TTR analysis. The differences between TDB's and LIB's TTR scores were only marginal at times. This finding stands in contrast with Iluz-Cohen and Walters (2012), Altman et al. (2016) and Tsimpli et al. (2016), who all found vocabulary diversity to differ between Bi-TD and Bi-LI. This divergence between the results obtained in this study and previous research could be due to LIB's relatively high (English) productive vocabulary scores. This hypothesis would be confirmed by the fact that the difference between TDB's and LIB's TTR was larger for the English than the Polish stories, which corresponds to LIB's substantially lower Polish vocabulary score. In other words, TTR and vocabulary knowledge seem to be strongly associated.

Therefore, if TTR is to be considered in the distinction of typical and atypical bilingual language development, productive lexis scores need to be included in the analysis. This is the case as the TTR of bilingual children with language impairment but a productive vocabulary score within the normal range, might not differ significantly from their typically developing bilingual peers. This is particularly relevant in relation to the influence of socio-economic status on vocabulary development. As section 5. 2. 2. of this thesis highlighted, socio-economic background plays a crucial role for the lexical development of bilingual children.

This is the case because children from higher socio-economic backgrounds receive more and more complex input than their peers from lower socio-economic backgrounds. It might therefore be the case that bilingual children with language impairment and a high socio-economic status, such as LIB, have a higher expressive vocabulary and, as a result, a higher TTR than their peers from low socio-economic backgrounds. This would once again highlight the importance of socio-economic background for bilingual development, which should be taken into account when assessing bilingual children for language impairment.

The section on lexical development also addressed the question of domain-specificity of bilingual language knowledge. It was confirmed that TDB and LIB had a larger English than Polish vocabulary, which reflects their minority-majority language combination. This suggests that bilingual children with language impairment also benefit from additional input and exposure.

Furthermore, evidence for the domain-specificity of bilingual vocabulary knowledge was found as both children knew words in one language that they did not know in the other. This finding provides further evidence for Grosjean's statement that a bilingual is not two monolinguals in one person and therefore that their vocabulary knowledge in both languages only overlaps partly. The fact that the words both children knew in Polish but not English were more likely to occur in the home domain, highlights the complementary nature of bilingual vocabulary knowledge.

Overall the investigation of typically and atypically developing bilingual

vocabulary development highlighted the following issues. Firstly, productive and receptive vocabulary tests appear to be less reliable in the distinction of English-Polish bilingual children with and without language impairment. This stands in contrast to the results obtained from the NWR task and suggests that potentially measures assessing procedural, rather than declarative knowledge might be more reliable in the distinction of typical and atypical bilingual development.

Furthermore, both children scored higher on the English than the Polish tests, which was interpreted as a reflection of the majority-minority status of their two languages. Additionally, the comparison to monolingual percentile scores revealed some bilingual-specific developmental patterns. The percentile scores from the receptive English vocabulary score showed that TDB's and LIB's receptive vocabulary did not appear to grow at the same pace as their monolingual peers' but developed in a parallel fashion in the two children. This suggests that receptive vocabulary may be affected more by bilingual status than productive vocabulary. Moreover, additional evidence for the domain-specificity of bilingual vocabulary knowledge was provided in this study.

Finally, the overall results of the vocabulary tests seem to be in line with dynamic systems theory because they emphasise the role of the environment (i.e.: exposure) for vocabulary development, which was emphasised by the minority-majority language difference. They also emphasise the interaction between separate components of the system (i.e.: languages), which becomes apparent in the complementary nature of domain-specific vocabulary knowledge.

10.1.3 Morphological and Syntactic Development

The analysis of TDB's and LIB's TROG scores revealed that TDB outperformed LIB in both languages and at all ages. It needs to be noted, however, that the gap between their scores was more substantial at older ages (from 5;6 onward) with the exception of 7;9, when both children

performed within the average range again. This suggests that their performance on the English TROG test was linked to exposure and highlights once more the importance of input for bilingual development. This was also highlighted by Jacobson (2011) and Jacobson and Walden (2013) who found profiles of English-Spanish bilingual children with and without language impairment to overlap more in lower than in higher grades.

It should further be noted that both children performed better on the Polish task at younger ages with the exception of LIB aged 4;8, when he performed similarly on both versions of the task. This suggests that the increased structured input they received in the majority language in school improved their English receptive grammar, so that by the age of 7;9 they performed better on the English than the Polish task. This stresses once more the crucial role of exposure for bilingual language development and is therefore in line with dynamic systems theory, which emphasises the substantial role of the environment in complex systems. It needs to be noted, however, that TDB's and LIB's performance aged 8;6 differed in that TDB scored higher on the Polish task, while LIB continued to perform better on the English task.

One possible explanation for this divergence might be a difference in TDB's and LIB's boot-strapping ability. This would also be in line with their developmental patterns between the ages of 4;8 and 5;6, where TDB's English grammar knowledge increased, while LIB's decreased. This suggests that TDB might have been able to transfer knowledge between his two languages more successfully than LIB, for whom the additional exposure to English may have caused initial confusion leading to a decrease in his English grammar understanding. This explanation is more likely than a difference in their exposure as both children received the same amount of exposure to both their languages at all times.

Finally, an observation regarding the stability of TDB's and LIB's grammatical systems could be made as TDB's receptive grammar understanding increased steadily over the course of the four years, while LIB's understanding of grammatical structures decreased between the ages of

4;8 and 5;6 in English and for both languages between the ages of 7;9 and 8;6. This implies that TDB's grammatical system may be more robust.

However, the qualitative analysis of their scores highlighted that TDB's and LIB's grammatical development fluctuated. This became apparent where forms they appeared to have had acquired at younger ages, disappeared again when they were older. This highlights that bilingual grammatical development might potentially fluctuate more than would become apparent from cross-sectional studies. Such a fluctuation would also be in line with dynamic systems theory, according to which complex systems constantly re-arrange themselves depending on interactions between the various components and the environment they occur in.

It may also be possible that the observed fluctuations are a result of much shorter-term changes in the environment than was previously assumed in the literature. These could, for example, include the summer holidays during which children are more likely to hear and speak their home language more extensively, which could in turn influence their results on majority language tests carried out at the beginning of the school year. Vice versa for long periods without school holidays, were bilingual children are more likely to hear more of the majority language and therefore perform worse on tests in their home language. This is not to say that these periods of changing language exposure actually lead to language attrition but rather to an increased activation of one over the other language. The observed fluctuation in bilingual language development would need to be investigated further in a longitudinal cohort study, in order to draw further conclusions about bilingual language development.

Data from the sentence repetition tasks showed that TDB outperformed LIB at all ages and in both languages. Therefore, sentence repetition tasks appear to be a very reliable tool in the distinction of typically and atypically developing English-Polish bilingual children. The same appears to be the case for MLU in words, which was found to be reliable in the distinction between TDB and LIB in both languages, across ages and in narrative production as well as spontaneous speech. This finding corresponds to LIB's

substantial difficulties with morpholgy and syntax that became apparent from the sentence repetition tasks. It is also in line with Altman et al. (2016) who found MLU to differentiate between the Bi-TD and Bi-LI groups in their study. At older ages, this difference became particularly apparent from the more challenging wordless picture books. This suggests that motivation plays a key role in narrative (or general test) performance and therefore narrative tasks need to be carefully designed to challenge particularly typically developing bilingual children at older ages. Otherwise, lack of motivation or stimulation might lead to distorted MLU results. Apart from this word of caution, the finding that MLU distinguished well between typically and atypically developing bilingual children, can be confirmed for the English-Polish bilingual children studied here.

Apart from differing in their overall performance on the sentence repetition tasks, TDB and LIB displayed a slightly diverging relationship between their two languages. The gap between TDB's English and Polish performance decreased consistently over time, so that his two languages seemed pretty balanced at later ages. For LIB, on the other hand, the gap between his English and Polish score widened substantially between the ages of 6;8 and 8;6, so that his morphological and syntactic production was clearly better in English than Polish at the last testing point. Once more this difference cannot be traced back to different exposure to the two languages as both children heard a similar amount of both languages. It may be the case, however, that English speech and language therapy and regular formal instruction in the majority language had an increased effect on LIB.

The finding that LIB's grammatical production was not balanced across his two languages is also important to bear in mind with regard to bilingual language impairment. Even though typical bilingual development can typically be differentiated from bilingual language impairment with regard to their performance in their two languages. That is, bilingual children with language impairment tend to show a low performance in both languages, while typically developing children will perform well in at least one of their two languages. This is not to say, however, that a mismatch between the two languages is

exclusive to bilingual children with typical development. It seems like it also occurs in atypically developing bilingual children but the important point is that their overall performance in both languages is substantially lower than that of their typically developing peers.

The grammaticality analysis further revealed that TDB produced more grammatically correct sentences during the sentence repetition task even if they were not exact replicas of the target sentences. This is in line with Juarez (1983), Lee and Gorman (2008), McKaig (1988), Restrepo and Kruth (2000), Orgassa and Weerman (2008), Rothweiler and colleagues (2010), Blom and colleagues (2013) or Blom and Paradis (2013; 2014), who all found typically developing bilingual children to outperform their peers with language impairment on overall grammatical accuracy.

It was further highlighted that LIB regularly only repeated sentence initial and final words and sentence intonation until the age of 6;8. This is in line with the findings from the verbal recall task, which showed that LIB relies more heavily on intonation in his phonological processing. TDB, on the other hand, relies on familiarity of words, which is why he repeatedly replaced unknown content words and tenses with known forms in the SR test.

Apart from their overall performance on the sentence repetition task, TDB's and LIB's production of plural, verb form, case inflection, determiners, pronouns, prepositions and relative clauses was analysed. The comparison of their performance on the formal tests and their narrative and spontaneous speech data revealed a mis-match between the two, generally in favour of the tests. This mis-match is in line with previous findings comparing test data to spontaneous speech production (Dressler & Laaha, 2012; Korecky-Kröll et al., 2012; Laaha, Ravid, Korecky-Kröll, Laaha, & Dressler, 2006) and needs to be borne in mind when drawing conclusions about child language development based on test data alone.

Regarding TDB's and LIB's plural acquisition it emerged that LIB acquired the English plural at a slower rate than TDB, who seemed to have fully acquired it in his spontaneous speech at the last testing point aged 8;6. This has important implications for the use of plural inflection as a marker of

language impairment. While studies on monolingual language impairment indicate that plural inflection may be a reliable marker of language difficulties, even as early as five years of age (Conti-Ramsden, 2003), this difference only seems to occur later in bilingual children. Polish noun plural forms in spontaneous speech might be an even less reliable indicator of language impairment as inaccurately inflected noun plurals were observed for TDB and LIB until the age of 7;9. It needs to be noted, however, that differences with regard to noun plural production were more apparent in the sentence repetition task. On the formal test TDB did not make any noun plural errors anymore from the age of 4;8 onward, while LIB still made errors by the age of 8;6. For Polish, TDB did not make any plural errors on the SR task anymore by the age of 6;8 and LIB by the age of 8;6. This suggests that differences on plural production in formal tests may be more reliable in the distinction between TDB and LIB.

Another marker of monolingual language impairment is the third person singular *–s* (cf. section 6. 2. 3). This difference was also observed for TDB and LIB. While TDB did not omit any verb inflections anymore by the age of 5;6, LIB omitted English verb inflection until the age of 7;9. This is in line with Albertini (1980 qtd. In Leonard 1998: 60), who found monolingual children with language impairment to develop grammatical morphemes at a much slower rate than their typically developing peers. According to Albertini, the acquisition of grammatical morphemes in children with language impairment corresponds to a relatively longer sentence length. This is confirmed by the data in this study, which also showed that LIB only acquired the third person singular –s and the English noun plural once he had reached a higher MLU, which in turn correlated with his older age.

The interaction of grammatical development, MLU and age is once more in line with dynamic systems theory, which predicts that complexity emerges from the interaction of components. Therefore, the omission of third person singular *–s* does seem to differentiate between TDB and LIB between the ages of 5;6 and 7;9 but not beyond that. It is therefore exposure dependent and does not seem reliable for the early diagnosis of bilingual children with

language impairment.

The analysis of English past tense production revealed that TDB started to overgeneralise regular past tense forms earlier than LIB (5;6 vs. 6;8) and that LIB used those forms in parallel to omitted past tense inflections. This is in line with Clahsen and colleagues' (2014) study, who also found German-Turkish bilingual children with language impairment to use overgeneralised and omitted forms in parallel. This finding also suggests that TDB develops similarly to typically developing peers, where omission precedes overgeneralistion. This is not the case for LIB, who makes these errors in parallel. The same has been found for children with Down syndrome (W. U. Dressler, personal communication, 22 June 2016). This finding hence suggests that the omission-commission opposition may be a feature that depends on the language combinations a bilingual child speaks, is exposure dependent and that grammar acquisition only partly overlaps between TDB and LIB.

This is also supported by the analysis of case inflections, which revealed that LIB only omitted case inflections until the age of 5;6. Beyond this, he produced erroneous forms. This suggests that omitted noun inflections may only dinstinguish between younger English-Polish bilinguals with and without language impairment. Overall, TDB acquired Polish noun inflection faster than LIB but both exhibited particular problems with noun stems ending in *–k*. Both children had particular difficulties with the unnatural zero ending in the feminine genitive plural (see section 9. 1. 1.). As stems ending in *–k* are less common in Polish than nouns ending on other, non-palatalised or palatal consonants, their difficulty with this inflectional class may potentially be a result of their bilingual status. For the differentiation between typical and atypical bilingual development this means that difficulties with these noun stems may even occur in older typically developing English-Polish bilinguals and should not be interpreted as a sign of language impairment. This finding highlights once more the need to assess bilingual children with independent norms.

Tense errors in Polish distinguished between TDB and LIB from 6;8

onward but verb aspect was a persistent problem for both children beyond the age of 8;6. This suggests a bilingual specificity in language acquisition and therefore errors with verb aspect should not be misinterpreted as a sign of language impairment in English-Polish bilingual children. As perfective and imperfective verb aspect is specific to Slavic languages, TDB's and LIB's overgeneralistion of the imperfective might be a result of cross-linguistic interference.

Another potentially cross-linguistic interference became apparent from their use of determiners, which TDB omitted in the sentence repetition task until the age of 5;6 and LIB still occasionally omitted at the age of 8;6. Two possible explanations come to mind. Firstly, TDB's omission of determiners at younger ages might be a result of cross-linguistic influence from Polish, where determiners are less frequently employed, especially as Polish lacks articles. The fact that LIB showed persistent problems with determiners might be due to their low saliency. Bearing in mind that both the verbal recall and the sentence repetition task highlighted LIB's reliance on prosody in his phonological processing, the unstressed position of determiners might make their processing more challenging for LIB. This hypothesis would further be supported by LIB's omissions of the Polish monophonemic and non-syllabic preposition *w* ‚in' until the age of 7;9.

Phonological processing difficulties could potentially also explain LIB's persistent problems with Polish personal pronouns, which he omitted or substituted until the age of 8;6. TDB, on the other hand, did not make any errors with Polish personal pronouns anymore after the age of 7;9. This suggests yet again that linguistic markers of English-Polish bilingual language impairment might only start to emerge at later ages, which makes them unsuitable for the diagnosis of language impairment at earlier ages.

The same can be said for TDB's and LIB's use of relative clauses. Both children exhibited substantial difficulties with complex sentences at all ages. While TDB started to gradually acquire relative clauses by the age of 7;9, even though he struggled with inflected Polish relative pronouns, LIB still was not able to repeat these sentences accurately by the age of 8;6. This

suggests once more the interplay between exposure and language development and shows that a differentiation between typical and atypical English-Polish bilingualism based on specific grammatical features might only be feasible at older ages, when typically developing children have had enough exposure to both languages to acquire all relevant structures.

This is in line with the argument that was presented in the introductory chapters of this thesis and which called for a more holistic approach to the description of typical and atypical language development. In line with the systematic review presented in section 7 of this thesis and which argued for a description of bilingual language impairment beyond linguistic markers, the remaining part of this discussion will be concerned with the evaluation of the data on TDB's and LIB's discourse, interactional, sociocultural, strategic and monitoring abilities. It will become apparent from this overview that TDB's difficulties reach beyond the grammatical domain.

10.2 Discourse Abilities

The analysis of story length revealed that this measure was more reliable in the distinction between TDB and LIB before the age of 6;8. This finding provides further evidence for studies reporting on the declining correlation between age and storytelling abilities in typically developing bilingual children, from the age of seven onward (Bohnacker, 2016; Gagarina, 2016; Mavis et al., 2016; Roch et al., 2016). Based on the data presented in this thesis, it could be argued that age might only substantially affect the storytelling abilities of bilingual children with language impairment after the age of seven, which is why they can potentially catch up with their unimpaired peers around this age.

Previous studies only occasionally found story length to differ substantially between children with and without language impairment (Altman, Armon-Lotem, Fichman, & Walters, 2016; Cleave, Girolametto, Chen, & Johnson, 2010; Fey, Catts, Proctor-Williams, & Tomblin, 2004). Therefore, story length does not appear to be a very reliable indicator of language impairment in

bilingual children. This is particularly true for older ages.

The story structure analysis revealed that TDB outperformed LIB at all ages in Polish and at every age apart from 6;8 in English. This suggests that story structure (i.e.: the number of story elements) is indicative of bilingual language impairment. This corresponds to Squires and colleagues' (2014) findings but stands once more in contrast to Iluz-Cohen and Walters (2012), Altman et al. (2016) and Tsimpli et al. (2016), who did not find macrostructure to differentiate between the two bilingual groups. This thesis therefore adds to the controversial findings regarding the distinctive potential of macrostructural elements in the assessment of bilingual children. Due to his controversy story structure alone cannot be recommended for the diagnosis of bilingual children but needs to be combined with other measures, such as story complexity.

The analysis of story structure revealed one striking finding in the context of typical and atypical bilingual development. It was shown that LIB's development of story structure was very linear and increased steadily between time point one and four in English and Polish. In contrast, TDB's use of story structure elements fluctuated in both languages and whenever he used more elements in one language, he used less in the other. This finding is particularly relevant in the context of dynamic systems theory and the interaction between two languages in one system. Judging from these findings, it seems like TDB's languages stand in a more dynamic relationship to each other, while LIB's two codes are developing in parallel. This might also explain why TDB might have potentially benefitted more from bilingual boot-strapping in grammar acquisition than LIB (see above).

The observations from the story structure analysis were further confirmed in an assessment of TDB's and LIB's story complexity. The children differed substantially in the number of sequences (i.e.: attempt-goal; single goal; goal-attempt, goal-outcome; full goal-attempt-outcome) they described. TDB outperformed LIB and the difference was particularly apparent for Polish and in their use of complete GAO sequences.

This finding implies that LIB has got more difficulty arranging his narratives in a coherent and chronological order. The fact that LIB did not use a single

whole GAO sequence could also imply difficulty in his working memory, as GAO sequences require to keep the goal in mind while describing the attempt and finally the outcome. This would also be supported by the fact that LIB prefers to read shorter factual texts, while TDB shows a preference for narratives and novels. The reading of novels requires a longer attention span and better working memory as the reader needs to keep a lot of information in mind while processing subsequent sentences and chapters. Reading difficulties have indeed been linked to language impairment (e.g.: Baird, Slonims, Simonoff, & Dworzynski, 2011) and a particular strong connection was found for children with very low nonword repetition abilities, which is the case for LIB.

It therefore seems like LIB's difficulties with phonological processing, attention span and working memory, which will be further discussed below, might influence his preference of reading material. As a result, he gets less exposure to classic narrative structure and has therefore fewer opportunities to acquire GAO sequences. Even though reading skills were not specifically investigated in this thesis, the link between phonological processing, attention span, reading and storytelling, which becomes apparent in LIB's choice of reading material and his narrative abilities, emphasises once more the interconnectedness of all components of communicative abilitiy and its environment. LIB has language and concentration difficulties, which influence his choice of reading materials, which in turn impact his language development. This shows once more that input, in spoken and written form, must not be understimated in the study of (bilingual) language development.

In addition to the difference between TDB and LIB with regard to their story complexity, the macrostructure of their English and Polish stories was compared. This analysis revealed substantial differences aged 4;8 and 6;8, when LIB's story complexity overlapped in his two languages, while it differed by two sequences in favour of Polish for TDB. At the remaining ages, story complexity differed by one sequence for both children. This finding contrasts with Altman et al. (2016), who did not find any difference between typically and atypicaly developing bilingual children with regard to their use of GAO

structures. This difference between TDB and LIB provides further evidence for higher levels of fluctuation in TDB's language development, which is potentially due to his stronger reaction to environmental input.

In essence, the analysis of TDB's and LIB's discourse abilities shows that they differ in most areas but that some of these differences correpond to exposure and therefore only appear at older ages. It has been argued that their diverging discourse abilities might be a result of their reading habits, which in turn appear to be influenced by differences in attention span and working memory. Discourse abilities therefore appear to interact with language and cognitive abilities, on the one hand, and environmental factors, such as reading habits, on the other. TDB's discourse development was further found to fluctuate substantially more than LIB's. This fluctuation was interpreted as a stronger interaction between his two languages and a more intense reaction to environmental changes. This is to say that potentially TDB is more successful in activating and de-activating his two languages depending on which he (or his environment) currently uses more.

This could lead to a steeper increase in the language he is exposed to more at the time and as a result of this steep increase, a subsequent decrease due to less use, is more substantial. This would suggest that inhibition processes, wich have been found to be particularly well developed in typically developing bilingual children (Ellen Bialystok et al., 2012) might also be negatively affected by language impairment, leading to a qualitatively different profile of language acquisition in the two groups of language learners.

The findings on discourse abilities are therefore in line with the model of the dynamic model of communicative ability, which underlies this study. It was shown that various components of the model are intertwined, that the participants' two languages stand in an interactive relationship with each other (more so for TDB than LIB) and that discourse ability is strongly influenced by external factors like socio-economic background and reading preferences.

10.3 Interactional Abilities

The quantity and complexity of utterances, questions and turn-taking was assessed in order to determine TDB's and LIB's interactional ability. It was found that TDB spoke more than LIB in both languages and that both children spoke more in their home language Polish than the majority language. It was argued that the latter finding might result from a difference in the conversation partners, rather than their actual interactional behaviour. Additional recordings would be required to further scrutinise the difference between the minority and the majority language. This is particularly relevant in the light of previously controversial findings regarding a potential difference in the quantity of utterances between children with and without language impairment (Blackwell, Harding, Babayigit, & Roulstone, 2014).

The analysis of questions showed that TDB asked marginally more questions than LIB but this difference would need to be verified on a larger dataset in order to see whether this small trend is indicative of their actual interrogative behaviour. The result would correspond to Blackwell et al.'s review (2014), which also reported on typically developing children asking more questions than children with language impairment. It was further found that both children asked more questions in Polish than English, which corresponds to their higher number of utterances spoken in their home language. However, due to the small difference observed in the dataset presented here, the result needs to be treated with caution.

The analysis of turn-taking behaviour investigated how TDB and LIB interacted with their interlocutors. From this analysis it became clear that both children responded adequately to questions. This is, they both reacted to questions that were addressed to them, which is also in line with Blackwell et al.'s review. However, their replies differed substantially in exhaustivity. This is, LIB's answers were shorter, occasionally violated Grice's maxims of communication and required more effort from his interlocutor to elicit further information, thereby violating de Beaugrande and Dressler's (1981) principle of efficiency. Moreover, LIB's answers seldom provided the opportunity to continue a conversation. That is, he was less likely to provide additional new

information beyond the question asked. This suggests that LIB showed less agency in conversations, assuming a more passive role, which is once more in line with Blackwell et al.'s (2014) review. In contrast, TDB was more likely to provide additional information in his answers to questions, which provided new opportunities for his interlocutor to continue the interaction. This findings would need to be confirmed further in a detailed analysis of their topic initiations.

Based on the overall findings on TDB's and LIB's interactional abilities, it can be concluded that quantitative measures such as the number of utterances and questions do not seem to differ substantially between TDB and LIB. However, the children were found to differ substantially in their exhaustivity of utterances, which also corresponds to their divergent MLU and their adherence to Grice's maxims. This difference could potentially be influenced by LIB's awareness of his deficits and a resulting reluctance to engage in conversations. It has been argued that, as a result, conversations with LIB require additional effort from his interlocutors to maintain conversations.

The difference between TDB and LIB also suggests a difference in their willingness to engage in dialogues that serve the sole purpose of communication. This would be supported by the mother's answer to the *Lifetime Social Communication Questionnaire*, in which she indicated that LIB did not initiate conversations just to be friendly, when he was younger. TDB, on the other, did engage in "chit-chat". By the age of 8;6, these differences had largely disappeared but the divergence at younger ages suggests a higher reluctance of LIB to engage in conversations.

For the diagnosis of bilingual children with language impairment, the findings on interactional abilities indicate that these two groups of language learners differ in their conversational behaviour. This might become particularly apparent at younger ages, when typically developing children might be willing to engage in conversations, despite limited language skills, while children with language impairment could be more reluctant to do so.

For dynamic systems theory and the model underlying this study, the

findings on interactional ability confirm the interconnectedness of all components. Additionally, the finding that LIB would not initiate conversations at younger ages just to be friendly, appears to have had an impact on his interaction skills at older ages. This is in line with principle twelve of Larsen-Freeman's list (cf. section 4.2. of this thesis), which describes the importance of preceding states on further development. For typical and atypical bilingual development this means, that a child with language impairment might be less willing to engage in conversations when younger and, as a result, have fewer opportunities to practice and improve their interactional skills. This would also be in line with findings assigning lower pragmatic skills to children with language impairment (cf. section 6 for an overview) and the idea that problems in one area of communicative abilities, will impact on all remaining components. This will further be illustrated in the discussion of TDB's and LIB's sociocultural abilities, which is presented below.

10.4 Sociocultural Ability

The analysis of TDB's and LIB's *Theory of Mind* skills showed a clear difference in their performance. This difference became apparent from two different tests and in both their languages, which is why language is not likely to have played a key role for the outcome. Therefore, the results obtained in this study provide further evidence for a view where social and language skills are intertwined, such as proposed by Osman et al. (2011), Chiant and Roy (2013), Bishop (2000) and Buiza et al. (2015). Therefore, they do not confirm the view of language and pragmatics being two distinct properties, such as proposed by Schaeffer (2005).

The fact that TDB outperformed his monolingual peers aged 6;8, when he already performed at ceiling, confirms the bilingual advantage on ToM tasks previously described in the literature (Andrés-Roqueta, Adrian, Clemente, & Katsos, 2013; Farrant, Fletcher, & Maybery, 2006; Loukusa, Mäkinen, Kuusikko-Gauffin, Ebeling, & Moilanen, 2014; Miller, 2001). Furthermore, the fact that LIB's score was generally lower than TDB's but increased over time

provides further evidence for Andrés-Roqueta et al.'s finding (2013) that the development of *Theory of Mind* is delayed in children with language impairment but not qualitatively different.

TDB's and LIB's divergent Theory of Mind development corresponds to their use of internal state terms. It was shown that TDB used more and a wider variety of internal state terms in both languages from the age of 5;6 onward for English and from 6;8 onward for Polish. This finding is in line with Squires et al. (2014) and a suggestion raised above. TDB's preference for reading stories and novels, where internal state terms are more common than in factual publications, appears to also influence his use of internal state terms. This hypothesis seems to be supported by the fact that the difference between TDB and LIB became particularly visible at older ages, when they would have become more fluent readers and start to influence their choice of reading material. The difference in their use of IST further relates to the difference in their vocabulary scores described above and provides further evidence that IST and ToM are associated (Ziatas et al., 1998).

For bilingual language impairment these findings imply that bilingual children with language impairment might not benefit from their bilingual status as much as their typically developing peers. However, in order to verify this hypothesis, LIB's result would need to be compared to monolingual children with language impairment using the same assessment. Unfortunately, the participants in Andrés-Roqueta's study were significantly younger than LIB at the first assessment and were only tested on false-belief tasks. Therefore an age-related comparison was not possible at this point.

In addition to the differences in their Theory of Mind skills and their use of IST, TDB's and LIB's mother reported on differences in their social communication, which was assessed using the current and lifetime form of the Social Communication Questionnaire (SCQ). While the two children still overlapped at younger ages in their inaccurate use of personal pronouns and neologisms, this similarity had disappeared by the age of 8;6. It was already mentioned above that LIB did not initiate conversations at younger ages while TDB did. Additionally, the mother mentioned that LIB showed unusually strong

but otherwise appropriate interest in various topics. This last point is interesting with regard to the question of the relationship between autism and language impairment. Neither child scored anywhere close of the 15 point cut-off-score and therefore are not at risk of a diagnosis with ASD. However, LIB showed persistent problems in the Restricted, Repetitive and Stereotyped Patterns of Behaviour domain associated with ASD.

This suggests that language impairment and ASD might indeed share certain patterns of (language) behaviour and might not be as distinct as traditionally assumed, confirming the recent interest in the relationship between the two neurodevelopmental disorders (Bishop, 2003; Bishop, 2010; Chiat & Roy, 2013; Conti-Ramsden, Simkin, & Botting, 2006; Norbury & Bishop, 2003; Riches et al., 2010; Ruser et al., 2007; Williams, Botting, & Boucher, 2008).

This is not to say, however, that LIB is at risk of ASD, which is very clearly indicated by his mother's replies to the SCQ that show that he is very considerate of his environment. What it does imply, however, is that limited communication skills might lead to the development of behavioural patterns that resemble ASD. Bearing in mind how much everyday interactions rely on oral communication skills, it only seems logical that limited language skills can influence children's social development. Examples of the connection between language and behaviour could include emotional outbursts out of frustration not to be able to communicate one's needs adequately, more solitary play to avoid verbal interactions and as a result, the development of peculiar or particularly strong interests that are not influenced by peers.

The twins' mother reported on all but the emotional outbursts to rather apply to LIB than to TDB. This suggests that social (communication) development is associated with language impairment. I would therefore argue that language impairment can lead to behaviour resembling ASD due to the importance of language and communication for social interaction. Whether these overlaps are a surface phenomenon or the result of a shared underlying aetiology will need to be addressed in studies discussing this relationship in more detail.

For the purpose of this thesis the differences between TDB's and LIB's sociocultural abilities implies that language abilities and social (communication) development are intertwined, as suggested by the *Dynamic Model of Communicative Ability*. This difference in social communication skills might also potentially explain the different patterns of fluctuation observed in TDB's and LIB's language development. It was argued that TDB's languages might develop differently as a result of a stronger reaction to environmental input, while LIB's languages were shown to develop in a more linear fashion. This difference might potentially be influenced by their social (communication) skills, which might lead them to communicate less (intensely) with their environment and, as a result, react less strongly to a change in exposure to one or the other language. Once more, this hypothesis would need to be verified in a longitudinal study comparing the language development of a larger cohort of typically and atypically develeoping bilingual children in reaction to their environment.

10.5 Strategic Ability

The results from the analysis of their use of circumlocution, approximation, substitution, neologisms, code-switching, avoidance and message abandonment suggested that LIB used more communication strategies than TDB. This finding corresponds to LIB's lower vocabulary and grammar scores, which are likely to result in more gaps in his knowledge, leading to more potential breakdowns in communication that need to be resolved. It also indicates that strategic ability does indeed function as a compensatory mechanism, as suggested in the description of the Dynamic Model of Communicative ability proposed in chapter four of this thesis.

Interestingly, both children used slightly more strategies in English than in Polish. This difference might however be connected to the fact that both told longer stories in English than Polish, which hence provided more opportunities for knowledge gaps to arise.

The qualitative analysis of type of communication strategy used by both children showed that their choice of strategy differed. While TDB opted for

more target-language strategies (i.e.: language of conversation), such as circumlocution, LIB used neologisms and code-switching more frequently.

This qualitative difference relates to findings presented in preceding sections of this discussion. Firstly, TDB's advanced vocabulary and grammar skills would make it easier for him to opt for communication strategies in the language of the conversation. The correlation between language proficiency and use of communication strategy was also discussed by Bialystok (1990) and confirmed that more proficient language learners are more likely to opt for circumlocutions in the target language over other strategies.

It is therefore not surprising that LIB's lower vocabulary and grammatical abilities would influence his choice of strategies toward neologisms or code-switching. The latter is particularly interesting in light of the finding that LIB has lower Theory of Mind skills than TDB, which was discussed above. It was previously hypothesised that bilingual children might have increased ToM skills because their bilingual experience requires them to understand which person in their environment to address in which of their two languages (cf. section 5.5.). Therefore, if bilingual children with language impairment have decreased ToM skills, as was presented above, they might have a deficit in awareness of norms and, as a result, to stick to one language in a monolingual setting. They might then initiate discourse in a language which is not appropriate for the speech situation or for the interlocutor. This might particularly be the case at younger ages. This would be supported by data were LIB used inapproprate code-switches in monolingual settings, suggesting that he might have lower levels of conversational inference (cf. section 3. 2. 2. for details).

Another possibility would be that TDB and LIB differ in their cognitive control (i.e.: the inhibition of the language not spoken in a given situation), which was discussed above in relation to their discourse development. The finding that LIB used substantially more code-switches, even in monolingual test settings, suggests that he might not distinguish between his two languages as succesfully as TDB, particularly at younger ages.

Unfortunately, no data from pure cognitive control and inhibition tasks are

available to scrutinise this hypothesis further but it would certainly be interesting to investigate inhibitory control in relation to choice of communication strategy in a follow-up study.

Therefore, the data obtained from the comparison of TDB's and LIB's communication strategies could not confirm Osman et al.'s (2011) finding, which suggests that typically developing children outperform their peers with language impairment overall on their use of communication strategies. However, this study was able to add an in-depth view of the qualitative differences of typical and atypical bilingual strategic abilities to previous investigations.

10.6 Monitoring Ability

The last component of Dynamic Communicative Ability that was investigated in this study, were TDB's and LIB's nonverbal skills. Their results on the nonverbal IQ test showed that both children performed in the average range but that TDB scored slightly higher than LIB. The difference amounts to about one standard deviation at both time points and is therefore in line with Gallinat and Spaulding's (2014) meta-analysis, which reported that children with language impairment generally performed an average of -0.693 standard deviations below their typically developing peers on nonverbal IQ tests. Therefore, the difference between TDB and LIB on the Raven Coloured Progressive Matrices is not unusual in a comparison of children with and without language impairment but suggests once more that language and general cognitive skills are strongly connected.

TDB's and LIB's performance on the Corsi Blocks task testing visuospatial memory, could not confirm the finding from Vugs et al.'s (2013) meta-analysis, which reported on a difference of half a standard deviation between children with and without language impairment on such tasks. TDB and LIB performed exactly the same on the Corsi Block task and similary to typically developing age norms, which suggests that visuo-spatial memory might not be equally affected in all children with language impairment.

Vugs et al. (2013) also showed that verbal working memory, as tested in

digit-span tests, was clearly more substantially affected by language impairment than nonverbal and visuo-sptial memory. This finding was clearly confirmed by TDB's and LIB's scores on the digit-span task, where TDB outperformed LIB. It was argued above that LIB's performance on nonword repetition and sentence repetition tasks might be influenced by lower phonological working memory. Their results on the verbal recall task provide further evidence for this hypothesis.

The results on the BRIEF questionnaire shed more light on the question whether a difference in working memory might explain the differences in TDB's and LIB's language profiles. From the results it became clear that TDB and LIB did not differ in their emotional control but their metacognition. The difference between the two children was particularly apparent in working memory, planning/organising and organisation of materials.

This finding relates directly to the data presented above and shows that working memory is clearly related to language production. It was argued above that a difference in phonological memory might influence TDB's and LIB's performance on the nonword, verbal recall and the sentence repetition task, where substantial differences could be observed between both children at all ages. It was further hypothesised that a difference in working memory might influence LIB's choice of reading materials (i.e.: his preference of short factual texts over narratives and novels) and, as a result, his macrostructural organisation.

LIB's lower working memory is further important with regard to code-switching in bilingual children with language impairment. It has been found that even though working memory and inhibition are separable, they are related skills (Miyake et al., 2000). It was also found that inhibition was affected in monolingual children with language impairment when compared to their typically developing peers (Henry et al., 2012). Therefore, bilingual children with language impairment might have lower inhibition skills than their typically developing peers, leading to more initiations of discourse in a language that is not appropriate for the speech situation or for the interlocutor (e.g.: code-switching in monolingual settings).

The findings on TDB's and LIB's cognitive abilities suggest that they are intertwined with language abilities, which became particularly apparent from the analysis of their executive functions in general and working memory in particular. Therefore, this data appears to confirm the dynamic model of communicative ability, which describes language and cognitive skills as intertwined.

11 Conclusion

As the aim of this thesis was to analyse the similarities and differences in typical and atypical bilingual language development in order to help prevent the misdiagnosis of either group in the future, this conclusion will take a slightly alternative form. Rather than only summarising and commenting on what has been said in the preceding chapters and proposing future directions, this chapter will present the prototype of a bilingual screening tool, which was developed on the basis of the literature reviews and the twin case study discussed in this thesis. In order to provide the rationale behind this prototype of a screening tool, the first part of this conclusion will provide a brief summary of the theoretical basis underlying this thesis. This will be followed by the presentation of the prototype of a bilingual screening tool, which will be discussed in the context of the findings presented in this thesis.

At the outset of this monograph, it was argued that we first need to clarify what we understand when speaking of language impairment. Questions were asked as to whether impairment is merely a deviation from the (monolingual) native speaker norm and where the line should be drawn between difference and impairment. It was argued that the answer to these questions lies within the definition of language itself. Therefore, section two reviewed a myriad of approaches to the study of language and discussed how these various definitions relate to bilingualism and language impairment. Grammatical, social, contextual, functional and combinatory theories were discussed and related to language impairment and bilingualism. From this discussion it became clear that language is more than the sum of its grammatical features and has a social function in a communicative context.

Based on this review, it was argued that the definition and study of language impairment should not be restricted to grammatical inaccuracies but also take the social and functional level of language into account. It was suggested that such an approach might help to disentangle the overlaps between typical and atypical bilingual development as these two groups of language learners might potentially differ less in the grammatical domain, which would be in line with their frequent misdiagnosis based on common

language measures, but more in their overall communicative ability.

Therefore, section three of this thesis reviewed models of communicative competence, which traditionally take a more holistic approach to language and communication as they were developed as direct oppositions to Chomsky's generative grammar. This review highlighted that models of communicative competence, ability or capacity have become increasingly complex over time. However, the existing models have been criticised for continuing to propose hierarchical relationships between the various components.

Consequently, a new model of communicative ability was proposed in chapter four of this thesis. It was explained that the term abaility was more appropriate than capacity or competence in the context of this thesis, as it encompasses both declarative and procedural knowledge, which were both assessed in the present study. Based on the review presented in the two preceding chapters, this new model encompasses linguistic, discourse, sociocultural, interactional, strategic and monitoring abilities. Rooted in dynamic systems theory, a hierarchical organisation of the six components was rejected and a dynamic interactional approach adopted. It was argued that the ability to communicate successfully hence depends on speakers' abilities in each of these components and their interaction with each other.

Furthermore, it was hypothesised that children with language impairment will have difficulties in all of these domains rather than just one and that typical bilingualism and bilingual language impairment could be differentiated based on their overall communicative ability.

These hypotheses were subsequently verified in the longitudinal twin case study underlying this thesis. Both children were assessed using a combination of formal tests and spontaneous speech data, in order to analyse both their procedural and their declarative knowledge over the course of four years.

Overall, the results obtained from this investigation support an intertwined view of communicative competence as TDB generally outperformed LIB on all components of the *Dynamic Model of Communicative Ability*. This is to say that TDB and LIB differ in their overall communicative ability rather than just their grammatical knowledge.

In order to illustrate how these findings could potentially be applied to the assessment of bilingual children, an assessment grid of bilingual communicative ability is presented below. This grid was developed on the basis of the literature and data discussed in this thesis. It is needless to say that its potential as a screening tool would need to be validated in a larger study assessing a greater number of bilingual children. Therefore, the prototype presented here is not meant for clinical but rather for research purposes – as a basis for further studies.

The intention was to create a screening tool which might give a first insight into the child's communication skills. Therefore, the format of a questionnaire was chosen as it can easily be translated into various languages and therefore be administered to parents, in order for them to assess their child's home language. This is particularly relevant in the context of bilingual children, where information on children's first languages bears essential insights regarding their overall language development.

The idea would hence be that an assessment grid like the one provided here, would be filled in by parents and educational professionals in order to determine whether concerns are reported for both languages. If parents report no concerns regarding their child's language development, their communication problems in the majority language are likely to be due to a lack of exposure and hence to resolve over time. However, if concerns are raised for both languages, a further investigation by a speech and language therapist might be warranted.

The questionnaire is split into two sections with the first being a general overview of children's communication skills. The aim of this first part is to determine the level of overall communication the child displays and whether concerns about children's overall communicative ability overlap in their two

languages. To this end, it inquires about children's general language development in relation to their bilingual (!) peers. This aspect is particularly important as this thesis has shown that bilingual development diverges from monolingual development and therefore, concerns parents might raise when comparing their bilingual children to their monolingual peers in the parents home country, are likely to be a result of their bilingual status, rather than language difficulties. Therefore, the comparison to other bilingual children speaking the same language combination and growing up in the same setting as the child in question, will be a more accurate reflection of their language skills.

The first part of this communicative assessment tool is also to be understood as the first step in screening for language impairment. If parents do not voice any concern about their child's development in their home language, the difficulties reported by teachers are likely to resolve with additional exposure and therefore the second part of the questionnaire would not need to be administered. In case of concerns in both the home and the school language, the second part should be administered, which will provide additional information on the precise difficulties children are experiencing and provide a basis for follow-up assessment by a speech and language therapist.

The second, more detailed, part of this prototype of a screening tool is divided according to the six components of dynamic communicative ability and was developed on the basis of the systematic review presented in section seven of this thesis and the analysis of TDB's and LIB's data. It contains 48 questions, eight per category, in yes/no format in order to minimise response times. The questions have been formulated so that they are understandable to the general public. The whole rating scale is presented below and the components of the detailed rating scale will be discussed in relation to findings from this thesis on the following pages.

HOLISTIC RATING

Type	L_a	L_b
Nonverbal Communicator Can communicate nonverbally using gestures/pictures/drawings to convey meaning and understands a small number of isolated words. e.g.: points to bottle to ask for a drink.		
Rudimentary Communicator Can understand and convey basic meaning in a limited number of domains, using isolated words (holophrases) or formulaic language. e.g.: says „drink/water“ to ask for a drink.		
Elementary Communicator Can verbalise needs and understands simple sentences in a limited number of domains, tentatively using basic grammatical structures and rules. Has difficulty understaning and communicating more complex meaning. e.g.: „I want drink“ to ask for a drink.		
Moderate Communicator Can understand and interact on a basic level in various contexts showing increased awareness for grammatical structures and their application. e.g.: “I want a drink“ to ask for a drink.		
Intermediate Communicator Can understand and exchange about a wide range of topics, explain their opinion and apply grammatical and social rules. e.g.: “Could I get a drink, please?“		

Are you or have you ever been concerned about your/the child’s language development? Yes ☐ No ☐

Compared to other bilingual children speaking the same language combination, how does your/this child compare? Please indicate on the scale below with 0 being the lowest and 10 being the highest score.

0_____1_____2_____3_____4_____5_____6_____7_____8_____9_____10

DETAILED RATING

Please choose if the statement applies to the/your child.

		Y	N
Linguistic Ability	1) Produces grammatical errors in a wide range of contexts (i.e.: also very common forms)		
	2) Sometimes omits word initial or final sounds.		
	3) Regularly uses long and complex sentences.		
	4) Uses very short sentences (2-3 words).		
	5) Pronounces words clearly and accurately so that they can be understood by someone who doesn't know them very well.		
	6) Makes mistakes pronouncing longer words (e.g.: vegable for vegetable).		
	7) Confuses words that sound similar (e.g.: telephone and television).		
	8) Jumbles up the order of sentences.		
Discourse Ability	9) Tells stories chronologically.		
	10) Goes into detail when telling stories.		
	11) Describes character's feelings, emotions and reactions when telling stories.		
	12) Tells stories with a clear beginning, middle and end.		
	13) Generally likes to read.		
	14) Enjoys reading narratives and texts.		
	15) Prefers to read shorter, factual texts.		
	16) Shows genre awareness (i.e.: tries to imitate storytelling conventions).		
Interactional Ability	17) Generally reacts when spoken to.		
	18) Generally does not speak a lot.		
	19) Is generally aware of conversational rules (i.e.: when to speak/not to speak).		
	20) When younger, rarely started conversations just to be friendly.		
	21) Gives detailed answers, sometimes providing additional information.		

	22) Frequently introduces new topics.		
	23) Regularly initiates conversations.		
	24) Seems generally happy to engage in chit-chat.		
Sociocultural Ability	25) Sometimes has difficulties to understand other people's point of view.		
	26) Shows unusually strong but otherwise normal interest in certain topics.		
	27) Frequently prefers to play alone.		
	28) Gets frustrated when he/she can't get their point across.		
	29) Refers to people's feelings and emotions when describing events.		
	30) Uses politeness markers appropriately.		
	31) Is generally aware of which language to use with whom and in what context.		
	32) When younger, was more interested in specific parts of a toy than their overall function.		
Strategic Competence	33) Code-switches in monolingual settings.		
	34) Often coins neologisms.		
	35) Stops mid-sentence or says something like "never mind" when he/she cannot think of the right word/phrase.		
	36) Rather does not describe words when he/she cannot think of them.		
	37) Chooses not to speak when he/she lacks the right word.		
	38) Asks for clarification when needed.		
	39) Sometimes uses words that do not fit the meaning of the rest of the sentence.		
	40) Is generally aware of a lack in his/her knowledge and tries to address it.		
Monitoring Ability	41) Has troube concentrating for a longer period of time.		
	42) Has trouble understanding longer/more complex sentences.		
	43) Can easily shift from one task to another.		
	44) Needs time to understand instructions.		
	45) Is generally well organised.		
	46) Gets easily distracted.		
	47) Can generally repeat a sequence of movements accurately.		
	48) Has difficulty planning out tasks.		

Linguistic Ability: From the measures assessing TDB's and LIB's linguistic abilities, nonword repetition and sentence repetition tasks as well as MLU were the most reliable in the distinction between the two children. While TDB also outperformed LIB on lexical tasks, the gap in their performance was not as remarkable and they did not differ substantially on TTR. The argument presented in the discussion of this thesis suggested that this result might be influenced by the participants' high socio-economic background. Therefore, procedural tasks such as nonword and sentence repetition appear to be reliable even at younger ages and in both languages for the distinction of typically and atypically developing English-Polish bilinguals. In contrast, results on lexical tasks need to be treated with caution.

These findings are reflected in questions 1-8 of the screening tool. Question 1 is concerned with overall grammatical accuracy, which has been found to distinguish between TDB and LIB, particularly at older ages. This was also confirmed in the systematic review. It needs to be borne in mind, however, that overall grammatical accuracy correlates with exposure and should therefore be used with caution when assessing younger bilingual children. This is also why a screening tool like the one presented here is advantageous as it does not rely exclusively on the assessment of grammatical accuracy. Questions 2, 5, 6 and 7 relate to findings regarding phonological processing and phonetics, which showed the largest differences for longer (non)words and persistent difficulties for children with language impairment on consonant clusters. Finally, questions 3, 4 and 8 reflect findings regarding the substantial difference with regard to sentence complexity and syntactic knowledge in bilingual children with and without language impairment.

Discourse Ability. Regarding their discourse development, TDB and LIB did not differ substantially on story length but on story structure and story complexity. Furthermore, the difference in TDB's and LIB's story complexity appears to be related to differences in their (phonological) working memory and, resulting from it, their divergent choice of prefered reading material.

For the assessment of (English-Polish) bilingual children, the results

indicate that measures of complexity might be more reliable in the distinction between typically and atypically developing bilingual children than measures of quantity, such as story length. This seems to be particularly true for children from high socio-economic backgrounds. These findings are presented in questions 9 to 16. Questions 9, 12, 16 reflect findings regarding substantial differences in story structure, while questions 10 and 11 address story complexity. Finally, questions 13, 14 and 15 deal with differences in reading behaviour, which has been proposed as resulting from differences in (phonological) working memory.

Interactional ability. The observations from discourse ability were supported by data from TDB's and LIB's interactional abilities, which showed that measures of quanitity, such as overall number of questions asked, only differed marginally between the two children. However, exhaustivity of answers showed remarkable differences with TDB using more complex utterances and providing more and new information in dialogues than LIB. Furthermore, LIB violated Grice's communicative maxims and de Beaugrande and Dressler's (1981) principle of efficiency more frequently, requiring more effort from his interlocutors to maintain conversations. It was suggested that the differences in TDB's and LIB's interactional ability might be linked to LIB's awareness about his language difficulties and his resulting reluctance to initiate conversations (at younger ages).

For the assessment of bilingual children these findings imply that children with and without language impairment are likely to differ in their interactional behaviour. At younger ages, this difference seems to manifest itself in affected children's limited willingness to initiate and engange in friendly conversation. At older ages, the two groups appear to differ in the exhaustivity of their answers, requiring additional effort from their interlocutors to maintain conversations. These findings are reflected in questions 17 to 24 of the assessment grid. Questions 17 and 19 inquire about turn-taking behaviour and question 18 relates to the difference in quantity of utterances in the two groups of language learners, which was observed in some studies. Question 21 assesses exhaustivity of answers and questions 20, 22, 23 and 24 are

connected to a difference in general engagement, which was described in the systematic review presented in chapter seven of this thesis.

Sociocultural ability. The assessment of TDB's and LIB's sociocultural ability showed that they differed substantially on Theory of Mind, the variety of internal state terms they used and their social communication skills. It was suggested that LIB might not benefit to a similar extent from the bilingual advantage traditionally associated with Theory of Mind development, leading to more inappropriate language choices. Their divergent social communication skills are of particular interest in relation to recent studies re-evaluating the relationship between ASD and (specific) language impairment, which were traditionally regarded as strictly separate neurodevelopmental disorders. It became clear that language difficulties are likely to be closely related to social (communication) development as social development is heavily reliant on communication skills. These findings therefore support the interaction between all components of communicative ability and environmental influences, which is in line with the *Dynamic Model of Communicative Ability*. For the diagnosis of bilingual children, it seems like differences in Theory of Mind development might be indicative of language impairment and that affected children might display certain behavioural patterns which also occur in ASD. It will therefore be necessary to further investigate the exact relationship between ASD and language impairment, in order to understand the exact differences and overlaps, if misdiagnosis is to be prevented in the future. These findings are represented in questions 25 to 32 of the assessment grid. While questions 25 and 31 inquire about differences in ToM and inaccurate language choice that might be connected to it, questions 26, 27, 28 and 32 assess some of the behavioural patterns that have been found to co-occur in ASD and (S)LI. Finally, question 29 relates to differences int heir use of internal state terms.

Strategic ability. The analysis of TDB's and LIB's strategic ability further confirmed that TDB and LIB did not differ substantially in the overall number of communication strategies they used, but rather in the type of strategy they employed. While TDB opted for more target-language strategies, LIB

preferred code-switching and neologisms. The difference in their Theory of Mind or divergent levels of inhibitions have been proposed as potential explanations for their disparate use of communication strategies. For bilingual language acquisition the findings imply that communication strategies are an essential aspect of bilingual communicative ability. This is to say that the domain-specificity and potential imbalance of bilingualism entails the use of communication strategies in order to circumvent a breakdown in communication. However, the types of strategies used by bilingual children with and without language impairment appear to differ, potentially due to cognitive discrepancies. Consequently, it should be considered to include strategic ability in the assessment of bilingual children. An attempt to cover communication strategies as part of bilingual assessment is reflected in questions 33 to 40 of the screening tool.

Monitoring ability. Finally, the assessment of TDB's and LIB's cognitive abilities revealed that they differed most substantially on (verbal) working memory. This finding is in line with the *Dynamic Model of Communicative Ability*, which suggested that more general cognitive skills are intertwined with communication skills. Therefore, they are likely to be affected by language impairment. LIB's lower working memory skills relate to his lower performance on nonword and sentence repetition task, which test phonological working memory. Furthermore, his decreased working memory might influence his choice of reading and his preference for shorter texts. Consequently, his narrative abilities might have developed differently from TDB. Finally, working memory and inhibition are related, which could explain the difference in TDB and LIB with regard to code-switching and their general choice of communication strategies. This difference in working memory is further important in the diagnosis of bilingual children as the assessment of executive functions is likely to help disentangle other overlaps between typical and atypical bilingual development. This difference in their working memory is summarised in questions 41 to 48 in the screening tool. These questions are strongly influenced by some of the items on the BRIEF questionnaire, which assess metacognitive functions on which LIB and TDB differed most

substantially.

Overall, this prototype of a screening tool shows the attempt to create an assessment instrument which is more inclusive of general communication skills and which could potentially be used across various language combinations. As was already noted at numerous points in this conclusion, this grid would need to be trialled on a larger cohort, potentially spanning a variety of language combinations and amended accordingly.

For now, all that remains to say is to emphasise once more the importance of taking a holistic approach to the description, analysis and assessment of bilingual children and to treat them independently of monolingual norms. Hopefully this thesis has shed some more light on the distinct properties of bilingualism, disentangled some of the overlaps between typical and atypical bilingual development and highlighted where more research is needed to prevent the misdiagnosis of dual language learners in the future.

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Appendix A: Search Terms Systematic Literature Review

Boolean Search Phrase

(Specific Language Impairment OR Language Impairment OR Language Deficit OR Primary Language Impairment OR Language Learning Disability OR Language Learning Difficult* OR Language Learning Impairment OR Language Delay OR Language Disorder OR Developmental Dysphasia OR Developmental Language Impairment OR Developmental Language Disorder)

AND

bilingual OR dual language learner OR second language learner OR second generation OR immigrant OR first generation

AND

child OR preschool* OR pre-school* OR school child* OR scholchild*

NOT

treatment OR therapy OR intervention OR Mental retardation, child developmental disorders OR aspergers OR cleft lip OR palate OR OME OR hearing loss OR blindness OR stuttering OR aphonia OR pain OR crying OR analgesia OR reading OR dyslexia OR cerebral palsy OR AAC OR aged OR geriatrics OR animal OR aphasia OR monolingual OR adult

Appendix B: Systematic Literature Review - Data Extraction Form

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Altman, Armon-lotem, Fichman, & Walters, 2016	English-Hebrew	64-78mths (5;3-6;5)	Bi-LI (n=12) Bi-TD (n=19)	Mental state terms in MAIN narratives	sequential	MAIN narrative assessment	Hebrew & English
Differences			**Similarities**			**Comments**	
story length: Bi-TD>Bi-LI; L1 > L2 NDW: Bi-TD > Bi-LI; L1 > L2 MLCU & MLCUmax: Bi-TD > Bi-LI (MLCU trend toward significance, MLCUmax significant) General-purpose verbs (get/go): Bi-LI > Bi-TD pronoun instead of name: Bi-LI > Bi-TD (significant); L2 > L1 tense inflection: Bi-TD > Bi-LI (omission of –ed & frozen irregular forms) MST: L2 > L1 consciousness terms: L1 > L2			macrostructure (goal, attempt, outcome): Bi-TD = Bi-LI; L1 = L2 agreement mismatches in pre-subject copula: Bi-TD = Bi-LI (E: sing for pl, H: masc for fem) preposition errors: Bi-TD = Bi-LI				
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Blom, De Jong, Orgassa, Baker, & Weerman, 2013	Turkish-Dutch	6-8yrs. Mono-TD -2yrs.	Mono-TD (n=31) Mono-LI (n=23) Bi-LI (n=20) Bi-TD (n=20)	Verb inflection	sequential	Elicitation task with picture prompts	Dutch
Differences			**Similarities**			**Comments**	
Bi-TD > LI: overall accuracy Bi-TD > LI: bare verbs Bi-TD > LI: substitution of inflection			Bi-TD = Bi-LI: more inaccuracies in 3SG than 3PL			Frenquency of verb inflection errors seems to distinguish between TDB and LIB.	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Blom & Paradis, 2013	Cantonese/Mandarin/Vietnamese/Arabic/Assyrian/Gujarati/Portuguese/Punjabi/Somali/Spanish/Urdu – English (Western Canadian)	5-6 yrs.	Bi-TD (n=24) Bi-LI (n=24) Matched in language & age pairs (range 4 months)	past tense production (regular & irregular)	sequential	Past tense probe from *Test of Early Grammatical Impairment* (Rice & Wexler 2001) *Peabody Picture Vocabulary Test* (Dunn & Dunn 1997)	English (home language assessed using *Alberta Language Development Questionnaire* (ALDeQ)

Differences	Similarities	Comments
Bi-TD > Bi-LI: overall accuracy, overall tense marking (when outlier removed, difference significant) use of overregularisation tense marking more frequent in Bi-TD with inflecting L1, larger receptive vocab & higher frequency verbs Bi-TD fewer errors with allomorph /d/ than /t/ vs. Bi-LI fewer errors with /t/ than /d/	Bi-TD = Bi-LI: irregular past tense inflection Past tense accuracy was predicted by vocabulary size, L1 & word frequency for Bi-TD & Bi-LI Regular past tense marking was more often omitted after alveolar stops & irregular verbs ending in alveolar stop were overreularised less often.	Target-like responses, overregularisations & double past tense marking were counted as correct as they indicate ability to use past tense (p. 287) Omission was counted as incorrect

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Blom & Paradis, 2014	Cantonese/Mandarin/Vietnamese/Arabic/Assyrian/Gujarati/Portuguese/Punjabi/Somali/Spanish/Urdu – English (Western Canadian)	5-6yrs.	TD-Bi (24) TD-LI (24) – matched in language & age pairs (range 4 months)	Tense inflection; 3rd person singular *–s* & regular past tense *-ed*	sequential	Picture elicitation from *Test of Early Grammatical Impairment* (TEGI) screener (Rice & Wexler 2001)	English (home language assessed using *Alberta Language Development Questionnaire* (ALDeQ)

Differences	Similarties	Comments
Bi-TD > Bi-LI: overall accuracy, 3rd person singular *–s* & past tense *–ed* collapsed & separately Bi-TD & Bi-LI (inflecting L1) > Bi-TD & Bi-LI (isolating L1) Bigger difference between Bi-TD (inflecting) & Bi-TD (isolating) than Bi-LI (inflecting) & Bi-LI (isolating) → properties of L1 less significant for Bi-LI Exposure to L2 stronger effect on Bi-TD; Bi-TD with more exposure performed better than Bi-TD with less exposure; first effect after 15 months and again after 18 months Age effect stronger for Bi-LI; At 46 months, LI group with older AoA performed better than LI group with lower AoA	Group, age, exposure & L1 type reliable predictors of performance but not in the same way for Bi-TD & Bi-LI Bi-TD & Bi-LI: later AoA & more exposure → fewer errors BUT larger effect of exposure on Bi-TD group	Within older LI group, children with more than 19 months exposure performed better than group with less exposure. Bi TD; L1 important after 15 months of exposure (inflecting > isolating)

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Brice, A. Montgomery, 1996	Spanish-English	11-14	Bi-TD (n=25) Bi-LI (n=15)	Pragmatic skills	sequential	Adolescent Pragmatic Screeening Sclae (APSS; Brice 1992) by teachers & SLTs	English
Differences			**Similarities**			**Comments**	
Bi-TD > Bi-LI: initiates & maintains conversation, cues listener regarding topic shift, expresses self, establishes greetings, listens actively & total score (in order of difference)							
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Damico JS, Oller JW, 1983	Spanish-English	6;4-8;3 yrs	Bi-LI (n=7) Bi-TD (n=3)	Grammar & pragmatics	sequential	Spontaneous speech; morphosyntactic & pragmatic analyses	English & Spanish
Differences			**Similarities**			**Comments**	
Bi-LI > Bi-TD: pragmatic performance Bi-LI > Bi-TD: academic improvement from T1 to T2						Pragmatic criteria were more effective than traditional surface-oriented criteria in identifiying language disorders (p. 392)	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Jacobson & Schwartz, 2002	Spanish-English	TDB (4;1–5;0) LIB (4;2-5;4) Exposure to L2 – 1 years prior to experiment	Bi-TD *(n=10)* Bi-LI *(n=10)*	Morphology – clitic pronouns used as direct objects with finite verbs	Sequential (incipent – first language contact)	Verb Tense Color Cards (1994)	Spanish
Differences			**Similarties**			**Comments**	
Bi-TD > Bi-LI: Bi-TD use clitic pronouns more frequently Bi-LI: more gender substitutions and more use of unmarked form (lo)						COMMUNICATION STRATEGY – lo instead of la/le/les ?	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Jacobson & Schwartz, 2005	Spanish-English	7;0-9;0	Bi-TD *(n=15)* Bi-LI *(n=11)*	Past tense morphology	sequential	Elicited speech	English

Differences	Similarities	Comments
Bi-TD > Bi-LI: overall accuracy Bi-LI better at irregular forms & novel verbs Bi-TD better at regular forms Bi-LI Omission vs. Bi-TD Commission Bi-TD > Bi-LI: later developing forms (progressive, present and past subjunctive) BI-TD > Bi-LI greater verb variety	Bi-TD = Bi-LI most common error type – bare stems Bi-TD = Bi-LI: early developing tense forms (present indicative, preterite, simple future, imperfect)	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Gibson, Peña, & Bedore, 2014	Spanish-English	7-10	Bi-TD (n=37) Bi-LI (n=37) 2 comparison groups: English dominant/Spanish dominant (n=61)	Expressive-receptive gap semantic knowledge; categories, functions, characteristic properties, associations, definitions, similarities & differences, analogies	mixed	Parent and teacher interviews *Bilingual English-Spanish Assessment – Middle Extension* (BESA-ME: Pena, Bedore, Gutierrez-Clellen, Iglesias & Goldstein, 2010) testing	Spanish & English

Similarities	Comments	
Bi-TD > Bi-LI: overall score Bi-LI bigger gap (12 standard score pts) than Bi-TD (5pts)	higher score on receptive than expressive tasks & higher scores in overall Spanish Significant receptive-expressive gap in English, not Spanish	For Bi-TD AoA only significant predicting variable For Bi-LI current exposure only significant predicting variable

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Gillam, Pena, Bedore, Bohman, & Mendez-Perez, 2013	Spanish-English	5 yrs.	Bi-TD (n=145) Bi-LI (n=21)	specificity & sensitivity of EpiSLI criteria (Tomblin, Records & Zhan 1996) assessing picture vocab., relational vocab., oral vocab., gramm. understanding, sentence imitation & gramm. complet.	sequential	*Test of Language Development-Primary: 3rd ed.* (TOLD-P;3 Newcomer & Hammill, 1997) & *Test of Narrative Language* (TNL; Gillam & Pearson, 2004) – re-narration	English & Spanish
Differences			**Similarities**			**Comments**	
Adapted criterion level below .18 likely to be LIB, above criterion level likely to be TDB			Original EpiSLI criteria (standard score of 6.25 or less on two or more composites) yielded sensitivity of .95 and specificity of .45 → overdiagnosis of Bi-TD			None oft he nine subtests alone could reliably distinguish between Bi-LI and Bi-TD. (p.1818)	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Jacobson & Livert, 2010	Spanish-English	7-11 yrs. 3rd-6th grade	Bi-LI (n=10) younger Bi-TD & Bi-LI (Jacobson, 2005)	English past tense		elicitation task using videos (regular, irregular & novel past tense)	English
Differences			**Similarities**			**Comments**	
older Bi-LI > younger Bi-LI younger Bi-TD > older Bi-LI younger Bi-TD > older Bi-LI: morphological productivity older Bi-LI produce more bare stems in irregular verbs than younger Bi-TD older Bi-LI produces more overregularisations than younger Bi-LI but fewer than younger Bi-TD.						Accuracy rates varied considerably (0/12-12/12)	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Jacobson, 2011	English-Spanish	5-11yrs. (1st-2nd 3rd & 6thgrade)	Bi-TD (n=25) Bi-LI (n=20)	object clitic pronouns & verb inflection	sequential	elicitation task designed by author using video recordings	Spanish
Differences			**Similarities**			**Comments**	
Bi-LI: more OCP omissions Bi-TD > Bi-LI: gender assignment in preverbial context & numeracy accuracy pre-v & post-v Bi-TD > Bi-LI: overall in pre-v & post-v context Bi-TD > Bi-LI (higher grades): verb forms matching target Bi-TD > Bi-LI (higher grades): higher accuracy in person marking Bi-TD > Bi-LI: higher overall accuracy in inflection			Bi-TD = Bi-LI: higher accuracy in higher grades on preverbal number & gender accuracy Bi-TD = Bi-LI (lower grades): verb form matching target Bi-TD = Bi-LI (lower grades): person errors in verbs Bi-TD = Bi-LI: more accurate masculine than feminine gender assignment & preference for singular forms Bi-TD = Bi-LI: proportion of "near-miss" errors (one out of two properties correct; e.g.: number/gender)			
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Jacobson & Walden, 2013	Spanish-English	8 yrs.	Bi-TD (n=26) Bi-LI (n=22)	Lexical diversity & omission errors	sequential	narrative re-tell task based on frog story (Mayer, 1969 & Mayer, 1967)	English & Spanish
Differences			**Similarities**			**Comments**	
Bi-TD > Bi-LI: grammaticality in English & Spanish (more word/morpheme omission in Bi-LI) English & Spanish omission of words & bound morphemes best predictor of LI			Bi-LI = Bi-TD: NDW-English & Spanish – less overlap in older ages Bi-LI = Bi-TD: VocD-Spanish, only marginal difference in English VocD Lexical diversity not a good predictor of LI			VocD did not add any essential information that was not obtained from NDW.	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Juarez, 1983	English-Spanish	5;6-6;6	Bi-TD (n=6) Bi-LI (n=6)	Phonological and morphosyntax	sequential	Elicitation of sponanteous speech Formal tests of phonology, morphology, syntax	English-Spanish
Differences			**Similarities**			**Comments**	
Bi-TD > Bi-LI: overall accuracy			Few qualitative differences			No full text available!	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Lee & Gorman, 2008	Korean-English	Bi-LI 7;2 Bi-TD (age) 7;3 Bi-TD (MLU) 4;6 Mono-TD 7;3	Bi-LI (n=1) Bi-TD (n=3)	Korean case particles	sequential	Formal tests narratives spontaneous speech	Korean
Differences			**Similarities**			**Comments**	
Bi-TD (age) & Mono-TD > Bi-LI: overall accuracy Bi-TD (MLU) code-switched more than all other groups (including Bi-LI) Bi-LI consistently omitted accusative for object particle (less salient & shorter)			Bi-LI = Bi-TD = Bi-TD (MLU) = Mono-TD: correct nominative for person & vocative Bi-LI = Bi-TD (MLU): nominative for object (omission) → after question paraphrase Bi-LI: wrong morpheme Bi-LI = Bi-TD (MLU): omission of accusative case particles All groupd produced vocative case particles correctly			Bi-LI's performance differed in formal testing & narrative; better performance in narrative (no unusual or nondevelopmental patterns) Saliency & item frequency suggested as possible explanations	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Merino, 1983	English-Spanish	3-8 (mono) 5-8 (bi)	Bi-LI (n=22) Bi-TD (n=22) Mono-TD (n=50)	Syntax articulation	sequential	Formal tests Spontaneous speech (narrative) Parental questionnaire interviews	English-Spanish (focus on Spanish)
Differences			**Similarities**			**Comments**	
Significant differences between Bi-TD & Bi-LI Bi-TD > Bi-LI: passive & optative subjunctive, contrafactuals, long plurals, number in verb phrase & gender in direct object pronoun Bi-TD > Bi-LI: articulation, particularly consonant clusters Different order of difficulty of grammatical morphemes			No significant differences in comprehension Types of errors produced by Bi-TD similar to L1 learners			Only comprehension of lexis was tested, using a choice oft wo pictures	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Orgassa, 2009	Turkish-Dutch	6-8 yrs.	Bi-TD (n=20) Bi-LI (n=20) Bi-TD (adult) (n=9) Mono-TD (y.)(n=20) Mono-TD (old) (n=24) Mono-LI (n=25)	Dutch inflection Determiner Agreement	sequential	Inflection in Language Production (FlexiT; Blom, Orgassa and Polisenska 2008)	Dutch

Differences	Similarities	Comments
Mono-LI & Bi-TD: avoid V2 more often, use dummy auxiliaries and RIs Mono-LI & Bi-TD produce more omissions and –t endings Mono-LI & Bi-LI: higher error frequency in verb inflection Mono-LI & Bi-LI: more omission of determiners and overgeneralisation of common determiner Mono-LI make better use of morphological cues for gender than Bi-LI	All child groups score relatively highly on finitie verb positioning No large differences in error types in verb inflection were found betweenn Bi-TD & Mono-TD and Bi-LI and Mono-LI All child groupd overgeneralised *–e* adjective ending but not bare adjective (apart from few Bi-TD) Neuter particularly problematic for Bi-TD, Bi-LI & Mono-LI	Either longer optional infinitve phase or avoidance of more complex structures due fo higher processing demand

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Pena, 2000 *Study 1*	English-Spanish	3-8 4-10	Mono-S (n=3) Mono-E (n=22) Bi-E&S (n=25) Of these LI (n=9)	Modifiability (planning, attention to task/discrimination, motivation, transfer, responsivity & examiner effort)	mixed	Mediated Learning Experience Dynamic Assessment EOWPVT & Comprehension subtest of CSSB as baseline	Child's preferred language

Differences	Similarities	Comments
TD > LI: modifiability (overall & subscales)	LI and TD did not differ on baseline measures LI and TD do not differ in motivation	**No information on exact number of Bi-LI & Bi-TD available**

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Pena, 2000 *Study 2*	English-Spanish	3-9 4-9	Mono-E (n=31) Mono-S (n=6) Bi-E&S (n=18)	Modifiability (planning, attention to task/discrimination, motivation, transfer, responsivity & examiner effort)	mixed	Mediated Learning Experience Dynamic Assessment EOWPVT-R, CSSB PLS-A (based on Zimmermann et al.1978) Learning Strategies Checklist	Child's preferred language

Differences	Similarities	Comments
TD > LI: modifiability	TD and LI do not differ in measures of motivation	Study suggests that measures of modifiability may distinguish accurately between LI and TD from linguisticall diverse backgrounds

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Peña, Gillam, & Bedore, 2014	Spanish-English	5yrs.	Bi-TD (n=18) Bi-LI (n=18) Comparison (n=18)	Dynamic assessment of narratives (setting, dialogue, complexity of vocabulary) & modifiability (compliance, metacognition, task orientation)	mixed	Dynamic Assessment Narratives (Two Friends & Bird And His Ring; Miller 2000)	English
Differences			**Similarities**			**Comments**	
Bi-TD > Bi-LI: number of grammatical utterances Bi-TD > Bi-LI: modifiability & story scores			No significant effect for group or pre-/post-test for NDW, TNW, MLUw Bi-TD = Bi-LI: anxiety, nonverbal self-reward, verbal mediation and responsiveness to feedback				
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Restrepo, 1998	English-Spanish	5-7 yrs.	Bi-TD (n=31) Bi-LI (n=21)	vocabulary novel bound-morpheme learning language form	sequential	formal tests spontaneous speech parent interview	Spanish
Difference			**Similarities**			**Comments**	
parental report, family history of LI, mean length of T-unit & errors per T-unit differentiated between Bi-LI and Bi-TD level of accuracy maintained with parental report & number of errors only			No significant differences in Spanish bound morpheme score				
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Roseberry & Connell, 1991	Spanish-English	5-6yrs.	Bi-TD (n=13) Bi-LI (n=13)	rule-learning ability	sequential	formal testing invented language rule	English
Differences			**Similarities**			**Comments**	
Bi-TD > Bi-LI: rule learning ability Bi-LI: predomantly omission errors							

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Sanz-Torrent, Serrat, Llorenc;, & Serra, 2008	Spanish-Catalan	3-5 3;9 & 4;9	Bi-TD (MLU) (n=6) Bi-TD (age) (n=6) Bi-LI (n=6)	verb morphology	mixed	spontaneous speech recordings at 2 time points (1 year difference)	Spanish/Catalan/bilingual mode (according to child's preference)

Differences	Similarities	Comments
<u>Time 1 (3;9):</u> Bi-TD (age&MLU) > Bi-LI: mean of (different) verbs B-TD (age&MLU) > Bi-LI: use of future and conditional & plural <u>Time 2 (4;9):</u> Bi-LI frequent use of non-finite forms (infinitives) Bi-LI > Bi-TD (MLU): gerunds Bi-LI: most frequent from present indicative Bi-LI (MLU) > Bi-TD: overall number of errors	<u>Time 1 (3;9)</u> Distribution of infinitives & gerunds in Bi-TD (age) & Bi-LI Difference in use of past tense not statistically significant Bi-LI = Bi-TD: distribution of person (3rd-1st-2nd) No bare verb stems in either group <u>Time 2 (4;9)</u> Overall low use of gerunds Bi-TD (age) = Bi-LI person markers Distribution of number markers no longer differed	Omission-commission does not seem tob e valid marker in Spanish-Catalan bilinguals Bi-LI verb production (type & topken), verb tenses incresed considerably between T1 and T2 T1: overall poor performance ofr Bi-Li T2: emergence of verb forms and distinct error patterns

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Sheng, Pena, Bedore & Fiestas, 2012	English-Spanish	7;0-9;10	Bi-TD (n=37) Bi-LI (n=37)	semantics	sequential	3 associations to 12 translation equivalents (paradigmatic, syntagmatic, errors)	English & Spanish

Differences	Similarities	Comments
Bi-TD > Bi-LI: semantic depth scores significantly lower for Bi-LI Demantic deficits in 65% of Bi-LI and 14% of Bi-TD Bi-LI: more no response" Bi-LI: more code-switches from English to Spanish, Bi-TD reverse → higher success rate for Bi-TD	Bi-TD = Bi-LI: higher conceptual scores than single language scores, decrease in semantic depth & paradigmatic responses and increase in errors over multiple elicitations No response most common error	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Sheng, Bedore, Peãa, & Taliancich-Klinger, 2013	Spanish-English	7;0-9;11	Bi-TD (n=37) Bi-LI (n=37) Normative sample (n=112)	semantic convergence	sequential	Formal testing (semantic associations to 24 words – 12 translation equivalents)	English & Spanish

Differences			Similarities			Comments	
Bi-LI generate significantly fewer most frequent associations (7%) than Bi-TD (15.2%) Bi-TD generated same response for numerous stimuli – indication of hub words						Convergent semantic representation is a requirement for succesful communication	
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Simon-Cereijido, Gabriela. Gutierrez-Clellen, 2007	Spanish-English	4-5yrs.	Bi-TD (n=5) Bi-LI (n=6)	language markers (MLUW, UNGRAMM, ART, VERB, CLIT, THEME, DITR)	mixed	spontaneous speech based on narratives	Spanish
Differences			**Similarities**			**Comments**	
Overall score differentiated between Bi-LI and Bi-TD Combination of GRAMM & MLUW distinguished with fair specificity and sensitivity Combination of ART, CLIT & VERB distinguished well Two modelst o distinguish Bi-LI from Bi-TD: morphological model (correct % verbs, articles, clitics) OR semantic-syntactic model (MLUW, theme omission, use of di-transitive verbs) fair sensitivity & specificity			Neither VERB nor ART nor CLIT differentiated adequately in isolation MLUW, DITR & THEME fair sensitivity but inadequate specificity No grammatical features in isolation could accurately distinguish the two groups				
Reference	**Languages**	**Age**	**Subjects**	**What?**	**Bilingual Type**	**How?**	**Languages tested**
Verhoeven, Steenge, & van Balkom, 2011	Dutch-Turkish/Moroccan-Arabic/Berber	7 & 9 yrs	Mono-TD (n=12) Bi-TD (n=12) Mono-LI (n=12) Bi-LI (n=12) Bilinguals exposure to L2 since 4yrs (start of primary school)	Verb morphology	sequential	narratives	Dutch

Differences	Similarities	Comments
TD > LI: length of utterances 9yrs > 7yrs: MLU TD > LI: grammaticality 9yrs > 7yrs: 7yrs more ungrammatical TD > LI: LI more omission errors 9yr > 7yr: 7yr more omission Bi-TD&Bi-LI < Mono-TD&Mono-LI: sing for pl substituation 9yrs > 7yrs: subst Mono-TD > Mono-LI: past tense omission	Bi-TD&Bi-LI>Mono-TD&Mono-LI: story length Bi-LI = Bi-TD: past tense omission	Bi-LI in additionally disadvantaged position reg. Acquisition of Verb mophology

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Orgassa & Weerman, 2008	Turkish-Dutch	Mono-TD: 4;0-5;11/ 6;2-7;11 Mono-LI: 6;1-8;0 Bi-TD: 6;3-8;5 Bi-LI: 6;0-8;3 Bi-TD(Adult): 22-36	Bi-LI (n=20) Bi-TD (n=19) Mono-TD (n=32) Mono-LI (n=25) Bi-TD (Adults) (n=9)	Verb position & inflection	sequential	*FlexiT `Inflection in language production' (Blom, Orgassa, and Polisenska 2008)* Subject-verb agreement Verb placement Determiner-adjective-noun agreement Determiner-noun agreement Subject-verb agreement	Dutch

Differences	Similarities	Comments

Bi-TD (Adults) make more placement errors than Bi-LI. Bi-TD > Bi-LI verb placement, particularly XVS & SXV, less significant in SVX Bi-LI use more SVX – less processing demand **Verb inflection:** Bi-LI & Bi-TD high accuracy (75% and 90% correct) - Bi-LI > omission LIB > TDB: LIB uses bare nouns more regularly TDB > LIB: het (TDB produces neuter gender more regularly) LIB > TDB: more –e substitution errors LIB > TDB: overall error frequency	Neither Bi-LI nor Bi-TD result in Bi-TD (Adult) patterns TDM (young) = TDB: determiner agreement TDB & LIB produce bare nouns while TDM and LIM replace determiner Better performance with morphological cues (e.g.: diminutives) than with root neuter nouns TDB = LIB: more word final omission (bare adjectives) than LIM & TDM

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Gutiérrez-Clellen & Simon-Cereijido, 2007	Spanish-English	5yrs.	TD (n=59) LI (n=52) (mix of mono and bi-no further specification)	possessives, 3rd person singular, regular & irregular past tense, plurals, copula, auxiliary, negation, passive voice complex sentences (adverbial & relative clauses & conditionals)	mixed	E-MST (cloze & sentence repetition)	English

Differences	Similarities	Comments
Cut off score of .61 correctly distinguished Bi-TD and Bi-LI in south-western sample.	Cut off score of .61 did NOT distinguish accurately between Bi-TD and Bi-LI in north-eastern sample Both NE Bi-TD and Bi-LI scored particularly low on possessives, 3rd person sing. & passives → even when re-scored, inadequate classification accuracy remained.	Results not only influences by LI vs. TD but also by region.

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Gutiérrez-Clellen, Simon-Cereijido, & Wagner, 2008	English-Spanish	4;5-6;5	Mono-TD *(n=15)* Mono-LI *(n=13)* Bi-TD *(n=16)* Bi-LI *(n=11)* EL2 *(n=16)* (learners)	Finite verb morphology & subject use	mixed	*Narratives*	English
Differences			**Similarities**			**Comments**	
TDB > LIB: verb finiteness (TDB more accurate) TDB > LIB: subject use EL2 > subject use < verb finiteness			EL2 = LIB: 3rd pers. Sing., auxiliary BE, DO & copular verbs – omission of past tense & wrong past tense of BE & DO not as common			Profiles of EL2 and LIB more similar than TDB and LIB (effect of length of exposure/proficiency?)	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Eng & O'Connor, 2000	Spanish-English	Bi-TD(3;0-4;7) Bi-LI (3;1-4;9)	Bi-TD (n=20) Bi-LI (n=20)	Definite Article + Noun Agreement	sequential	*Grammaticality judgement* *Grammar elicitation*	Spanish
Differences			**Similarities**			**Comments**	
Bi-TD > Bi-LI: expressive –el, receptive –la, receptive –el in regular feminine (-la) and masculine (-el) endings; expressive & receptive –el/-la and regular f&m words with consonant endings TDB > LIB: expressive & receptive irregular forms (e.g.: el mapa) – larger group effect for masculine irregulars			Bi-TD = Bi-LI: acquisition order; regular, to consonant endings to irregular*f*				

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Restrepo & Kruth, 2000	English-Spanish	6;6 /7;0	Bi-TD *(n=1)* Bi-LI *(n=1)*	grammar	sequential	*Spontaneous speech samples;* story retell, play, informal conversation	English & Spanish
Differences			**Similarities**			**Comments**	
English: MLU: Bi-LI (5.7) > Bi-TD (7.1) Errors: Bi-TD (0.28/utterance) < Bi-LI (1.5) Bi-TD > Bi-LI: definite articles, 3rd person –s & uncontractible auxiliary – Bi-LI omitted article or			**English** Bi-TD = Bi-LI: mastery of plural –s & progressive –ing Bi-TD = Bi-LI: 90% accuracy of indefinite articles, uncontractible & copular be			Discrepancy between Diana's test performance and actual competence of copular "be" – less consistent!! (test only required 3rd person; less consistency with increased variety)	

substituted Spanish for English (le) Bi-TD > Bi-LI: variety of verb types, sentence types, prepositions, pronouns Bi-LI: substitues „in“ for „on“ BI-TD > BI-LI: object, demonstrative, relative pronouns BI-LI > BI-LI: past progressive, past perfect, periphrastic (i.e.: going to) future, gerund forms – 60% correct vs. None used BI-TD > BI-TD: irregular past tense (76.5% correct vs. 11%) Bi-TD > Bi-LI: sentence complexity: Bi-LI – 83% simple, 7% conjoined, 10% complex; Bi-TD – 21% simple, 56% conjoined, 13% complex BUT Bi-LI's complex sentences only 2 clauses, Bi-TD 2-4 clauses & Bi-LI's contained morphosyntactic errors	Bi-TD = Bi-LI: partial mastery of contractible auxiliary Bi-TD = Bi-LI: pronouns – “in, with, up“ Bi-TD = Bi-LI: possessive & personal pronouns Bi-TD = Bi-LI: present simple, present progressive Bi-TD = Bi-LI: correct simple past tense marking (81% vs. 50%) – even below in subsequent sessions	As in my study, sentence complexity alone no sufficient indicator but grammaticality is.
Spanish *MLU*; Bi-TD (5.49/na) > Bi-LI (3.18/1.96) *Sentence complexity*: Bi-TD > Bi-LI: Bi-TD (71% simple – 24% complex) Bi-LI (99% simple – 1% complex/100%simple) *Articles*: Bi-TD > Bi-LI; Bi-LI 6%/33%accuracy – subtitution „el“ for „le“ (in masc. Sing & pl) & overgeneralisation (masc for fem) *Prepositions*: BI-TD > Bi-LI: Bi-TD uses variety correctly, Bi-LI: “para“ (100% correct), cpn (50%), de & en (0%) *Type & accuracy of pronouns*: Bi-TD > Bi-LI: Bi-TD 4 pronouns – 48 occasions; Bi-LI 3 on 7 occasions (85% accuracy)/2 on 6 (75%) *Verb use*: BI-TD > Bi-LI; BI-TD 100% past tense LIB: 82% correct past tense		

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Rothweiler, Chilla, & Babur, 2010	Turkish-German	Bi-TD-1: (3;1) Bi-TD-2 (6;2) Bi-LI-1 (6;5) Bi-LI-2 (5;5) Mono-TD (2;5)	Bi-TD *(n=2)* Bi-LI *(n=2)* Mono-TD *(n=1)*	Case morphology	Sequential (age of onset – 3yrs)	*Spontaneous speech samples (40 minutes each)*	Turkish

Differences	Similarities	Comments
Bi-TD > Bi-LI: Bi-TD produce more contexts for and realisations of "instrumental"; LIB ≤ 0	Bi-TD= Bi-LI: produce comparable number of case morphemes	Accuracy for Bi-TD > 3yrs reaches 100% Mono-TD – 73.1%
Bi-TD > Bi-LI: overall accuracy (15% errors vs. 5.6%) Bi-TD > Bi-LI: dative & accusative	Mono-LI: uses all but lower number	More commission in older Bi-TD and omission in Bi-LI and Mono-TD
Bi-TD ≠ Bi-LI: commission vs. Omission BI-TD ≠ Bi-LI: substitution errors until age 3 vs. Until age 5-6	BI-LI = Mono-LI: omission errors	Bi-TD acquire case morphology like Mono-TD (Turkish)

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Clahsen, Rothweiler, Sterner, & Chilla, 2014	Turkish-German	4;8-7;11 MLU: 2.3-4.1	Bi-TD *(n=6)* Mono-LI *(n=6)* Bi-LI *(n=6)*	Past participle morphology	sequential	Spontaneous speech & picture elicitation	German

Differences	Similarities	Comments
Bi-TD > Bi-LI: accuracy by participle type *(-t:* 53.75% vs. 82.72%; *-n:* 51.62% vs. 64.0%) Bi-TD > Bi-LI: Bi-LI more omission of -t	Bi-TD = Bi-LI = Mono-LI: accuracy in *–t* contexts higher than in *–n* contexts (*-n*: TDB: 98.50%/LIM: 99.63%/ 95.80% -t: TDB: 87.68%/LIM: 84.30%/LIB: 88.68%) Bi-TD = Bi-LI = Mono-LI: incorrect *–n* forms extremely rare for all participants Bi-TD = Bi-LI = Mono-LI: overapplication of *–t* for *–n* more common Bi-TD = Bi-LI = Mono-LI: 0 suffix more common in *–n* contexts Bi-TD = Bi-LI = Mono-LI: *ge-* prefixation	NOTE: _n ending occurs on past participle of irregular (so-called "strong") verbs in German, and the _t ending on participles of all other verbs Overapplication of –t attributed to different morpho-lexical representation and/or higher frequency (e.g.: Clahsen & Rothweiler 1993)

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Håkansson, Salameh, & Nettelbladt, 2003	Swedish-Arabic	4-7yrs.	TBi-TD *(n=10)* Bi-LI *(n=10)*	Grammatical development	Sequential	Elicitation test in Swedish & Arabic developed for this study	Swedish & Arabic

Differences	Similarities	Comments
Bi-LI – low level of development of grammatical morphology in both languages Bi-TD – at least one language well developed		

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Salameh, Håkansson, & Nettelbladt, 2004	Arabic-Swedish	Bi-TD (3;11-6;7) Bi-LI (3;10 – 6;7) AoO L2 with pre-school entry	Bi-TD *(n=10)* LBi-LI *(n=10)*	Swedish processability	sequential	Longitudinal; 3 sittings (processability): Elicitation tasks; *The Lund Test of Phonology and Grammar (Holmberg and Stenkvist 1983);* *The Swedish Test of Language Comprehension (SIT) (Hellquist 1989)*	Swedish & Arabic

Differences	Similarities	Comments
Bi-TD > Bi-LI: *Lund Test* (1. 16.5% vs. 50.9% 2. 30.1% vs. 55.1% 3. 42.9% vs. 64.2%) – not significant. Bi-TD > Bi-LI: SIT (1. 55.7% vs. 72% 2. 67.4% vs. 83.3% 3. 75.4% vs. 88.7%) Bi-TD ≠ Bi-LI: quantity and variety of non-target structures Bi-TD > Bi-LI: Bi-TD progresses faster	Bi-TD = Bi-LI: better performance on comprehension than production Bi-TD = Bi-LI: majority of most used non-target structures BI-LI = Bi-TD: they progress in implicational order – slow progress clear sign of LI	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Girbau & Schwartz, 2008	Spanish-English	9yrs	Bi-TD (n=11) LI Bi-LI (n=11)	Phonological working memory	sequential	auditory non-word repetition task using Spanish phonotactic patterns	„Spanish“ (nonwords but Spanish phonotactic patterns)

Differences	Similarities	Comments
Bi-LI: Fewer correct non-words & length effect in 3-4-5 syllable words & more consonant substituation and omission	More consonant than vowel errors	Strong correlation of nonword performance & ITPA subtest score

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Thordardottir & Brandeker, 2013 *Study 1*	French-English	5 yrs.	TDM-E (n=16) TDM-F (n=19) TDB (n=49) with varying exposure	Effect of exposure on auditory processing	simultaneus	NWR SR	English/French

Differences	Similarities	Comments
NWR & SR correctly distinguish between TD and LI in mono-and bilingualism TDB outperform LIB on NWR and SR	NWRS & SR (but particularly NWR) less affected by exposure than lexis	NWR distinguishes accurately between TDB and LIB even with little exposure

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Thordardottir & Brandeker, 2013 *Study 2*	French-English	5 yrs.	TDB (n=14) LIB (n=14) LIM-F (n=14) TDM-F (n=14)	NWR and SR as differentiation between TDB and LIB	simultaneous	NWR SR	French

Differences	Similarities	Comments
TDB outperform LIB on NWR Length of NW only affects LI groups significantly	Vocabulary score only differentiates between LIB and TDM Does not distinguish between LIM and TDB	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Tsimpli, Peristeri, & Andreou, 2016	Albanian/Bulgarian /English/Romanian/Ukrainian/German-Greek	9;1	Bi-TD (n=15) Bi-LI (n=15) Mono-TD (n=21) Mono-LI (n=21)	Narrative production	sequential	MAIN Narrative assessment	Greek

Differences	Similarities	Comments
sentence rep: Bi-TD & Mono-LI > Bi-LI = Mono-LI backward digit recall: Bi-TD & Mono-TD > Bi-LI & Mono-LI lexical diversity: Mono-TD, Mono-LI & Bi-TD > Bi-LI use of subordniation: Bi-TD > Mono-TD & Bi-LI ISTs: Mono-TD & Bi-TD > Mono-LI & Bi-LI +ToM-related ISTs: Bi-TD > Mono-TD & Bi-LI / Mono-TD > Mono-LI story structure: Bi-TD & Bi-LI > Mono-TD & Mono-LI	expressive vocab: Bi-TD = Bi-LI (Mono-TD > Mono-LI) -ToM-related ISTs: Bi-TD = Mono-TD, Bi-LI = Mono-LI +ToM-related ISTs: Mono-LI = Bi-LI story structure: Bi-TD = Bi-LI	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Windsor, Kohnert, Lobitz, & Pham, 2010	English & Spanish	8-9 *yrs.*	Bi-TD *(n=65)* Bi-LI *(n=19)* Mono-TD *(n=69)* Mono-LI *(n=34)*	Phonological processing	sequential	Nonword repetition tasks	English & Spanish

Differences	Similarities	Comments
Bi-TD & Mono-TD > Bi-LI & Mono-LI: English NWR Bi-TD & Mono-TD > Bi-LI & Mono-LI: Spanish NWR BI-TD > Bi-LI: L1 & L2 – longer words		LIB higher accuracy in Spanish than English TDB score 11 times more likely to get a score over 80% in E NWR than LIB

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Gutierrez-Clellen, Simon-Cereijido, & Erickson Leone, 2009	Spanish-English	6 yrs	Bi-TD (n=40) Bi-LI (n=18)	Code-switching	Early sequential (start of preschool)	Narratives (tell & re-telling) & elicited spontaneous speech	English & Spanish

Similarities	Differences	Comments
No significant differences (quantitative or qualitative)	Overall low percentage of CS (6.5%) Similar number for LI and TD Mostly nouns & conjunctions for both groups Fewer CS in dominant language No difference in bound morpheme constraint	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Iluz-Cohen & Walters, 2012 *Study 1*	English-Hebrew	5;0-7;5	Bi-TD (n=8) Bi-LI (n=9)	Narratives	sequential	Study 1: Spontaneous narrative based on familiar stories (*Jungle Book*, *Goldilocks and the Three Bears*) Study 2: Three stories in L1/L2 and bilingual mode	English & Hebrew

Differences	Similarities	Comments
Bi-TD > Bi-LI: number of words, word types, type/token ratio, number of content words, different content words, number of function words, total and percent of utterances which contained verbs, and MLU. Omission of prepositions and articles more CS in Bi-LI	Intact narrative structure	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Iluz-Cohen & Walters, 2012 *Study 2*	English-Hebrew	5;3	Bi-TD (n=14) Bi-LI (n=6)	Narratives	sequential	Study 2: Narratives differing in sociolinguistic domains; home/school/doctor) to be told to puppets	English & Hebrew & bilingual mode

Difference	Similarities	Comments
BI-TD longer stories than Bi-LI (particularly in CS condition) Overall more CS in BI-LI than Bi-TD LI twice as many CS for N/NP Bi-TD > CS: L1-L2 (38 vs 31) BI-LI > CS: L2-L1 (63 vs 30)	More CS in monolingual (translation) home/school setting than in bilingual story	Tests bilingual mode !!!

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Squires et al. 2014	Spanish-English	5 & 6yrs.	Bi-TD (n=21) Bi-LI (n=21)	Micro – and macrostructure of narratives	mixed	Retell of *Frog on His Own* (Mayer, 1973) *or One Frog Too Many* (Mayer, 1975)	English & Spanish
Differences			**Similarities**			**Comments**	
BI-TD > Bi-LI overall performance on micro- and macrostructure Bi-TD significantly larger improvements over 1 year & improved micro-structure in Spanish Bi-LI showed improvement in micro-structure						Macrostructure scores in Spanish in kindergarten predicted macrostructure scores in English in 1st grade	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Verhoeven, Steenge, van Weerdenburg, 2011	Dutch-Maroccan/ Turkish/Surinamese	6 yrs 7 yrs 8 yrs *L2 exposure since school (4yrs)*	Bi-LI (n=74) Bi-TD (n=321) Mono-LI (n=137) Mono-TD (n=576)	Phonology Morphosyntax Lexis text	sequential	Dutch Language Test: *Taaltoets Alle Kinderen* (Verhoeven & Vermeer 2001)	Dutch
Differences			**Similarities**			**Comments**	
All ages: Bi-TD > Bi-LI: articulation, setence rep, auditory discrimination **6-7yrs:** BI-TD > Bi-LI: auditory discrimination **7yrs:** comprehension of function words **7-8yrs:** BI-TD > Bi-LI: Morphology, comprehension of function words word definition, sentence comprehension **8yrs:** BI-TD > Bi-LI: receptive vocab, sentence comprehension, story comprehension			**6yrs**: Bi-TD = Bi-LI: morphology, comprehension of function words, word definition **6-7yrs:** receptive vocab, sentence comprehension, story comprehension			Overall, highest scores for Mono-TD and lowest for BI-LI, Mono-LI and BI-TD in between. Overall performance increased with age. Lexicon and gramar particularly affected for Bi-LI	

Reference	Languages	Age	Subjects	What?	Bilingual Type	How?	Languages tested
Verhoeven, Steenge, & van Balkom, 2012	Turkish-Dutch	6-7yrs *(n=19)* 8-9 *(n=27)* 10-11 *(n=29)* *L2 exposure since school* *(4yrs)*	Bi-LI *(n=75)* *compared to BI-TD from previous study:* *Turkish (n=24) (Narrain & Verhoeven 1994)* *Dutch (n=99) (Verhoeven & Vermeer 2001)*	Phonology Morphosyntax Lexis Text	sequential	*Dutch: Taaltoets Alle Kinderen* (Verhoeven & Vermeer 1996, 2001) *Turkish: Toets Tweetaligheid* (Verhoeven et al 1995)	Turkish Dutch

Differences	Similarities	Comments
6/7yrs (Turkish): Bi-TD > Bi-LI: receptive vocab, productive vocab, sentence rep, story comprehension **6/7 yrs (Dutch):** BI-TD > Bi-LI: auditory discrimination, articulation, word definition, function word comprehension, sentence rep, story comprehension		Every task showed a significant effect for age group Auditory Discrimination, Articulation, Non-word Repetition, Receptive Vocabulary, Word Definition, Sentence Imitation, Story Comprehension, LAC – **higher performance on Turkish tasks** **Dutch > Turkish:** Articulation

Appendix C: Lists of Nonwords for Qualitative Analysis

for-nikt	CCSB	CC			
t͡ɕɛ̃- ʑi	PC	NV	PC		
ba- t͡ɕi	PC				
ca-jɔ̃c	NV				
vyj-ʐa	PCCSB				
po-t͡ʂyw	PC	PC			
ry-puɕt͡ɕ	PCC				
po-skaw	CC	PC			
skvi-te	CC				
na-dʑuw	PC	PC			
biur-lat͡ɕ	CCSB	PC			
klu-det-ke	CC	CCSB			
ko-zwop-ca	PCC	CC			
kʂa-kje-je	CC	CC			
re-vjut-ʂe	CC	PCC			
kʂe-swy-chy	CC	PCC			
spo-vie-dy	CC				
zviɔ̃ - ʑli-nie	CC	NV	PCC		
pro-gɛ̃- t͡ɕe	CC	NV	PC		
plac-kiem-nich	CC	CCSB	CCSB		
krut-ku-jɔ̃c	CC	CCSB	PCC		
i-na-stʂec	PCC				
li-tvy-cy	CC				
mwo-t͡ʂɔ̃ -su	CC	PC	NV		
to-wol-bʐy-dʐej	PCC	PC			
spi-t͡ʂaj-ʂyb- t͡ɕe	CC	PC	PC	PC	OK
by-dva-dzɔ̃-cej	CC	CC	NV		
za-u-faj-skaw	CC	PC			
t͡ʂe-ka-ma-vie	PC				
po-te-ʐy-wo	PC	PC			
t͡ɕo-no-vis-ko	PC	CCSB			
pod-ka-za-miej	CCSB				
spo-vte-dy- ɕli	CC	CC	PCC		
ʂko-tu-bal-sku	PCC	CCSB			
do-ry-tom-nia	CCSB				
a-ra-gnie-nia	PCC				
od-pa-ras-tak	CCSB	CCSB			
ɕviet-noɕ- t͡ɕow-u	PCC	CCSB	PCCSB	PCC	
muɕ- t͡ɕ -cho-dʑi	PCCSB	PC			
dla-te-t͡ʂny-chy	CC	PCC			
ʂva-ły-ma-chaj	PCC	PC			
bez-vwa-tel-kiɕ	CCSB	CCSB	PC		

CC = consonant cluster PCC = Polish consonant cluster SB = syllable boundary PC = Polish consonant

NV = nasal vowel

English

eɪ-**dʒ**ə	CC					
bɪ**l-dr**uːm	CCSB					
dʒɪm-baɪ	CC		CCSB			
dɔː**t-n**ət	CCSB					
rɒ**t-j**uː	CCSB					
iː-rə**nt**	CC					
mɪ**ŋ-g**eɪn	CCSB					
rɒ**b-l**əm	CCSB					
ɪk-teɪs	CCSB					
bjuː-tɔː	CC					
aɪ-də**s-f**ɪə	CCSB					
spe**k-t**ɪ-də**ns**	CCSB		CC			
ʌ**n-d**ə-nuːn	CCSB					
naː-wə-rɪ**ts**	CC					
fæ-nɪ-kə	OK					
rɪ-piː-**tl**	CC					
sɜː-**dʒ**ə-rɔɪd	CC					
reɪ**z-m**ə-laɪ	CCSB					
dʒən-jə-raːʒ	CC		CCSB			
ɪm-bə-**dj**uːt	CCSB		CC			
prɪs-treɪlz	CC		CC		CC	
kɔ-ni-weɪ						
ɔ-heɪ-kə						
dɪ**s-t**ər-ɪ**ŋg**	CCSB		CC			
kɔ-re-və	OK					
tʃuː-ɪ-saɪt	OK					
gloː-zɪ-**bl**iː	CC		CC			
te-rɪ-weɪ**nt**	CC					
seɪ-və-nuːn	OK					
ve-rə-pjuː-tən	OK					
ma-ha-mə-saɪz	OK					
suː-pi-deɪ-tə	OK					
kə-me-rɪ-tə	OK					
e-nɪ-tɪ**s-t**ə	CCSB					
a-nɪ-tə-**bl**	CC					
i-nə-reɪ-təd	OK					
ri-ja-lɪ-ʃən	OK					
a**grɪ**-geɪ-ʃən-ʃɪp	CC					
re-**klɪ-gr**æ-ʃən	CC		CC			
æ-də-mɪ**s-t**ɪk	CC					
rɜ**s-l**i-səʊ-tə**ns**	CCSB		CC			
sɪ-li-**dʒæk-ʃ**ən	CC		CCSB			
a-nɪ-kə**n-s**ɪs	CCSB					
tɪ-fa-sɪ-gəm	OK					
sæ-tɪ-seɪ-ʃən	OK					
rɪ-sə-piː-sɪ**ŋg**	CC					
ə-fɜː-mɪ-tə	OK					
fes-fɔː-meɪ-ʃən	OK					
sɪ-ra-ʃə**n-d**iː	CCSB					
θi-jə-nɪ-**klɪ**st	CC					
ə-**vj**uː-ɪ-tiː	CC					
frɪ-tɪ-kju-leɪt	CC		CC			

CC = consonant cluster SB = syllable boundary

Appendix D: Renfrew Picture Naming – Polish Translation

	słowo	odpowiedź		słowo	odpowiedź
1	filiżanka/kubek		26	łańcuszek/naszyjnik/korale	
2	klucz		27	biżuteria	
3	okno		28	rękaw	
4	księżyc/gwiazdki		29	mankiet	
5	palec		30	skrzypce	
6	wąż		31	smyczek	
7	latawiec		32	lornetka	
8	kaczka		33	ananas	
9	klaun		34	latarnia morska	
10	krokodyl		35	warzywa	
11	helikopter		36	spadochron	
12	kangór		37	magnez	
13	kość/kostka/kostki		38	kotwica	
14	ślimak		39	ul/pszczelarnia	
15	strach na wróble		40	igloo	
16	wieszak		41	gwóźdź	
17	sowa		42	mikrofon	
18	szczała		43	siodło	
19	gitara		44	klucz	
20	wielbąd		45	antena	
21	konefka		46	rakieta	
22	syrena/syrenka		47	temblak	
23	gąsienica		48	kompas	
24	mapa		49	termometr	
25	wiertarka		50	wieżyczka	

Appendix E: Transcription Samples – Narratives

LIB 4;8 MAIN Narration

@Begin
@Languages: eng
@Participants: LIB Language_Impaired_Bilingual, INV Investigator
@ID: engIILIBIIIIILanguage_Impaired_BilingualIII
@ID: engIINVIIIIIInvestigatorIII
@Media: LIB_MAIN_4y8m_eng video
*LIB: mummy flew away into the tree.
%com: 30 sec pause.
*INV: can you tell me what happened in each picture?
*INV: what happens in this picture?
%com: INV points to picture 2.
*LIB: she is flying away.
*LIB: look!
*LIB: the cat is catching the bird.
%com: 5 sec pause.
*INV: is there anything else?
*LIB: and then the dog is catching him.
*INV: and is that the end?
*LIB: yeah.
*INV: thats the end of the story.
@End

TDB 4;8 MAIN Narration

@Begin
@Languages: eng
@Participants: TDB Typically_Developing_Bilingual, INV Investigator
@ID: engIITDBIIIIITypically_Developing_BilingualIII
@ID: engI INVIIIIIInvestigatorIII
@Media: TDB_MAIN_4y8m_eng video
*INV: are you ready to tell me the story?
%com: 10 second break.
*TDB: the sheep was [: were] in the water and he was [//] and the [/] the [//] and there is [//] and his dad helped him get out.
*TDB: and then the fox came too.
*TDB: and then he got the baby (..) sheep.
*TDB: and then the owl got on his tail and he was crying.
*TDB: and then the fox get [: got] away.
*INV: wow.
*INV: and is that the end of the story?
%com: TDB nods.
@End

LIB 4;8 MAIN Narration PL

@Begin
@Languages: pol
@Participants: LIB Language_Impaired_Bilingual, INV Investigator
@ID: poll |LIB|||||Language_Impaired_Bilingual|||
@ID: poll |INV|||||Investigator|||
@Media: LIB_MAIN_4y8m_pol audio
*INV: Zaczniesz opowiadać?
are you going to start telling the story?
*LIB: nie wiem.
I don't know
*INV: no co tutaj się wydarzyło?
what happened here?
%com: investigator points to first picture
*LIB: jego tata by ciał [: chciał] tego mydzieło@c.
his dad would want him to @c
*LIB: oni mogli wychać [: wychodzić] do wody.
they could go into the water.
*LIB: i on pychał [: pchał] jego
(..) taki (..) baby sheep@s:eng.
and he pushed him a baby sheep.
*LIB: i on se [: chce] jeść tego ze [: że] taki ze [: że] on jest głodny
taki i se [: chce] jeść.
and he wants to eat him he is hungry so that he wants to eat.
*LIB: a on złapał go bo on se [: chce] zjeść go.
and he caught him because he wants to eat him.
*LIB: bo on (..) gryzuje [: gryzie] go [: jego] ogon i [/] i wzieło.
because he bites him tail and took.
*LIB: a on by dział [: chciał] [//] on chce zabyć [: zabrać] jego ogon bo
on bygał [: biegał].
and he would want to take his tail because he ran.
*LIB: i pleciało [: poleciało].
and flew away.
*INV: i koniec?
and the end?
*LIB: tak.
yes.
@End

TDB 4;6 MAIN Narration PL

@Begin
@Languages: pol
@Participants: TDB Typically_Developing_Bilingual, INV Investigator
@ID: pollchange_me_later|TDB|||||Typically_Developing_Bilingual|||
@ID: pollchange_me_later|INV|||||Investigator|||
@Media: TDB_MAIN_4y8m_pol audio
*TDB: &uh piersy [: najpierw] był [: były] dwa małe ptaski [: ptaszki] i
duza [: duży] ptaska [: ptaszek].
first was two birds and the big bird.
*TDB: i jej [: ich] mama poleciała.
and her mother flew away.
*TDB: a potem kot psysedł [: przyszedł].
and then came the cat.
*TDB: a potem mama psysła [: przyszła] i dała jedzenie.
and then came the mum and gave them food.
*TDB: a kot chodził [: wchodził] na dzewo [: drzewo].

and the cat went on the tree.
*TDB: a potem złapał małe (..) &uh [//] złapał jego domek.
and then he caught the small he caught his house.
*TDB: a potem pies psysedł [: przyszedł] i oglądał.
and then came the dog and watched.
*TDB: a potem pies &uh ugryzł ogon i kot spadał [: spadł].
and then the dog bit the tail and the cat fell down.
*TDB: a potem (..) i (..) a potem kot juz [: już] nie robił to [: tego]
ptasków [: ptaszkom] i pies juz [: już] gonił kotka.
and then the cat wasn't doing that anymore tot he birds and the dog was already chasing the cat.
@End

LIB 5;6 MAIN Narration E

@Begin
@Languages: eng
@Participants: LIB Language_Impaired_Bilingual, INV Investigator
@ID: eng|LIB|||||Language_Impaired_Bilingual|||
@ID: eng|INV|||||Investigator|||
*INV: do you like listening to stories?
%com: INV asks warm-up questions and gives instructions for the storytelling task.
*LIB: the ghost [: goats] [//] the baby ghost [: goats] went in the (.) forest.
*LIB: and [/] and the dad er (..) er get (.) out (.) of it.
*LIB: then the fox get in.
*LIB: then he gets his leg.
*LIB: then the bird eat [: eats] [///] got his (.) er tail.
*LIB: and he run away.
*LIB: the fox run away.
*LIB: look.
*LIB: I finished.
@End

TDB 5;6 Narration E

@Begin
@Languages: eng
@Participants: TDB Typically_Developing_Bilingual, INV Investigator
@ID: eng|TDB|||||Typically_Developing_Bilingual|||
@ID: eng|INV|||||Investigator|||
*INV: okay so will you tell me the story?
*TDB: once upon a time there was three goats.
*TDB: and then the baby one was in the water and it couldnt swim cause it had a drink.
*TDB: and then he falled [//] he fall [//] fell over.
*TDB: and then the mother pushed him [//] helped him to go out.
*TDB: and then [/] and then the fox was running to get the goat [//] the baby goat.
*TDB: and then he got the (.) er the baby's goat [: the baby goat's] leg but then the bird bited [: bit] his (.) tail.
*TDB: and then the fox ran away (.) and the bird chased him (.) and the goats had (...) [/] had a (.) [/] a good end.
*INV: have you finished?
*TDB: yeah.
*INV: okay.
*TDB: the end.
@End

LIB Narration 5;6 PL

@Begin
@Languages: pol
@Participants: LIB Language_Impaired_Bilingual, INV Investigator
@ID: pol|change_me_later|LIB|||||Language_Impaired_Bilingual|||
@ID: pol|change_me_later|INV|||||Investigator|||
*LIB: koza mała koza i [/] i [/] i chciała wejść na [: do] wodę [: wody].
goat small goat and wanted to go on the water.
*LIB: i [/] i (..) koza pójzie [: pójdzie].
and the goat will go.
*LIB: i lis złapał go [: ją].
and the fox caught him.
*LIB: i [x 5] ptasek [: ptaszek] er goni er er lisa.
and the bird chases the fox.
*INV: a czy to już wszystko?
is that everything?
%com: LIB nods.
*LIB: zjobiłem [: zrobiłem].
I did it.
@End

TDB 5;6 Narration PL

@Begin
@Languages: pol
@Participants: TDB Typically_Developing_Bilingual, INV Investigator
@ID: pol||TDB|||||Typically_Developing_Bilingual|||
@ID: pol|INV|||||Investigator|||
*INV: to zaczynamy.
let's start.
*TDB: kiedyś była [: były] tsy [: trzy] (...) jak się [//] mmh lamy [: kozy] i mały [: mała] [//] mała owiecka [: owieczka].
There once was three how are they called lamy and the small goat.
*TDB: byly tsy [: trzy] owieczki i kiedyś jak najmniejsa [: najmniejsza] piła to on [//] ona niestety spadla [: wpadła] do wody.
there were three goats and once when the smallest one was drinking he unfortunately fell into the water.
*TDB: a potem er (.) tata pomóc [//] pomogła [: pomógł] jej zaby [: żeby] wyjść.
and then daddy helped her so that she could get out.
*TDB: a potem ona widziała lis [//] mówi się pojawił się lis.
And then she saw [//] one says a fox appeared.
*TDB: i potem lis [//] i potem owieczka widziałem [//] widział lisa.
and then the goat saw the fox.
*TDB: a potem lisa [: lis] złapał za nogę.
and then the fox caught the leg.
*TDB: a potem ptasek [: ptaszek] ugryzł lisa (.) w ogon.
and then the bird bitt he fox.
*TDB: a potem on [///] ona er (...) psestrasyło [: przestraszyło] go.
and then she frightened him.
*TDB: i potem lis uciekł.
and then the fox ran away.
*TDB: to systko [: wszystko].
that's everything.
@End

LIB 6;8 RAINSTORM

@Begin
@Languages: eng
@Participants: LIB Language_Impaired_Bilingual, INV Investigator
@ID: engILIBIIIIILanguage_Impaired_BilingualIII
@ID: engIINVIIIIIInvestigatorIII
@Media: LIB_RAINSTORM_6y9m_E video
%com: LIB keeps flipping through the pages.
*LIB: the boy is looking out of the window and it's raining.
*LIB: (..) the boy is tickin [: kicking] the ball.
*LIB: i(t) came downstairs and i(t) dropped on the floor.
*LIB: he foun(d) i(t) an(d) he couldn't ge(t) i(t) under the chair.
*LIB: and then he had a key (.) to go through (..) and get the ball.
*LIB: (..) i(t) opened <all the> [/] <all the> [/] all the &ke.
*LIB: he opened a box.
*LIB: he opened a cupboard.
*LIB: he opened a drawer.
*LIB: he opened a &ca door and i(t) opened a treasure.
%com: LIB studies next double page for a while before he continues.
*LIB: <he climbed up the ladder> [x 2] (...) he climb up the (..) and then
he went out and (.) <he (.) and (.) out> [//] he went out and (...)
[% turns to next page] <and he &wa> [/] and he
walked to the door (..) and on the stairs the curly whirly stairs.
*LIB: he went out (...) and he went <on the> [/] on the lightlamp.
*LIB: he lived in a little er land.
*LIB: <they> [/] had dinner.
*LIB: they played on the field.
*LIB: they had kites (.) and played with them.
*LIB: they made the sandcastle.
*LIB: they went on the windmill <and &han> [//] and went in
the <lamb> [/] lamb [/] lampsea [: lampseat] [?].
*LIB: then they pointed at him tha(t) gonna [//] they just gonna play.
%com: LIB studies the following double page and after a while looks at
INV and shrugs his shoulders.
*INV: mmhm.
%com: LIB keeps looking at the same double page for another 5 seconds.
*INV: and what happened then?
*LIB: <they switched on> [/] they switched on <the> [/] the lamp on and
then (..) they went down.
*LIB: they went up <and they> [//] (...) <and he> [/] and he (..) did his
to(p) bu(tt)on.
*LIB: then he climbed up the ladder (.) <and> [//] (..)
[% turns page] and went (..) for dinner.
*LIB: and then (.) when (.) to go to sleep.
*LIB: and then (..) he went again (.) to the lampsea@c.
*LIB: and then they played toys.
*LIB: the end.
*LIB: the end.
@End

TDB 6;8 RAINSTORM

@Begin
@Languages: eng
@Participants: TDB Typically_Developing_Bilingual, INV Investigator
@ID: engl ITDBIIIITypically_Developing_BilingualIII
@ID: engl IINVIIIIInvestigatorIII

*INV: you look at the book and tell me the story the best you can.
*INV: okay?
*TDB: one day there was a little boy and he saw (.) that i(t) was raining.
*TDB: then he was (.) kicking his ball and went <&upstair> [//] he went upstairs and kicked the ball down and <&i> [/] it went under the chair so <because the ball> [//] he was trying to get the ball under the chair but he couldn't.
*TDB: so (.) he thought that he opened a book (.) and then the cupboard.
*TDB: then the door and then he locked er a treasure chest.
*TDB: in it he saw a ladder.
*TDB: <then he (.) came down the ladder> [/] (...) then <he> [/] he came down the &lad.
*TDB: it was cold down the ladder and he came down on it and he went across [?].
*TDB: <then he saw a door and he went> [//] he saw a door and he came through it.
*TDB: and he was running and running (un)til he saw a different door and there were like [% gestures a spiral and looks at INV] a &s er like stairs going round and round.
*TDB: then <he> [/] he gone up a lighthouse and he was really happy.
*TDB: and he saw the whole island.
*TDB: (...) and all of his friends and the dog saw him up there.
*TDB: then they had lunch and then they played outside with the dog.
*TDB: then they <&ha> [/] had kites and <the &do> [/] the &do and everyone was having fun.
*TDB: then they made sandcastle <but then> [/] <and soon it was> [/] <it's> [/] it was <&be> [/] beginning to be late so they went back to the lighthouse.
*TDB: and then one of his friends pointed at him.
*TDB: and they lighted up the lighthouse.
*TDB: <and then he> [//] then he went [//] then he was going back the way now.
*TDB: all the stairs and right [?] out and open the door and (.) then (.) went up the ladders.
*TDB: &clim open the chest.
*TDB: went (.) for supper.
*TDB: swallow the &sup went up and see the window.
*TDB: saw the sun.
*TDB: (...) <went> [/] (..) went into bed and closed his eyes and <he yawned> [/] he yawned.
*TDB: then <he> [/] he waked up again.
*TDB: <then he went down> [/] then he went down the ladder again and ran through the cave <and> [/] (.) and went to his friends again.
*TDB: then they played.
*INV: (...) is that it?
*TDB: and they was happy ever after.
*INV: great.
*INV: thank you very much.
@End

LIB 7;9 WALRUS PL

@Begin
@Languages: pol
@Participants: LIB Language_Impaired_Bilingual, INV Investigator
@ID: pol,| |LIB|||||Language_Impaired_Bilingual|||
@ID: pol,| |INV|||||Investigator|||
*LIB: kiedyś był (...) nie wiem (...).
once there was I don't know.

*INV: wymyśl sobie coś.
make something up.
*LIB: nie wiem (.) nie umiem.
I don't know I can't
*INV: no wymyśl sobie coś.
make something up.
*LIB: nie wiem.
I don't know.
*INV: foka.
seal.
*LIB: foka który nazywa się (...) Ala.
a seal who was called Ala.
*LIB: wszyscy śpili [: spali] [//] wszyscy spali.
everyone was sleeping.
*INV: mhm.
*LIB: i foka nie [//] Ala foka nie.
and the seal not Ala the seal not.
*LIB: i potem policja widziała foka iść do fontanny.
and then the police saw the seal go to fountain.
*LIB: i był policjant tylko bo było (..) ciemno.
and it was only the police man because it was dark.
*LIB: i potem policjant nie mógł zobaczyć fokę Ala który [: która] był
[: była] w fontannie.
and then the policeman couldn't see the seal Ala who was in the fountain.
*LIB: i potem znowu nie znalazł w [x 3] shopu@s:eng bo on wyglądał jak
pan.
and then he again did not find in the shop@s because he looked like a man.
*LIB: i potem robił show@s:eng.
and then he did a show@s.
*LIB: i potem (.) budował bo policja nigdzie nie mógł znaleść go.
and then he was building because the police couldn't find him nowhere.
*LIB: i potem robi strażaczki.
and then he was making firefighters.
*LIB: i potem znowu nie uważał.
and then he again did not pay attention.
*LIB: i potem robi balet i policja (.) widział [: widziała].
and then he did ballet and saw.
*LIB: i potem był artystą.
and then he was an artist.
*LIB: i potem narytował [: narysował] policję.
and then he painted the police man.
*LIB: potem foka był na stawinie@c.
and then the seal was on the @c.
*LIB: i potem skaczył [: skoczył] do wody i policja był [: była] zaskokony
[: zaskoczona].
and then he jumped into the water and the police was surprised.
*LIB: robił (..) dwa kółki [: kółka].
he did two circles.
*LIB: i potem splash@s:eng poszedł do wody.
and then splash@s went into the water.
*LIB: i potem punkty (..) było pięć razy dziesięć.
and then points it was five times ten.
*LIB: i policja był [: była] tak zaskokony [: zaszkoczona] że nie mógł [: mogła] uwieżyć.
and police was surprise so that she could not believe.
*LIB: i potem foka dostał [: dostała] (...) medal [//] złoty medal.
and then the seal got a medal a gold medal.
*LIB: i potem policja miał [: miała] (...) pomysł.
and then the police had an idea.

*LIB: zrobie basen żeby foka mógł zrobić zawsze dwa fikołki.
I will make a pool so that the seal kann always make two tumbles.
*LIB: koniec.
@End

TDB 7;9 WALRUS PL

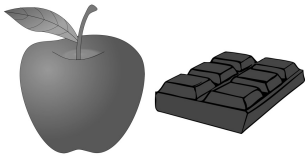
@Begin
@Languages: pol
@Participants: TDB Typically_Developing_Bilingual, INV Investigator
@ID: pol,l lLIBllllLanguage_Impaired_Bilinguallll
@ID: pol,l lINVllllInvestigatorlll
*TDB: kiedyś był taki (..) zwierze z długimi zębami który mieszka w wodzie
i miał chytry plan żeby uciec z zoo.
once was such an animal that had long teeth and lives in water.
*TDB: kiedy policjant zasnął on uczekać [: uciekać] do fontanny.
and when the policeman fell asleep he ran away to the fountain.
*TDB: policjant się obudził i próbował złapać żeby jego chytry plan się
nie udał.
the policeman woke up and tried to catch him so that his evil plan wouldn't work.
*TDB: jednak udało się mu (..) ukryć się od policjanta i był bardzo
podobno [: podobny] do innego [//] do innej postawy we fontannie i policjant go
nie zobaczył.
but it did work anyway to hide from the policeman and he was very similar to another figure in the fountain and the policeman could not see him.
*TDB: później ukrył się w barze i też wyglądał bardzo tak samo i
policjant też go nie zauważył.
then he hid in the bar and he also looked very much alike and the policeman also did not see him.
*TDB: potem jeszcze raz zrobił kamuflaż.
then he did a camouflage again.
*TDB: a potem już trochę zaczynał pomagać ludziom i budować ścżane
[: ściane].
and then he already started helping people a little bit and building a wall.
*TDB: potem nawet był strażakiem kiedy policjant nie zauważył.
then he was even a firefighter when the policeman didn't notice him.
*TDB: później on tańczył.
then he danced.
*TDB: potem był malarz [//] malarzem i namalował policjanta.
then he was a painter and painted the policeman.
*TDB: potem skakał do wody (.) policjant tam był ale nie zobaczył go.
them je jumped into the water and the policeman was there but did not see him.
*TDB: potem zrobił taki skok (..) i do wody.
then he did such a jump.
*TDB: i dostał (..) pięć dziesiątek.
and he got five tens.
*TDB: wszystkie sędzie rozd [///] postawili dziesiątki.
all judges gave him tens.
*TDB: potem dostał medal.
and then he got a medal.
*TDB: i potem dostał dużo większy basen i mógł robić skoki do basenu.
and then he got a much bigger pool and could make jumps into the pool.
*TDB: koniec.
the end.
@End

Appendix F: Extended Theory of Mind Scale

English Version

Diverse Desire

Here is Jack.



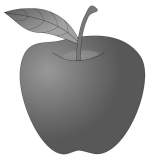
And here are two snacks.

Point: an apple and chocolate.

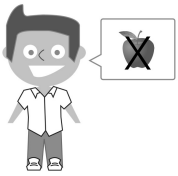
Which one would *you* choose?

*example **option A** – child chooses apple:*

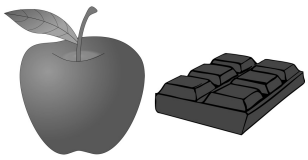
(if the child chooses chocolate, 'apple' is replaced by 'chocolate' in pictures and dialogue)



An apple! Great choice!



But Jack really does *not* like apples.



So what would *Jack* choose?

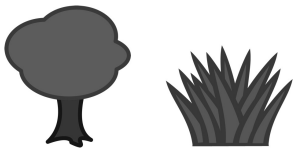
(Child points)

Well done!

Diverse Belief

Here is a squirrel.

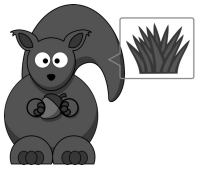
It is looking for its nut.



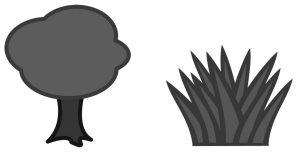
It could be in the tree *(point)* or it could be in the bush *(point).*
Where do *you* think it is?

example ***option A*** *– child chooses tree:*
(if the child chooses bush, 'tree' is replaced by 'bush in pictures and dialogue)

In the *tree*. Good guess!



But the squirrel *really* thinks it is in the bush.



So where will the *squirrel* look?

Well done!

(children were awarded with a different dancing smiley after each round, they will not be shown on the following pages due to spance constraints)

Knowledge Access

Here is a chest of drawers.

What do *you* think is in there?

Good guess!

But there are *socks* inside.

There are *socks* inside the *chest of drawers*.

So, what is inside the chest of drawers?

Well done!

This is Kermia.

Kermia has never seen the chest of drawers.

Will Kermia know what is inside?

Contents False Belief

Here is a first aid box.

What do *you* think is inside?

Good guess!

But there are crayons inside.

This is Franz.

Franz has *never* seen the first aid box before.

What will *Franz* think is inside?

Well done!

Explicit False Belief

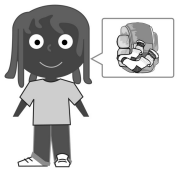
This is Anu.

Anu is looking for his socks.

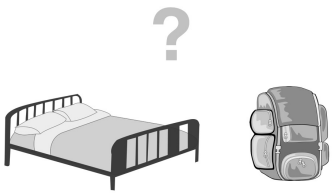
They could be under the bed or in the backpack.
Where do *you* think they are?

*example **option A** – child chooses "under the bed":*
(if the child chooses in the backpack, the examiner explains that they are actually under the bed)

Good job! They really are under the bed.



But Anu thinks they are in his backpack.

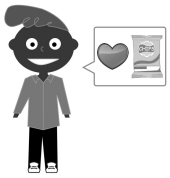


Where will Anu look?

Belief-Emotion

Here is a bag of crisps.

And here is Rrahiim.



Rrahiim loves crisps.
They are his favourite snack.

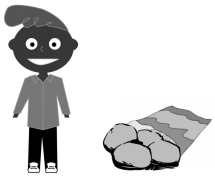
How Rrahiim goes outside to play.

What do you think is inside the bag?
Good idea! Let's have a look inside.

Oh! There are actually stones inside the crisp bag.

Okay. Do you remember Rrahiim's favourite snack?
That's right! His favourite snack are crisps.

Now let's give the crip bag to Rrahim.
How will he feel?



And how will he feel when he opens the bag?

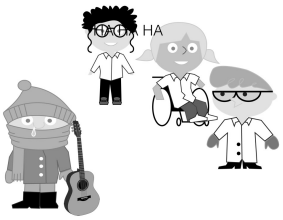
(let the child point to one picture)

Real-Apparent-Emotion

Can you tell me how these smileys feel?
This story is about a boy.
I am going to ask you how he *feels* on the *inside* and how he *looks* on the *outside*.

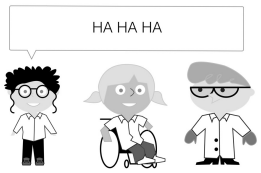
This is Aarjak.

Aarjak has got a new guitar.



One of his friends, Bjorn, tells a mean joke about people playing guitars. The other children laugh.

Aarjak does not like the joke, but he does not want the others to know.



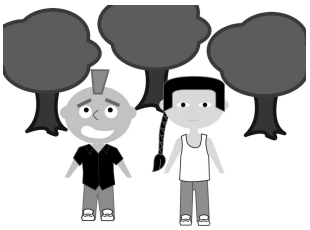
What did the other children do when Brjorn told the joke?

And how did Aarjak feel? (let child point)
And how did he look? (let child point)

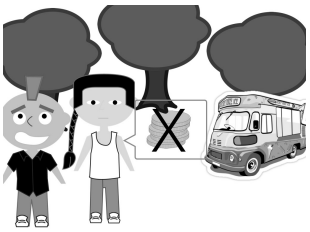
Second Order Thinking

This is Knut.

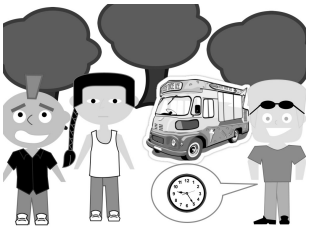
And this is Konstantinos.



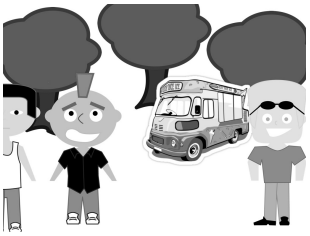
They are in the park.



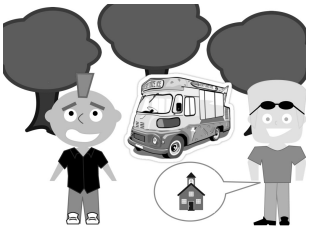
And here comes the ice cream man. Konstantinos wants to buy some ice cream. (click & money appears): But he has not got any money.



The ice cream man says: “Go home and get some money. I will be here all day.”

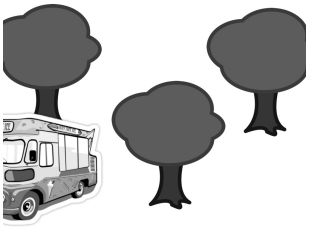


So Konstantinos goes home to get his money.

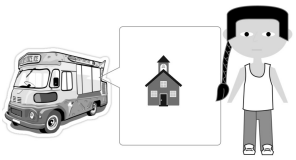


After some time, the hot dog man says to Knut: “I need to sell ice cream outside the church.”

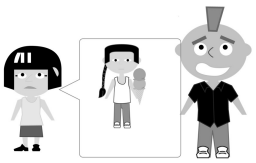
“Okay“, says Knut and goes home.



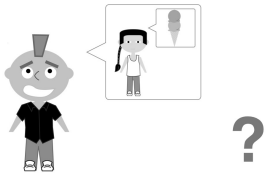
The ice cream man sets off to the church.



On his way, he meets Konstantinos. The ice cream man says: “Hello. I am off to the church to sell ice cream there.”

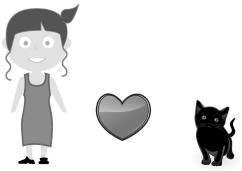


Later, Knut goes to Konstantinos’ house. (click & speech bubble appears): She says: “Konstantinos is out buying ice cream.”

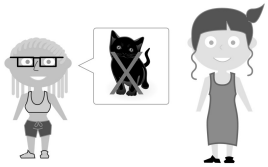


So, where does Knut think, is Konstantinos buying ice cream?

Faux Pas



This is Charlie.
(click & heart + cat appear):
Charlie loves her cat.



On her way home from school, she meets Andrea.
(click & speech bubble appears):
Andrea makes a mean joke about cats.

In the story, did anyone say anything they should not have said? Who? How does Charlie feel now? Did Andrea want to hurt Charlie’s feelings?

Polish version – Extended Theory of Mind Scale

Diverse Desire: To jest Lorn. Lornowi się chce pić.(next slide) *Tutaj są dwa napoje. Sok i Coca-Cola.* ***Co Ty wybrałbyś?*** (ns) *Ok. Ale Lorn nie nawidzi coca-coli/soku. On lubi sok/coca-cole.* (ns) ***Jaki napój wybrałby Lorn?*** (ns)

Diverse Belief: *To jest Hadriana.* (ns) *Hadriana szuka swojego brata, Marka.* (ns) *Marek może być w szafie albo pod łóżkiem.* ***Gdzie myślisz Marek się chowa?*** (ns) *Ok, ale Hadriana myśli że Marek się chowa pod łóżkiem.* (ns) ***Gdzie Hadrian będzie szukała Marka?*** (ns)

Knowledge Access: Tu jest pudełko. ***Jak myślisz. Co jest w pudełku?*** (ns) *Dobry pomysł ale tam jest kot. W pudełku jest kot.* (ns) *Okay.* ***Co jest w pudełku?*** *Bardzo dobrze.* (ns*To jest Aiko. Aiko pierwszy raz widzi pudełko.* (ns) ***Czy Aiko wie co jest w pudełku? A czy Aiko widział wcześniej pudełko?*** (ns)

Contents False Belief**:** Tutaj jest słoik miodu. **Jak myślisz, co jest w słoiku?** (ns) Dobry pomysł, ale tam jest sok pomarańczowy W słoiku od miodu jest sok pomarańczowy. (ns) To jest Marcelina. Marcelina nie zajrzała do słoika. (ns **Co Marcelina myśli że jest w słoiku? Czy Marcelina zajrzała do słoika?**

Explicit False Belief**:** To jest Dora. (ns) Dora szuka swoje buty. (ns) **Jak Ty myślisz gdzie są?**
A. Dziecko wybiera szafe: wspaniale! Buty na prawdę są w szafie.
B. Dziecko wybiera szuflade: Dobry pomysł, ale butysą w szafie. (ns)
Ale Anu myśli że są w jego plecaku (ns) **Czy Anu wie gdzie są jego skarpetki? Gdzie on ich będzie szukał?**

Belief-Emotion: To jest paczka od płatek śniadaniowych. (ns) To jest Zola. (ns) Zola uwielbia płatki śniadaniowe. To jest jej ulubiony posiłek (ns) Teraz Zola wychodzi na dwór. (ns) **No to jak myślisz? Co jest w opakowaniu?** Dobry pomysł. To chodź. zajrzemy co tam jest w środku. (ns) Ah. tam są liście w środku. Ok. **Pamiętasz Zoli ulubiony posiłek?** Bardzo dobrze. (ns) Chodź damy Zoli paczkę płatek. (ns) **Jak ona się będzie czuła jak dostanie paczkę?** (ns) **A jak będzie się czuła jak otworzy paczkę? A dlaczego?**

Real-Apparent Emotion: **Możesz mi powiedzieć jak te śmieszki się czują?** Bardzo dobrze. Ta historyjka jest o chłopczyku. Ja się będę pytała jak on wygląda na zewnętrz i jak się czuje na wewenątrz, okay? (ns) To Arko. Arko ma nowego kota. On kocha swojego kota. (ns) Pokazuje swojego kota kolegom. (ns) Jeden kolega, Oskar, opowiada złośliwy kawał o kotach. Inne dzieci się śmieją. (ns) Arkowi się nie podoba ten kawał, ale nie chce żeby inni o tym wiedzieli. **Co zrobiły inne dzieci jak Oskar opowiedział kawał?** (ns) **A jak się czuł Arko? A jaki miał wyraz twarzy?**

Second-Order Thinking To jest Beniamin. A to jest Petros. Oni są w parku. (ns A tutaj przychodzi sprzedawca hot dogów. (ns) Petros chce kupić hot doga. (ns) Ale nie ma pieniędzy. (ns) Sprzedawca hotdogów mówi do niego: “Idź do domu po pieniądze. Ja tutaj będe cały dzień.” (ns) I Petros idzie do domu po pieniądze. (ns) Po jakimś czasie sprzedawca hotdogów mówi do Benjamina: “Muszę iść sprzedawać hot-dogi przed kościołem.” (ns) Benjamin idzie do domu. (ns) Sprzedawca hotdogów idzie w kierunku kościoła. (ns) Po drodze spotyka Petrosa. Sprzedawca mówi: “Cześć. jestem w drodze do kościoła żeba sprzedawać tam hotdogi.” (next slide) Później Benjamin idzie do Petrosa domu. (ns) Petrosa mama otwiera drzwi. Ona mówi: “Petros wyszedł kupić hotdogi.” (ns) **Gdzie Benjamin myśli że Petros poszedł po hotdogi?**

Faux-Pas Task: To jest Emilia. Emilia bardzo lubi grać na gitarze. Ona jest bardzo dumna w swojego występu na koncercie szkolnym. (ns) W drzodze do domu spotyka Cammie Cammie. Cammie mówi “Byłaś dzisiaj na koncercie? Dziewczynka która grała na gitarze była okropna!” Czy ktoś w tej historyjce powiedział coś co nie powinnień? Co nie powinno być powiedziano? (ns) Jak Emila się teraz czuje? Czy Cammie chciała obrazić Emilie

Appendix G: Word Frequency Target Words – Strategic Ability

Rainstorm – E

Word	SUBTLEX-UK	SUBTLEX-CBBC	CHILDES pmw	CHILDES Zipf
chest	4.48	4.43	0	n/a
doorway	3.71	3.51	7	3.84
hatch	3.85	4.26	0	n/a
jewelry	1.39	1.86	0	n/a
keyhole	3.01	3.12	0	n/a
kite	3.89	4.38	7	3.84
ladder	4.16	4.44	109	5.03
lighthouse	3.77	3.23	7	3.84
rainstorm	2.3	2.34	0	n/a
sandcastle	3.03	3.46	0	n/a
showcase	3.57	3.33	0	n/a
spiral	3.72	3.56	0	n/a
staircase	3.98	3.09	0	n/a
suitcase	3.78	3.77	23	4.36
switch	4.37	4.54	15	4.17
tie	4.5	4.66	265	5.42
treasure	4.46	4.94	0	n/a
tunnel	4.23	4.36	7	3.84

Where is Walrus? – E

Word	SUBTLEX-UK	SUBTLEX-CBBC	CHILDES pmw	CHILDES Zipf
artist	4.71	4.46	15	4.17
cafe	4.25	4.43	7	3.84
construction	4.32	3.74	0	n/a
display	4.46	4.47	0	n/a
diving	4.07	4.41	0	n/a
firefighter	3.28	2.77	0	n/a
fountain	3.67	3.96	0	n/a
gate	4.34	4.38	85	4.9
painter	4.03	3.59	7	3.84
site	4.87	4.29	0	n/a
somersault	3.04	2.86	0	n/a
springboard	2.96	2.98	0	n/a
theatre	4.74	4.54	0	n/a
walrus	3.17	3.42	0	n/a
zoo	4.25	4.5	62	4.79
zookeeper	2.49	2.71	0	0

Quest – E

Word	SUBTLEX-UK	SUBTLEX-CBBC	CHILDES pmw	CHILDES Zipf
belt	4.32	4.45	54	4.73
celebration	4.24	4.11	0	n/a
crayon	3.09	3.4	0	n/a
crown	4.53	4.65	0	n/a
dragonfly	3.2	3.8	0	n/a
fin	3.59	4.05	0	n/a
map	4.52	4.5	0	n/a
mask	4.04	4.34	0	n/a
octopus	3.78	4.45	0	n/a
oxygen	4.24	4.26	0	n/a
rainbow	4.18	4.11	23	4.36
rhinoceros	3.07	3.5	0	n/a
soldier	4.36	4.2	0	n/a
temple	4.03	3.87	0	n/a
zeppelin	3.19	2.64	0	n/a

Rainstorm – PL		Where is Walrus – PL		Quest– PL	
Word	**SUBTLEX-PL**	**Word**	**SUBTLEX-PL**	**Word**	**SUBTLEX-PL**
biżuteria	3,3	**artysta**	3,8	**impreza**	4,4
burza	4,1	**brama**	3,7	**korona**	3,3
drabina	3,2	**budowa**	3,4	**kredka**	2,5
krawat	3,9	**fontanna**	3,14	**mapa**	3,9
latarnia	2,9	**kawiarnia**	2,8	**maska**	3,7
latawiec	3,2	**malarz**	3,3	**nosorożec**	2,8
luk	3,2	**mors**	2,7	**ośmiornica**	2,9
otwór	3,5	**opiekun**	3,4	**pasek**	2,6
schody	3,9	**restauracja**	3	**płetwa**	2,4
skarb	4,2	**salto**	2,8	**świątynia**	1,4
skrzynia	2,7	**skoczyć**	2,3	**tęcza**	3,1
tunel	4	**strażak**	3,1	**tlen**	3,8
walizka	3,1	**teatr**	3,8	**ważka**	2,5
witryna	2,3	**trampolina**	2,5	**zepelin**	1,1
włączyć	4,1	**wystawa**	2,4	**żołnierz**	1,4
zamek	4,2	**zoo**	4,1		

English Abstract

The aim of this thesis is to disentangle the overlaps between typically developing bilingualism and bilingual language impairment and to describe specificities of bilingual development. On the basis of an extensive literature review discussing definitions of language and communicative competence, a new model of *Dynamic Communicative Ability* is proposed. This model is rooted in dynamic systems theory and encompasses the six components of linguistic, discourse, interactional, sociocultural, strategic and monitoring (i.e.: cognitive) abilities. These are all intertwined and stand in close relationship with their environment. It is argued that such a holistic and dynamic approach is necessary to describe the heterogeneity of typical and atypical bilingual development.

The systematic literature review, summarising forty-four articles at the intersection of typical bilingualism and bilingual language impairment, provides further evidence for the importance of taking a more holistic approach to the description of these two groups of dual language learners. Based on this review, it will be argued that less language-specific features, such as phonological and semantic processing or the relationship between L1 and L2 might need to be considered if more general language assessments, spanning a wider variety of language combinations, are to be developed. Therefore, this thesis takes a holistic approach to the description and analysis of typical and atypical bilingual development.

The results of a longitudinal twin case study, assessing the phonological, lexical, grammatical, discourse, interactional, sociocultural, strategic and cognitive differences between a typically developing English-Polish bilingual child and his twin brother with (specific) language impairment are presented. The children were assessed between the ages of 4;8 and 8;6 in both their languages and results from standardised and non-standardised language assessments are complemented by spontaneous speech recordings.

The results clearly show that language impairment is not restricted to grammar but affects all aspects of language and communication. While differences were observed for grammatical accuracy in both languages, the children also differed in their story complexity and structure, exhaustivity of answers in conversations, Theory of Mind, use of internal state terms, social communication, type of communication strategies employed, verbal short-term memory and metacognitive executive functions.

This is in line with the *Dynamic Model of Communicative Ability* proposed in this thesis and provides further evidence for the necessity to take a holistic approach in the assessment of bilingual children, if misdiagnoses are to be prevented in the future.

Therefore, a screening tool for bilingual language impairment that attempts to give a broader overview of children's communicative abilities in their two languages is proposed in the conclusion.

This thesis hence adds to theoretical discussions about language, communication, bilingualism and language impairment, provides in-depth insights on typical and atypical bilingual development and proposes a potential practical application for the insights obtained.

Deutsche Zusammenfassung

Das Ziel dieser Dissertation ist es die Unterschiede und Gemeinsamkeiten zwischen typischer Zweisprachigkeit und zweisprachiger Sprachstörung zu verstehen und Spezifizitäten von zweisprachiger Entwicklung aufzuzeigen. Basierend auf einem ausführlichen Überblick über die Definitionen von Sprache und kommunikativer Kompetenz wird ein neues, dynamisches Model kommunikativer Fähigkeit vorgestellt. Dieses Modell hat seine Wurzeln in dynamischer Systemtheorie und besteht aus linguistischer, Diskurs-, Interaktions-, soziolinguistischer, strategischer und kognitiver Fähigkeiten. Diese interagieren alle miteinander und ihrem Umfeld. Es wird argumentiert, dass die Heterogenität von typischer Zweisprachigkeit und Sprachstörung einen solchen dynamischen und holistischen Ansatz verlangt.

Der systematische Literaturüberlick, welcher 44 Studien an der Schnittstelle von typischer und gestörter Zweisprachigkeit analysiert, ist ein weiterer Beleg für die Notwendigkeit von einem holistischen Ansatz in der Beschreibung dieser beiden Gruppen von Sprachlernenden. Auf Basis dieses systematischen Literaturüberblicks wird gezeigt, dass weniger sprachspezifische Faktoren, wie phonologische und semantische Verarbeitung oder das Verhältnis von L1 zu L2, in der Entwicklung von sprachübergreifenden Tests in Betracht gezogen werden sollten. Deshalb verfolgt diese Dissertation das Ziel einer holistischen Beschreibung von typischer und gestörter Zweisprachigkeit.

Es werden die Ergebnisse einer longitudinalen Zwillingsfallstudie präsentiert, in der ein normal entwickeltes Englisch-Polnisches zweisprachiges Kind mit seinem Zwillingsbruder, welcher eine (spezifische) Sprachstörung hat, verglichen wurde. Beide Kinder wurden zwischen 4;8 and 8;6 mit einer Kombination von standardisierten und nicht standardisierten Sprachtests in beiden Sprachen getesteset und die Ergebnisse wurden durch Spontansprachaufnahmen ergänzt.

Die Ergebnisse zeigen deutlich, dass (spezifische) Sprachstörung nicht auf Grammatik beschränkt ist, sondern einen Einfluss auf alle Ebenen von Sprache und Kommunikation hat. Die Kinder unterschieden sich zwar deutlich in ihrer Grammatikproduktion, was vor allem aus späteren Erhebungen deutlich wird, aber markante Unterschiede waren auch in der Struktur und Komplexität ihrer Narrationen, der Vollständigkeit ihrer Antworten, ihrer Wahl von kommunikativen Strategien, ihrer sozialen Kommunikation, ihrem verbal Kurzzeitgedächtnis und metakognitiven exekutiven Funktionen erkenntlich.

Diese Ergebenisse entsprechen dem dynamischen Modell von kommunikativen Fähigkeiten, welches in dieser Dissertation vorgeschlagen wurde und zeigt die Relevanz eines holistischen Ansatzes in der Beschreibung und Diagnose von zweisprachigen Kindern.

Deshalb wird im letzten Kapitel dieser Dissertation der Prototyp eines Screening Tools für zweisprachige Sprachstörung vorgestellt, welches alle sechs Ebenen des dynamischen Modells kommunikativer Fähigkeiten umfasst.

Diese Arbeit trägt somit zur theoretischen Diskussion von Sprache, Kommunikation, Zweisprachigkeit und Sprachstörung bei, beschreibt typische und gestörte Englisch-Polnische zweisprachige Entwicklung im Detail anhand einer Fallstudie und schlägt eine mögliche Anwendung der gewonnen Erkenntisse vor.