The relationship between cognitive abilities and bilingualism in early L2 acquisition: Individual and external factors

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1. Introduction

Human language and cognition do not develop independently of each other, but are dynamically intertwined in many ways. Each learner's second language acquisition (SLA)[1] is an individual, dynamic process. Differences between learners exist, for example, in the speed of acquisition and in the achieved (and achievable) language competence *(ultimate attainment)*, even under similar learning conditions (Dewaele 2013: 624). Learners contribute with their own abilities and personal characteristics to how this development unfolds (de Bot 2008). Accordingly, the influence of variables with these relationships are described in both directions of effects, as the influence of language development on cognitive abilities as well as the influence of cognitive development on the acquisition of one or more languages (e.g., Bialystok et al. 2009, Grundy & Timmer 2017, Adesope et al. 2010, Nicolay & Poncelet 2013, 2015, Dörnyei & Ryan 2015).

Fig. 1 depicts the individual characteristics of learners, i.e., their linguistic and cognitive abilities, their attitudes and personality traits, as a complex interplay with each other and with the external contextual factors with which they interact (cf. van Geert 1991, Lerner 2002, Douglas Fir Group 2016, Truscott & Sharwood Smith 2019). The individual characteristics are referred to below as *internal variables*, the contextual factors as *external variables*. The external factors include the interactions and materials with which a learner is in direct exchange ("micro level of social activity," Douglas Fir Group 2016: 25). This is the so-called *proximal level* (Kersten 2020, Kersten accepted [postscript: 2023]). It includes social interactions within the family, the peer group, and in social institutions with classmates, teachers, or in associations. On a higher, more abstract *distal level* (Kersten 2020, Kersten accepted [postscript: 2023]), these interactions are in turn part of larger contexts such as the social and institutional environment with their respective specific characteristics (cf. Paradis & Grüter 2014: 5).

[1] In this paper, the terms *second language* and *second language acquisition* are used generically in the sense of R. Ellis (2003: 3) as "any language that is learned subsequent to the mother tongue ... as the way in which people learn a language other than their mother tongue, inside or outside of a classroom [L2]." In the same sense, the terms therefore also include all other languages that are learned after the mother tongue. This also applies to the distinction between L2 acquisition in the natural vs. institutional environment (foreign language acquisition): "the term 'second language acquisition' is used as a superordinate term to cover both types of learning" (R. Ellis 2008: 6).

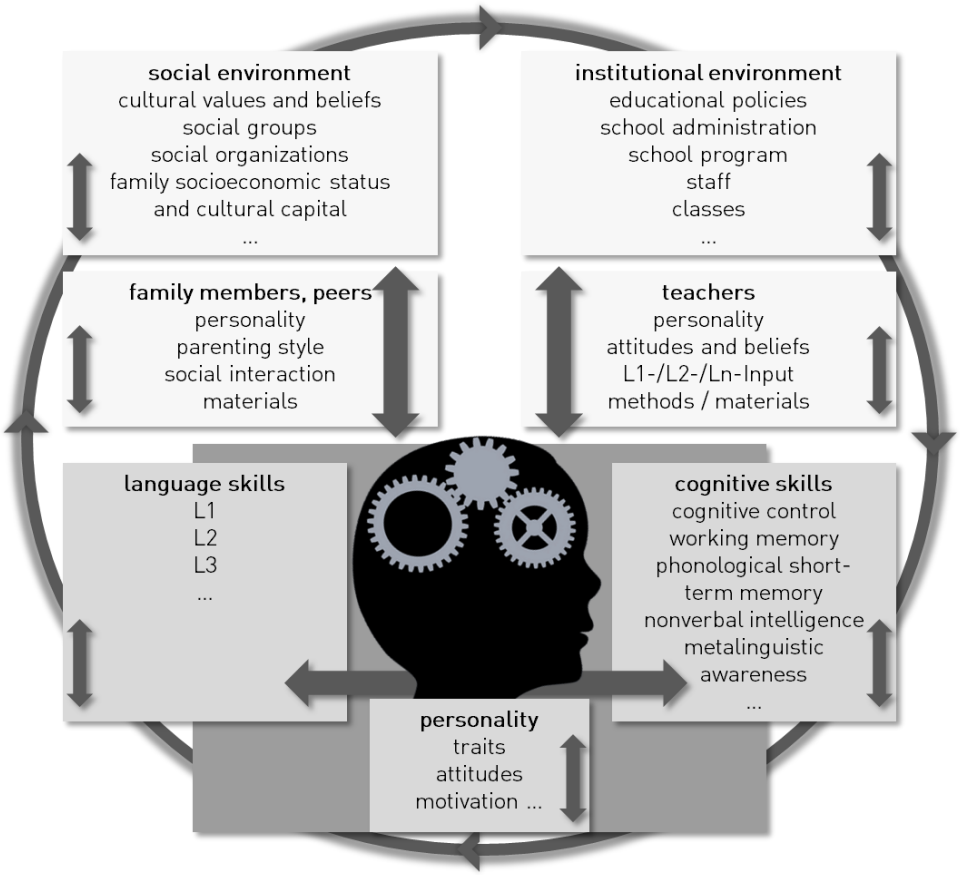

Fig. 1: Interplay of effects in linguistic and cognitive developmental processes
(adapted from Kersten 2019: 36, Kersten 2020, Kersten & Greve accepted [postscript: 2023])

Through mediation of the level of social interactions, they also have an effect on the individual (vertical arrows in the upper half, Fig. 1).[2]

This paper presents the interplay of learners' linguistic and cognitive abilities at the individual level (horizontal arrow, Fig. 1), and relates it to the level of external contextual factors in the social and institutional environment.

To that end, first, some definitions of terms will be introduced (section 2). At the level of language competences, it is important to distinguish between different forms of acquisition of two or more languages, which can take place in the family, in a natural environment, or in instructional environments in preschools or schools (section 2.1). Instructed L2 acquisition largely takes place as conventional foreign language teaching (FLT), but increasingly also in bilingual school programs, which, however, vary greatly in terms of onset, intensity, teaching approach, and effectiveness for L2 acquisition (section 2.2). In terms of cognitive abilities, the paper focuses in particular on frequently studied variables such as intelligence, working memory, cognitive control and meta-linguistic awareness (section 2.3).

In the subsequent section, correlations between individual linguistic and cognitive development are discussed on the basis of a few selected variables in both directions of effects (internal perspective, chapter 3): First, findings on the effects of bilingualism on cognitive abilities are examined (3.1), and then, in the opposite direction, effects of cognitive abilities on L2 acquisition (3.2).

[2] See Kersten (2020, accepted [postscript: 2023]) and Kersten & Greve (accepted [postscript: 2023]) for a detailed description of these levels and their consequences for empirical studies.

Finally, the article focuses on external contextual factors (chapter 4). First, findings on family contextual factors such as linguistic and social background are presented (4.1). Then, an overview of school contextual factors is given. Here, it will mainly be discussed whether and how instructional factors can contribute to creating conducive conditions for mutual development in both areas, cognition and language, and thus contribute to a potential compensation for disadvantaged learner groups (cf. Kersten 2019).

2. Terminology

2.1 First language acquisition, bilingual first language acquisition, second language acquisition

Contexts in which a child learns several languages are highly diverse and vary greatly from one individual to another (for a comprehensive overview of relevant distinguishing features, see Festman 2019: 239f). Those aspects relevant to this paper are discussed below.

The term *bilingual*, which in SLA research encompasses the acquisition of one or more additional languages (L2, L3, ... Ln) (R. Ellis 2003: 3, cf. footnote 1),[3] is used in very different ways in terms of language competence. For example, "weak" definitions postulate bilingualism when only some elements of an L2 are mastered while "strong" definitions assume an almost balanced competence in two languages, the so-called *balanced bilingualism* (Baker & Wright 2017). However, actual balance is rare (and difficult to determine) even among competent speakers of both languages because languages are usually used in a domain-specific way, and because a linguistic biography can change greatly depending on changes in personal needs and the environment (e.g., Lippert 2010: 40). Therefore, recent approaches assume a continuum of bilingual competence with regard to different dimensions (Baker & Wright 2017). These definitions necessarily remain arbitrary, and they have to be clearly operationalized for each research context.

With regard to the time of acquisition, a distinction is also made between the so-called *simultaneous* and *sequential* acquisition of both languages. Simultaneous acquisition is also referred to as *bilingual first language acquisition (BFLA)* (de Houwer 2009) and refers to children who learn more than one language from birth in the family and/or the environment. Typical examples of BFLA are families in which the mother and father have different mother tongues and speak these exclusively or predominantly with the child. Sequential bilingualism, on the other hand, refers to the acquisition of an L2 subsequent to L1 acquisition (Baker & Wright 2017).

Furthermore, a distinction is often made between naturalistic L2 acquisition in a non-institutional setting (e.g., family, peers, stays abroad) and so-called instructional, institutional (e.g., school-based) L2 acquisition, where the L2 is taught in class. This can take place either in regular FLT with a strong focus on the language, or in bilingual programs (CLIL, immersion, section 2), in which the teaching of subject content takes place in the L2. Therefore, in studies on instructional effects, a distinction is often made between *second language acquisition* for the naturalistic and *foreign language acquisition* for the instructional acquisition context, while in SLA research the terms L2 or second language are used as a generic term for both forms (R. Ellis 2003, 2008; cf. footnote 1).

[3] In the context of multilingualism research, further distinctions are made (see e.g., Festman 2019 on the distinction between bilingualism, trilingualism and multilingualism).

2.2 L2 acquisition in the school context: Foreign language teaching and bilingual teaching (CLIL, immersion)

In most federal states in Germany, regular FLT begins with the third school year and usually takes place twice a week for 45 minutes. In bilingual programs, on the other hand, which in European educational contexts are referred to as *CLIL (Content and Language Integrated Learning)*, non-language subject content such as mathematics, science, art, etc., is taught through the medium of an L2 (cf. Burmeister & Massler 2010, Coyle et al. 2010: 1, Mehisto et al. 2008: 13):

> Content and language integrated learning (CLIL) is a generic term and refers to any educational situation in which an additional language and therefore not the most widely used language of the environment is used for the teaching and learning of subjects other than the language itself. (Marsh & Langé 2000: iii)

The concept of *immersion* denotes a particularly intensive form of bilingual subject teaching. In a continuum of L2 intensity of CLIL programs, it represents the most intensive form (Kersten 2019: 40f). Here, at least 50% (partial immersion) to 100% (full immersion) of the curriculum is taught in the foreign language (cf. Burmeister 2006, Genesee 1987, Kersten & Rohde 2015). Such programs are called additive learning environments because their aim (among others) is to promote both languages involved in addition to the subject content (Swain & Johnson 1997: 7, Kersten & Rohde 2015: 72). Decades of international research have provided robust results on the positive effects of *immersion programs* in relation to L1 and L2 acquisition and subject learning (for an overview, see Kersten & Rohde 2015, Wesche 2002; chapter 4.2). More recent research in less intensive CLIL programs provides more heterogeneous results (see Rumlich 2019).

A distinction between these forms of teaching is important because, among other things, the language level in the L2 is significantly higher in intensive bilingual programs (Trebits et al. submitted [postscript: 2021], Pienemann et al. 2006, Maier et al. 2016; see Couve de Murville et al. 2016 for differential results of L2 lexicon acquisition according to program intensity). It is therefore essential to take contextual differences into account when comparing research results (section 4.2).

2.3 Cognitive abilities

The term “cognitive abilities” refers to the

> “thinking” or the information processing in the human brain in a general sense. More precisely, it is about a variety of cognitive abilities and processes, e.g. perceiving, paying attention, learning and transferring what has been learned. It also includes planning, anticipating, evaluating, deciding and performing actions, but also thinking logically and abstractly, drawing conclusions, solving problems and being creative. Finally, cognition includes the ability to observe and analyze one’s own experiences and behavior as well as situations in general (e.g. Funke/Frensch 2006). (Festman & Kersten 2010: 38f, translated by the author)

Research studies specifically focus on the so-called *cognitive control*. It generally refers to the ability to maintain the processing of information in the face of distractions, i.e., to focus on relevant information while *inhibiting* irrelevant information, to maintain or interrupt the execution of an activity, and to coordinate the course of all these activities, similar to a “manager” who is responsible for efficient and correct cognitive processing (Festman 2019: 245).

The *working memory*, in which information is stored, manipulated and retrieved for a short period of time, is closely related to these functions of cognitive control (cf. Hopp et al. 2018). This term is used differently in the literature (cf. e.g., Hasselhorn & Gold 2006: 73, Shah &

Miyake 1999: 1, French 2006: 13). In contrast to earlier models of short-term memory, the seminal model by Baddeley (2000; Fig. 2) includes not only the storage of information but also its manipulation and processing:

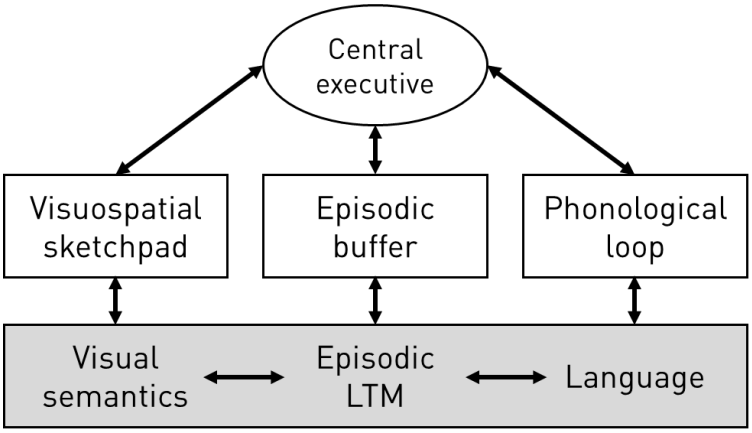

Fig. 2: Model of working memory according to Baddeley (2000: 5)

The *central executive* is the most important component of the model. It performs a wide range of functions, mainly coordinating activities within the working memory and controlling the exchange of information with other parts of the cognitive system. It controls attention and switches back and forth between different tasks.

The *phonological loop* and the *visuospatial sketchpad* are not capable of processing information independently; they only store them temporarily. The *phonological loop* is specialized in processing auditory input, particularly speech, and stores small amounts of auditory information over short periods of time. It thus functions as a storage system for *phonological short-term memory* (Henry 2011: 4).

The *visuospatial sketchpad* is a storage system for visual and spatial information. It does not manipulate or process the recorded information but merely stores it for a limited period of time. In contrast, the *episodic buffer* is seen as a system that can combine information from the *phonological loop*, the *visuospatial sketchpad* and *long-term memory,* and store it temporarily as a coherent episode (cf. Baddeley 2007: 148). It therefore functions as a kind of bridge that allows access to information from *long-term memory (LTM)* that can be used during ongoing processes in *working memory*.

Working memory and *phonological short-term memory (PSTM)* are therefore necessary for the comprehension process in order to store information temporarily and keep it readily available for further processing (cf. Rotter 2015). *Metalinguistic awareness*, i.e., the ability "to direct attention to the systematic elements of language and to be able to think about them" (Festman & Kersten 2010: 39), is closely related to these abilities, and relevant for learning (several) languages. *Metalinguistic awareness*, as well as *phonological awareness* as a part of it, are components of central language processing that is linked to attention and memory components (cf. Stackhouse & Wells 1997). Schnitzler (2008: 5) defines *phonological awareness* as "the metalinguistic ability to analyze and manipulate the phonetic structure of spoken language without analyzing the meaning of the linguistic material."

3. Selected internal variables: The relation between linguistic and cognitive abilities in L2 acquisition

3.1 The influence of different types of bilingualism on cognition

Hypotheses on the connection between bilingualism and cognitive development were described early on in the work of Jim Cummins. His *Threshold Theory* and *Interdependence Hypothesis* in particular have strongly influenced subsequent discourse (Cummins 2000): He claims that, if not at least one language is promoted in childhood in an age-appropriate manner, if for example a minority language is abandoned in favor of a new surrounding language *(subtractive bilingualism)*, there may be adverse effects on the development of cognitive abilities which are closely intertwined with the linguistic development. This phenomenon describes the lowest level in Cummins' Threshold Theory (Fig. 3, shown in grey). It is often (and critically) discussed in relation to a phenomenon called *semilingualism* (Cummins 2000; for an overview, see Baker & Wright 2017), which is assumed to result in a lack of linguistic foundations for academic school content. However, it is not always possible for teachers to identify this lack of linguistic competence. This is especially the case when it does not become immediately obvious. Here, Cummins distinguishes between *basic interpersonal communication skills (BICS)*, i.e., everyday language which these children often master very well, versus *cognitive academic language proficiency (CALP),* i.e., academic school language which is required for complex content. The latter is, according to the hypothesis, often not developed age-appropriately, but this does not always become apparent as long as the child's communication in everyday language does not stand out in any way. However, if one of the languages is age-appropriately developed, according to the *Threshold Theory*, age-appropriate cognitive development is also to be expected (first threshold, Fig. 3). Furthermore, if there is an age-appropriate level of language in more than one language, Cummins holds that learners can develop cognitive advantages over their peers (second threshold).

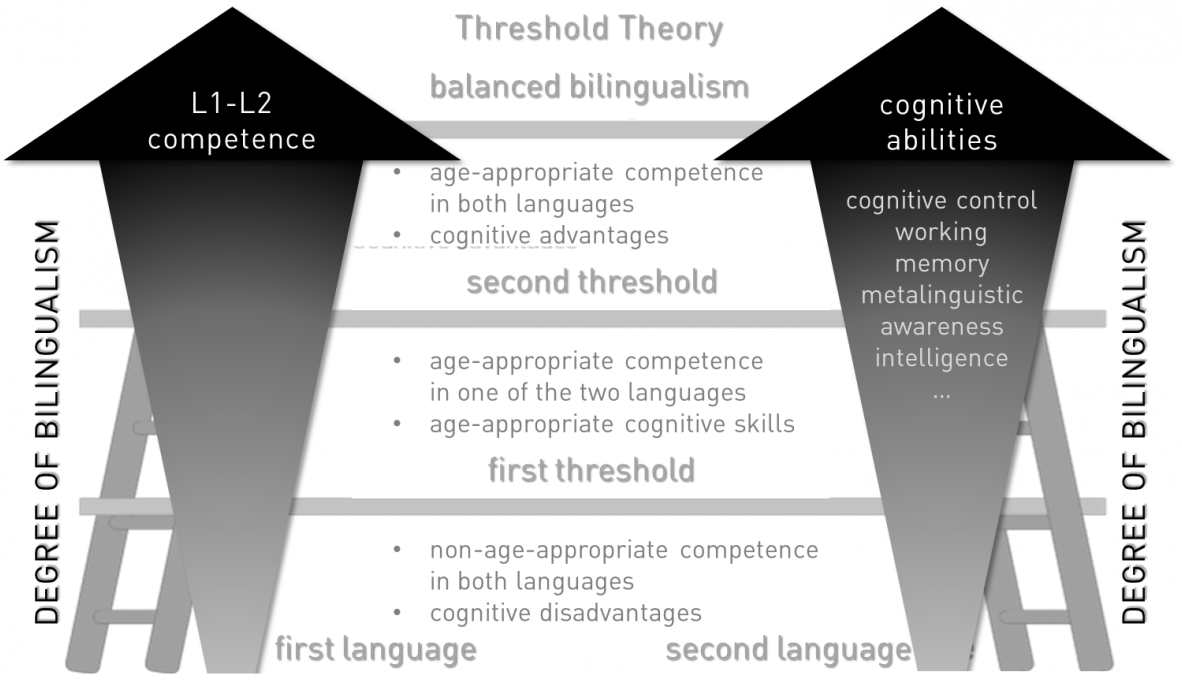

Fig. 3: Graphical representation of the *Threshold Theory* (Cummins 2000) and the *bilingual advantage hypothesis* based on the degree of development in two languages (Bialystok et al. 2009).

Cummins' *Interdependence Hypothesis* states accordingly that L2 competence is (at least partly) dependent on how far competence in the L1 is developed, and that "academic skills in both languages are signs of a common underlying skill and can therefore be transferred from one to the other" (Festman & Kersten 2010: 43).

More recent approaches, which take a more dynamic perspective on bilingual development (Baker & Wright 2017), speak of the so-called *bilingual effect* or *bilingual advantage* (see, e.g., Bialystok et al. 2009), which is seen as a gradual phenomenon (*degree of bilingualism*, Bialystok et al. 2009; arrows in Fig. 3). However, whether such effects are better represented by a threshold model, as originally postulated by Cummins, or as a continuum remains an empirical question.[4]

The influential contribution of Peal & Lambert (1962) marked a turning point in research on the effects of bilingualism on cognition. In contrast to the negative consequences postulated earlier (cf. for example Laurie 1890, Saer 1923), various studies currently find positive effects in methodologically much better controlled designs. These studies assume that continuously switching back and forth between several languages, or in other words, controlling two languages that are activated simultaneously and have to be selected or inhibited, might have a training effect. This training, according to the hypothesis, may lead to a change in certain cognitive abilities over time.

Evidence can be found, for example, in terms of better cognitive control abilities such as attentional control (Bialystok 2008) and inhibition (Poarch & van Hell 2012, Poarch & Bialystok 2015), higher meta-linguistic awareness, non-verbal intelligence (Woumans et al. 2016, 2019), and a greater storage capacity of working memory (Adesope et al. 2010; for an overview of various effects, see Bialystok et al. 2009). Adesope et al. (2010) find, for instance, a significant influence of bilingual first language acquisition on various cognitive factors in their extensive meta-analysis of data from 63 studies with a total of 6022 subjects:

> Results indicate that bilingualism is reliably associated with several cognitive outcomes, including increased attentional control, working memory, metalinguistic awareness, and abstract and symbolic representation skills. (Adesope et al. 2010: 1)

In a later meta-analysis of 27 studies with 2901 subjects, Grundy & Timmer (2017) show significant advantages for simultaneous bilinguals in working memory capacity (see also Blom et al. 2014, Morales et al. 2013, Veenstra et al. 2017).

However, research in area is heterogeneous and not all studies confirm such effects (Lehtonen et al. 2018, Antón et al. 2014, De Bruin et al. 2015, Dunabeitia et al. 2014, Paap et al. 2017). The *bilingual advantage hypothesis* is therefore currently subject of controversial discussion. Criticism relates to theoretical assumptions about how exactly bilingual experiences can influence cognitive abilities, to research designs and measurement instruments (Laine & Lehtonen 2018), to individual differences of bilingual speakers (de Bruin 2019), and a possible publication bias (de Bruin et al. 2015, Paap et al. 2017).

The most recent research approaches extend these investigations to neuroanatomy using neuroimaging techniques. These studies illustrate how the bilingual experience affects adaptations of brain structures, i.e., changes in grey and white matter (DeLuca et al. 2019a,b, Hämäläinen et al. 2018; for reviews see Hayakawa & Marian 2019 and Pliatsikas 2019). These studies assume that frequent use of two languages alters plasticity in the brain. These changes

[4] Ellen Bialystok herself does not make any statements on this (personal communication, August 31, 2018).

are described primarily for brain regions that are central to language acquisition and processing and, in particular, to controlling and switching between more than one language (Pliatsikas 2019).

The majority of studies on the impact of bilingualism on cognition examine simultaneous first language acquisition, while significantly fewer studies focus on sequential instruction-based L2 acquisition (Bialystok & Barac 2012, Carlson & Meltzoff 2008, Nicolay & Poncelet 2013, 2015; Poarch & van Hell 2012, Woumans et al. 2016, 2019; for a review, see Simonis et al. 2019). Arguably, the assumed effects are less evident in the school context since learners' L2 competence is much lower on average than it is when the languages are acquired in the family. In other words, in school contexts a less balanced *degree of bilingualism* between the two languages is to be expected. If positive cognitive effects can also be found in instructional L2 acquisition, this would have very important implications for educational policy considerations.

Some studies in immersion programs in primary schools have indeed reported significant effects on cognitive development in very different contexts (including Canada, Belgium, Germany) (e.g., Bialystok et al. 2014, Lazaruk 2007, Lee 1996). Nicolay & Poncelet (2013) compare cognitive abilities of 53 French-monolingual third graders with those of 53 third graders in immersion schools with L2 English in Belgium. The children started with the immersion program in their last year of preschool. 75% of the program was conducted in English for three years, and 50% in the last year. Results of the study show that

> [t]he immersion group's reaction times were significantly faster than those of the monolingual group on tasks assessing alerting, auditory selective attention, divided attention and mental flexibility (...). These results show that, after only three years, a second language immersion school experience also produces some of the cognitive benefits associated with early bilingualism. (Nicolay & Poncelet 2013: 597)

These results were confirmed in a longitudinal follow-up study with 101 learners from grade 1 to grade 3 (2015). This study additionally showed that at the baseline of the first testing time, both groups had not shown any differences in intelligence, socioeconomic status, or cognitive ability.

In another study, after one year in a 50% immersion program at the end of grade 1, 27 children show no advantages in cognitive control and verbal fluency, but do show advantages in tests on non-verbal intelligence (Woumans et al. 2016, see also Woumans et al. 2019 for similar effects). Simonis et al. (2019), on the other hand, find no cognitive advantages for immersion students in their study of 513 L2 learners; however, their study involved a less intensive L2 program (about 50% of the curriculum for primary students and 27% for secondary education).

In our longitudinal study in Lower Saxony, Germany, regular vs. immersion schools (Adler et al. 2018, Trebits et al. submitted [postscript: 2021]), the development of 39 third graders (mean age 9;4) is investigated over one year in receptive L2 acquisition, working memory, phonological short-term memory, phonological awareness and non-verbal intelligence. In the partial immersion program, all subjects except German were taught in English (approx. 77% of the curriculum). The immersion learners (n = 16) achieve significantly higher results in 3rd and 4th grade in comprehension tests on English grammar and vocabulary as well as in phonological awareness. In tests on working memory and non-verbal intelligence, they do not show any differences to the regular classes in grade 3; at the end of fourth grade, however, they achieve significantly higher results in working memory.

These findings support the assumption of the *bilingual advantage* hypothesis that cognitive effects can develop over a longer period of time at school in intensive L2 programs that lead

to comparatively high L2 competence. This would also be an explanation for studies with very short duration of immersive L2 acquisition (Carlson & Meltzoff, 2008; Poarch & van Hell; 2012; Woumans et al. 2016) and with less intensive programs (Simonis et al. 2016) which found no effects (cf. section 4.2 on the importance of contact duration and L2 intensity). In addition, these results suggest that some skills, such as phonological awareness, can be trained more easily or become apparent earlier than others. To corroborate such findings and to determine whether such a development is of a more gradual *(degree of bilingualism)* or stepwise nature *(Threshold Theory),* and at which *degree of bilingualism* these effects become apparent, larger longitudinal data sets are necessary that include learners' language competence in all their languages. In addition, social and other variables need to be controlled for in order to exclude possible selection effects, especially in the bilingual programs.

3.2 The influence of cognitive skills on L2 acquisition

(Sequential) second language acquisition takes place at a time when various skills have already been acquired in the course of L1 acquisition. It therefore relies more heavily than first language acquisition on previously acquired general learning mechanisms and principles (Miyake & Friedman 1998: 340). Individual cognitive abilities are thus considered an important factor in the L2 acquisition process (Dörnyei 2005, Dörnyei & Ryan 2015). In this context, research has focused on affective, cognitive and behavioral aspects, especially motivation, language aptitude, and learning styles and strategies (Dörnyei 2005: 33):

> [T]he composite of these variables has been seen to answer why, how long, how hard, how well, how proactively, and in what way the learner engages in the learning process (Dörnyei 2009: 231).

However, the definitions and composition of these variables are not consistent across papers. Recent studies therefore focus more on individual cognitive factors and their significance for second language acquisition (cf. e.g., Dörnyei 2005).[5]

In order to speak and understand a language, learners must be able to process a number of different symbols in temporal sequence (Miyake and Friedman 1998: 341). Consequently, the acquisition of a language (production and comprehension) requires the simultaneous storage and processing of information. For this reason, *working memory* is also considered to have a central influence on second language acquisition in this direction (ibid., cf. Skehan 2002, Wen 2014, Linck et al. 2014). *Phonological short-term memory (PSTM)* has often shown to be a relevant factor in the acquisition of new vocabulary: The learning of new lexemes does not usually involve significant conceptual development or restructuring because learners have already acquired the corresponding word in the first language (Gathercole et al. 1992: 897). Here, therefore, it is primarily a matter of learning a new phonological form. Since the phonological short-term memory briefly stores auditory information, it plays a crucial role for this process (cf. ibid.). *Phonological awareness* is an essential factor for L2 vocabulary acquisition,

[5] Within the framework of *Dynamic Systems Theory (DST)* in the SLA debate, the discussion also increasingly focuses on the dynamic change of variables depending on time and context (Dörnyei 2009). This debate relates, among other things, to the theoretical assumption of predictive possibilities in general: DST approaches "range from approaches that see L2 development as a highly variable and nonpredictable process [...] to those that view L2 development as both dynamic and rule-governed" (Lenzing 2015: 91). Elsewhere, however, we argue that predictions are in principle possible for those subsystems that are stable (for a certain period of time) (so-called non-chaotic subsystems and *attractor states,* vlg. Hiver 2015: 20), but *"within the constraints of the context, the state and nature of the DS, and the limitations of the research instruments"* (Kersten & Greve accepted [postscript: 2023). For reasons of space, however, this debate cannot be further discussed here.

as well (Hu 2008: 40, 2014, McBrideChang et al. 2006, Farnia & Geva 2011), and it possibly plays an even greater role than in first language acquisition: For foreign language vocabulary, not only individual sounds are unknown to the learner but also language-specific sound and intonation patterns as well as syllable structures (Hu 2003: 434). In particular, studies find an influence of phonological awareness on the acquisition of literacy (Hu 2008, Schründer-Lenzen 2013, Jongejan et al. 2007; for a review, see Murphy 2018). In his *Inhibitory Control Model*, Green (1998) assumes that bilingual speakers have to activate the language system in use, while the language system that is not in use has to be inhibited (section 2.3). For this reason, the *cognitive control skills* responsible for this reciprocal inhibition and activation also belong to the predictors of L2 acquisition (Woumans et al. 2019). Moreover, a connection between *nonverbal intelligence* and second language acquisition is assumed (Genesee & Hamayan 1980: 96): Learners must actively figure out the different components contained in the input, the meanings of these components, how they are structurally composed, and the principles used to achieve successful communication (Kristiansen 1990: 118). Because of the ability of complex pattern-recognition and logical reasoning, special importance is attributed to non-verbal intelligence for the acquisition of grammatical regularities (Kempe & Brooks 2011: 18). It is also central for general text comprehension as well as for the acquisition of word meanings (Kristiansen 1990: 43f), as this often requires deriving meaning from the linguistic context.

In a study of 200 learners at German primary schools, Hopp et al. (2018) show that non-verbal cognitive abilities ("basic intelligence") and phonological awareness significantly predict productive vocabulary, and working memory significantly predicts learners' L2 grammar production (measured by a sentence repetition task). Disadvantages of bilingual learners' L2 competences (cf. section 4.1) disappear after controlling for cognitive variables including working memory and phonological awareness.

A study of 46 4th-grade foreign language learners in regular FLT classes (n = 24) and immersion programs (n = 22) shows significant correlations of working memory, phonological short-term memory and non-verbal intelligence with L2 grammar comprehension in the regular group, as well as of phonological short-term memory with L2 vocabulary comprehension (Kersten 2019). In contrast, this correlation is not found in the immersion group. In a sub-study of the dataset, which includes 20 of the learners from the regular group and in which working memory, phonological short-term memory, phonological awareness and intelligence were examined, Werkmeister (2015) also finds a significant influence of phonological awareness on L2 grammar comprehension, and of phonological awareness as well as phonological short-term memory on L2 vocabulary comprehension. These findings support results from previous studies that show that children with higher cognitive abilities appear to have an advantage in foreign language acquisition. However, such results are mainly available in mainstream schools, whereas such a correlation was not found at the end of immersion primary school (Kersten 2019). It is therefore advisable for such studies to differentiate between these different school contexts (see section 4.2).

Overall, studies on the influence of cognitive skills on L2 acquisition are less heterogeneous than studies on the reverse direction of effects (see section 3.1). However, a more precise differentiation of individual components of the cognitive variables, the linguistic abilities (lexical, grammatical, pragmatic competences, etc.), the receptive vs. productive abilities as well as the four skills (listening, speaking, reading, writing) is required when interpreting the results. In this direction of effects, it is also essential to control for external learning contexts such as the school program and social variables. The influence of those conditions on the process of (second) language acquisition is almost certainly not categorical (i.e., relevant or not), but gradual.

The results presented here could indicate an effect of different types of language teaching in both programs (cf. Kersten 2019, Kersten et al. 2019): Immersion teaching relies more strongly on a multisensory approach that supports contextualization of content at multiple levels than regular foreign language instruction (section 4.2). That way, learners are provided with more opportunities to comprehend content and language through multiple channels. Arguably, this may lead to fewer differential effects on intelligence and memory skills than in regular FLT. This would suggest that learners with good cognitive abilities show advantages in FLT, while bilingual teaching also enables learners with less pronounced cognitive abilities to reach a high level of language proficiency in the L2 – presumably through stronger support of comprehensibility and other linguistic scaffolds. These findings, which are further elaborated in section 4.2, need to be corroborated with larger data samples.

4. Selected external variables: Family and school contextual factors

The external contextual factors within which language development takes place include interactions within the social and the school environment. Kersten & Greve (accepted [postscript: 2023]) state that these contextual factors are on different conceptual levels (Fig. 1).

On the one hand, the *proximal* level of social interactions and the *distal* level of superordinate social contexts need to be distinguished (chapter 1). A causal influence on the individual is assumed primarily through the direct stimulation of a proximal variable with which the learner interacts directly. The "influence" of distal contextual factors would accordingly have to be assumed to be mediated by proximal ones (*proximity of stimulation* approach), as Kersten (2020, accepted [postscript: 2023]) shows: In this study, influencing factors on the cognitive and linguistic development of 93 primary school children from regular and immersion classes (mean age 9;6) were investigated. The influence of socio-economic status (distal) on working memory was mediated by verbal interactions in the family (proximal), and the influence of the school program (distal) on L2 acquisition was mediated by stimulating tasks in the L2 (proximal).

On the other hand, factors on the higher level often represent so-called container-variables that include diverse, sometimes very different proximal factors (Fig. 1, Kersten & Greve accepted [postscript: 2023], Winsler et al. 2014). One such container-variable is the so-called "migration background," which includes numerous aspects that can have very different effects and must therefore be specifically assessed: These include, for example, the typologies and social prestige of the languages involved, the educational background, early cognitive support and frequency of language use in the families, and many more (cf. Festman 2019). For that reason, these different individual factors should not be comprised within only one variable for all multilingual children.

Using a construct such as "migration background" as an "influencing variable" in empirical studies disregards this problem because it confounds the diverse contexts underlying cognitive development and school success (cf. Thee 2006, Jessner 2008, Maluch et al. 2015, Kersten & Greve accepted [postscript: 2023]). This applies to institutional factors such as fostering the ambient language at school, the type of foreign language program, the duration and intensity of contact with the L2, the quality of the L2 instruction and input, etc. Here, it is equally important to distinguish between the different conceptual levels, containers, and the proximal stimulating factors. Section 4.1 addresses these aspects with regard to the social and family environment, section 4.2 to the school environment.

4.1 Family contextual factors: Social and linguistic background in L2 acquisition

The influence of the social environment as a distal context factor on child development has been documented in many studies (Hackman & Farah 2009, Lawson et al. 2016). This concerns effects regarding cognitive abilities, school performance (Kishiyama et al. 2009, Sheridan et al. 2012) and language acquisition (Hamid 2011, Klieme et al. 2006, Shamim 2011, Sorenson Duncan & Paradis 2018). At the proximal level, studies also find a link between cognitively stimulating activities in the family and language acquisition (Bracken & Fischel 2008, DeTemple 2001, Liebeskind et al. 2013, Nord et al. 1999, Pungello et al. 2009, Winner 2007).

The linguistic background of bilingual learners is usually classified on the basis of the immigration status of the families as the so-called "migration background" (cf. Statistisches Bundesamt 2013: 7). As explained above (chapter 4), however, this is problematic in empirical studies because this term confounds various distal and proximal influencing factors. Nevertheless, multilingualism is often considered a risk factor for children who do not learn German as their only mother tongue (OECD 2010, 2016). This discussion has an (often hampering) effect on the introduction of innovative educational concepts to promote early bilingual learning. For this reason in particular it is not surprising that the scientific discourse concerning bilingual children's acquisition of an additional foreign language is highly heterogeneous.

In many large-scale school achievement studies, learners with "migration background," which often correlates with socio-economic status (Hopp et al. 2018, Winsler et al. 2014), perform significantly lower on average than their monolingual peers (OECD 2010, 2016; Stanat & Christensen 2006). According to Cummins' (2000) *Threshold Theory* and *Interdependence Hypothesis* (section 3.1), this might be due to the phenomenon that language levels in both languages as well as cognitive abilities of the learners are not developed in an age-appropriate way. This lack of skills is not visible in everyday communication, but is often insufficient for the academic language of instruction. In some studies on foreign language learning, disadvantages for children with a migration background are also found in regular school programs (Elsner 2007, Hopp et al. 2018, Husfeldt & Bader Lehmann 2009).

A number of studies, on the other hand, show advantages for simultaneous bilingual learners in acquiring another language (e.g., Hesse et al. 2008, Maluch et al. 2015, Brohy 2001, Cenoz & Valencia, 1994, Sanz 2000; for a review, see Cenoz 2013), especially when learners' different languages are officially supported in the education system and further developed in the school curriculum (Cenoz 2013). In contrast, Wilden & Porsch (2015), for example, find no differences between monolingual and multilingual learners.

These findings relate primarily to foreign language acquisition in regular school programs. Various studies on bilingual teaching, on the other hand, find no disadvantages for bilingual learners; in some cases they even find advantages. Couve de Murville et al. (2016) carried out a study with 76 learners from different L2 programs in primary school on receptive lexical L2 acquisition. Here, the children's linguistic background had no influence on the language level in the L2; in contrast, the duration of contact and the intensity of the L2 had a significant effect. Maier et al. (2016) investigated the L2 language production of 105 learners from different L2 primary school programs using different communicative tasks. Similar to the study on lexical acquisition, the linguistic background did not show any influence on L2 proficiency, in contrast to contact duration and intensity (see Kersten et al. 2010, Couve de Murville & Lenz 2012, Steinlen & Piske 2013, 2016 and Steinlen et al. 2019 for other examples where no differences between monolingual and multilingual learners are found). Mady (2015, 2017) studied 90 6th-graders in a partial immersion program in Canada (50% in L2 French from grade 1). 30 learners were from monolingual Anglophone families, 30 multilingual learners were born in Canada, 30 multilingual learners were from immigrant families and were born abroad. 80% of the

learners in both multilingual groups had a background from India. The study shows significantly better results for the immigrant group in L2 reading and writing skills and oral L2 production compared to both other groups. Mady (2017) rules out increased metalinguistic awareness as a reason for these differences.

In view of the differences between conventional foreign language programs and bilingual teaching presented above (see also section 4.2), the question arises as to whether these findings vary systematically depending on the school context. One hypothesis is that bilingual programs provide more intensive language support, which enables (more) holistic cognitive support that goes beyond the mere teaching of foreign languages. These considerations are further elaborated in the following section.

4.2 School contextual factors: Program features of foreign language teaching and bilingual teaching as possible factors affecting L2 acquisition

Well-founded empirical findings on these relationships are of great importance for the design of school teaching programs, especially when it comes to counteracting the well-known "gap" in academic success between monolingual children and those with so-called "migration background."

In the above-mentioned conceptual hierarchy (chapter 1), teaching programs represent the institutional side of the distal contextual factors. An influence of the factor *school program* becomes relevant when differential effects are evident, i.e., when differences are found in instructional aspects as well as in the linguistic and cognitive development of learners in different programs. Studies on these variables show various influencing factors and distinguishing features. This concerns the quantity and quality of teaching as well as individual characteristics of the teachers in these programs. Effects of these differences have been described with regard to L1 and L2 acquisition, academic content knowledge, and some cognitive skills (see chapter 3).

The European Commission requests that European school systems should teach at least three languages at a functionally adequate level (KMK 2006), although it remains unclear what exactly is meant by "functionally adequate." Not all different school systems meet this requirement. In the research area of *Instructed Second Language Acquisition*, the conditions for successful L2 acquisition in schools are addressed. Language acquisition theories within the cognitive-interactionist approach (Long 2015) identify a number of input and instructional features that contribute to effective institutional L2 acquisition. Here, a distinction must be made above all between aspects of L2 quality and quantity in the classroom (see Kersten 2019 for an overview and further discussion, R. Ellis & Shintani 2014, Böttger 2016 for a detailed introduction).

Aspects of instructional quality include repetition of linguistic forms in the input (*Frequency Hypothesis*, N. Ellis 2002) and conscious awareness of forms and regularities (*Noticing Hypothesis,* Schmidt 1990), preferably within a meaningful communicative context (*Meaning-focused Instruction*, Krashen 1985) and at the exact moment when the need arises in communication (*Focus on Form*, Long 2015). Other important aspects are comprehensible input (*Input Hypothesis*, Krashen 1985), authentic interaction with opportunities for negotiating meaning and for various forms of error correction (*Interaction Hypothesis*, Long 1996, *Error Correction*, Lyster & Saito 2010) and the promotion of learners' linguistic production (*Output Hypothesis, Swain* 1995). It is also considered relevant to embed linguistic processes in meaningful activities *(tasks)* with a problem-solving character which stimulate the learners' active construction

of knowledge (Wolff 2002), activate their knowledge of the world *(prior knowledge)* and are related to their real-life experiences.

These and other *scaffolding strategies* all aim to convey an understanding of the situation and the content using diverse channels of information *(multisensory learning)*, and to promote cognitive stimulation, processing and storage in long-term memory (for a detailed description, see Kersten 2019 [postscript: Kersten 2021, Kersten et al., submitted a]).

Kersten et al. (2018a [postscript: Kersten 2021]) operationalize a variety of these characteristics in the quantitative observation instrument *TIOS (Teacher Input Observation Scheme),* which includes scales on cognitively stimulating language learning contexts, verbal input, non-verbal input (Fig. 4) and reactions to learner language. The instrument is a further development of the *Input Quality Observation Scheme* (Weitz et al. 2010: 44, Weitz 2015), which was created for the preschool context. Each item of the TIOS describes a teaching technique, which is defined as a "*description of how a behavior or activity is carried out in the classroom at a given moment as the actual point of contact with the learner/s"* (Kersten et al. 2019: 16, cf. Long 2015: 301 [postscript: Kersten 2021]). It is important to note that these techniques refer exclusively to behavior that can be concretely described, without needing to interpret a function of that behavior. For example, the terms *scaffolding* or *negotiation of meaning* automatically include the *intention* of the communication partners. This intention, however, can only be interpreted but not observed. In addition, items must be on a similar level of description within the *taxonomy* and should not represent abstract container variables that include various techniques – i.e., they should not represent supercategories such as *scaffolding* or *negotiation of meaning.*

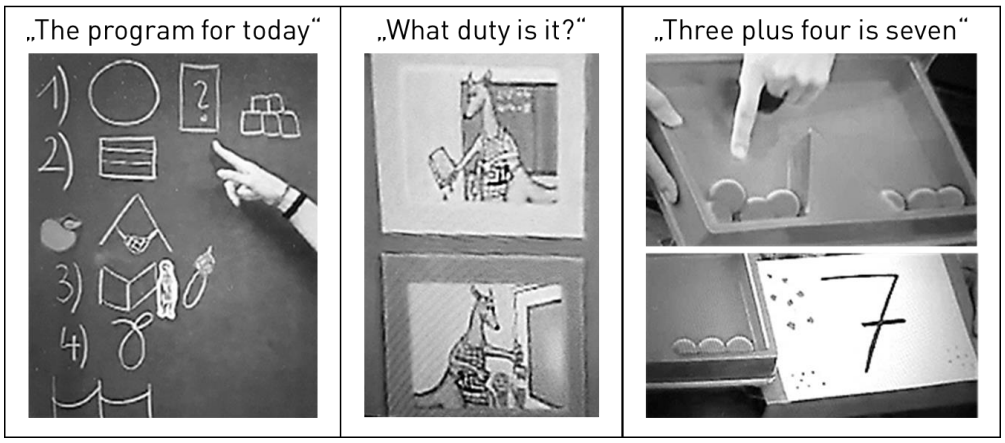

Fig. 4: Visualizations of instructions and subject teaching at an immersion school in Lower Saxony (grade 1)

The ELIAS project (*Early Language and Intercultural Acquisition Studies*, Kersten et al. 2010), a cross-national study in ten bilingual preschools, finds a positive effect of input quality on receptive lexical and grammatical L2 acquisition using the IQOS (Weitz et al. 2010, Weitz 2015). Kersten et al. (2018b, submitted [postscript: submitted b]) use multilevel modelling of the same data set to investigate the influence of the variables *duration of contact with the L2, L2 contact intensity, L2 input quality, age, gender, language background, social status* and *reading support in the family*. This study also concludes that input quality has a significant positive effect on the growth of receptive L2 grammar knowledge. Kersten et al. (2019) come to similar findings using the TIOS. They investigate the effect of L2 input from ten teachers in regular and immersion programs on receptive L2 lexicon and grammar acquisition of 169 learners (3rd and 4th grade). The teachers' TIOS score explains 21.4% of variance in the lexicon test and 20.8% of variance in the grammar test.

The most important aspects of quantity are the duration of contact with the L2, i.e., the period of time over which an L2 is learned, and its intensity, i.e., the number of hours during this time in which encounters with the L2 take place (see Weitz et al. 2010 for a discussion and operationalization of relevant aspects). The most robust research findings pertaining to these aspects are available from Canadian immersion programs, where intensive research has been carried out since the 1970s (Wesche 2002). More recent studies from immersion programs in Germany replicate these findings.

Tab. 1 shows two examples of the L2 production of learners without (Child 8) and with previous L2 experience (Child 16) from an immersion program. In this program, all subjects except German were taught in the L2, English (about 75% of the curriculum). At the end of grade 1 in the immersion school, Child 8's narrative already illustrates a language level that is well above the level of A1, the L2 level generally required at the end of primary school. This girl first encountered the L2 English at the beginning of grade 1. A typical structure of the learner language for early L2 stages that is evident here is, for example, the use of the -ing form without an auxiliary as a verb marker, the so-called *interlanguage -ing* (Pienemann 1998). It is embedded in a consistent use of the simple sentence structure (subject – verb – object), which is complemented by the repeated fronting of the adverbial *and then.* According to the developmental stages model of Pienemann (1998), SVO and the *interlanguage -ing* belong to stage 2, the adverbial fronting to stage 3 of the six developmental sequences in the L2 acquisition of English (cf. Kersten 2009a). Even though her lexical variability is still very limited, the girl is able to tell the events of the story comprehensibly with her linguistic resources.

In the second example at the end of her primary school years, child 16, a girl with three years of previous experience from a bilingual preschool, shows a broad and diverse lexical and morphosyntactic variety. She is familiar with technical terms such as *muzzle, beehive* and *antlers*, and she uses causal and temporal subordinate clause structures, direct speech with correct inversion of interrogative clauses, and narrative devices to express simultaneity and sequence of action, among other things (Tab. 1).

Picture Story Narrations "Frog Story" (*Frog, where are you?* Mayer 1969)
Child 8 (1st grade, no previous experience) There is a dog and a boy, and the dog looking in a glass, and in the glass sitting a frog and the moon shining. And then, the boy are sleeping and the dog sleeping. And then, the boy looking in the glass and the frog is not there. Then, the boy looking in the t-shirt and the dog looking in the glass and the boy looking out the window. And the dog staying next to the boy. And then, the dog falling down out the window and the boy has the dog in his hand. And then, the boy are staying out the house and looking in the wood. And then, the boy looking in a hole and the boy say "Au!" *[laughs]* And then, the boy looking in a hole and the bees fly away. And then, the dog are running away. Then, the boy coming to a stone and then, the boy staying on the stone. 'N then, the boy are sitting on a deer and the dog are running away. And then, the dog and the boy are falling down. 'N then, the boy and the dog are sitting in the water. 'N then, the boy are say "psst", and the dog are looking to the boy. And then, the boy see a frog and next to the frog sit a frog. And then, the frog children come out the grass. And then, the boy say goodbye to the frogs.
Child 16 (4th grade, previous experience from a bilingual preschool) This story is named "Frog, Where Are You?" by Mercer Mayer. A boy named Bill and his dog Barcardi looked at the glass jar within a frog. Because it was evening, they slept in their bed. Then suddenly the frog jumped out of his glass jar and suddenly disappeared. At morning when the sun shine(d?) out through the window the dog and the boy named Bill looked at the glass jar, and there was no frog in there. The boy jumped up and put on his clothes, boots and everything he had. The dog put his muzzle in the glass jar and wanted to

look if there was any frog in there. Then the boy opened(?) the window and shouted out: "Frog, where are you? Frog, come back!" And the dog wanted to look out the window, too, but then fell down into the grass. The boy looked(?) down and ran out of the house to come to the dog. He was a little bit angry. But the dog gave him a little kiss. But the glass jar was broken, so the dog was free. Then they wanted to go into the wood and the boy shouted out: "Frog, where are you? Frog, come back!" Then the dog looked up to the bees and ran to the beehive. The boy looked(?) down and shouted in a little hole in the grass: "Come out, frog! Are you in there?" But suddenly a mole come(?) out and stuck his nose out. Then the dog wanted to climb up the tree. And suddenly the beehive fell down. The bees were very angry and they wanted to sting the dog. In this time the boy, Bill, climbed up the big tree and shouted in a hole "Frog, come out! Are you in there?" But suddenly, an owl rushed out of this hole and the boy fell down on the ground. The dog ran into the wood because the bees wantes *[misspeaks]* to sting him in his skin. The boy was a little afraid of the owl that came out of the hole, and then he climbed up a big rock. Then he put his hands on the antlers and shouted: "Oh come out! Frog, are you there?" But suddenly a deer came out of there and carried Bill on his head, and they fell down a cliff, the dog and Bill. They fell into a pond. But then, suddenly, as they stuck out their head of the water, they heard a little noise. Then Bill said: "Pssht" because the dog was so loud in the water. Then they climbed over the trunk and saw their frog and another frog with their frog babies. Bill took one of the frog babies and went home. And so everybody has his family

Tab. 1: Oral narrations of the picture story "Frog, where are you?" (Mayer 1969) at the end of grade 1 and grade 4 of an immersive primary school in Schleswig-Holstein; transcriptions without hesitations, self-corrections and utterances of the interviewer (for complete transcripts, see Kersten 2009b).

As mentioned above, Couve de Murville et al. (2016) and Maier et al. (2016) identify contact duration and contact intensity to the L2 as the strongest predictors of lexical and morphosyntactic L2 proficiency in German primary schools (cf. section 4.1). In their above-mentioned study, Kersten et al. (2018b, submitted [postscript: submitted b) also show an influence of L2 contact duration and intensity on L2 grammar and vocabulary comprehension. Another influencing factor is age, while gender, social status and fostering reading in the family show no effect in this study.

In an extension of their 2017 study, Jaekel et al. (2018) describe an effect of contact duration among 1510 9th-graders. Learners who started English in grade 1 scored significantly higher in L2 listening comprehension and reading than learners with a start in grade 3. However, the authors discuss that factors such as the quality of input and instruction were not included in their study.

Studies also report positive results for the ambient majority language (for most children the L1) and for content knowledge in immersion programs when compared to non-immersion programs. Such advantages for L1 and content learning were found in early very intensive programs compared to monolingual instruction by Couve de Murville & Lenz (2012), Gebauer et al. (2012, 2013), Steinlen & Piske (2013, 2016), Zaunbauer & Möller (2006, 2010; for an overview, see Kersten & Rohde 2015, Wesche 2002). Initially, some delay may be observed because the L2 first has to be developed. The less intensive the programs, the less uniform these findings are (for further discussion, see Kersten 2019).

Differential effects for cognitive skills in conventional FLT vs. (intensive) immersion programs have already been described in section 3.1 (cf. Trebits et al. submitted [postscript: 2021], Adler et al. 2018, Bialystok et al. 2014, Lazaruk 2007, Lee 1996, Nicolay & Poncelet 2013, 2015; Woumans et al. 2016), and differential effects for learners with a migration background were described in section 4.1 (Kersten et al. 2010, Couve de Murville et al. 2016, Maier et al. 2016, Couve de Murville & Lenz 2012, Steinlen & Piske 2013, 2016, Steinlen et al. 2019).

Recent studies have also found initial evidence of such differences with regard to teachers. All the aforementioned teaching techniques operationalized in the TIOS are derived from general foreign language frameworks, especially from communicative language teaching. Never-

theless, in a study of 17 primary school teachers, Kersten et al. (2019) find that the nine immersion teachers use significantly more of the these techniques in their instruction than the eight teachers in mainstream schools in their FLT. Here, the variance among the regular teachers is significantly higher than among the immersion teachers.

In her dissertation study with 307 primary school teachers in the project BiLLiE *(Bilingual Teaching and Learning in Development),* Wegner (in prep. [postscript: 2022]) shows significant differences between teachers in regular (*n* = 240) and bilingual school programs (*n* = 67): Self-reports of bilingual teachers show significantly higher scores for foreign language skills, persuasiveness ("I find it easy to convince others of my ideas"), striving for optimization ("I am constantly looking for ways to improve my teaching"), teamwork skills and interest in multilingualism than those of the regular teachers. In addition, they assess the workload of bilingual teaching as significantly lower than regular teachers. Moreover, bilingual teachers are more willing to try out new teaching concepts and to invest more work for them. With regard to the implementation of teaching strategies, bilingual teachers report to use significantly more body language, visual illustrations with pictures and objects, and a significantly higher amount of L2 to accompany activities, i.e., explaining their activities linguistically as they perform them.

In the same project, a study involving 938 primary headmasters from Lower Saxony also reveals differences between regular and bilingual programs in attitudes towards bilingual teaching regarding the children, schools, the school system, mixed learner groups and the perceived challenges faced by the learners: Headmasters from bilingual primary schools show significantly more positive attitudes regarding these aspects than headmasters from regular primary schools (Blank 2017: 46, Wegner in prep. [postscript: 2022]).

Bilingual teaching is also associated with more positive attitudes among learners. As part of the BiLLiE project, Meinke & Meisner (2016) study 173 fourth-grade students in bilingual programs with different intensities and regular FLT. They show significantly higher scores for learners in the most intensive immersion program in terms of attitudes towards their own L2 competence, the English language and the bilingual program. The following quote is an illustrative example of these students' experiences:

> *"My highlight was actually every single second in the school. ... I will miss it, this atmosphere, and feeling confident in the class, and safe."*
>
> (Statement of a 4th-grader when asked about the "highlight" of her primary school years in the immersion program; Kersten 2019: 57)

In line with these findings, the SMILE project *(Studies on Multilingualism in Language Education)* finds that the type of school program significantly moderates the effect of social status on the working memory of learners in primary school (Kersten 2020): The more intensive the L2 program, the less noticeable the effect of social status on working memory [postscript: comp. Kersten et al. 2023 for similar effects of input quality]. This is a strong indication for beneficial effects of intensive L2 programs for general cognitive development.

In summary, these findings seem to indicate significant differences between regular and bilingual primary schools in terms of program characteristics (*L2 contact duration* and *intensity*), attitudes and teaching techniques (*cognitive stimulation, active knowledge construction through content-based instruction, L2 input quality,* Kersten 2019: 57 [postscript: Kersten 2021), which show effects on L2 acquisition as well as learners' cognitive development and attitudes. The use of these techniques appears to have the potential to compensate for certain disadvantages due to the lack of early family support (cf. Kersten 2020 [postscript: and Kersten et al. 2023]). These effects need to be corroborated with larger groups of subjects, including

the above-mentioned control variables, especially early family support, social background and detailed multilingualism status.

The difference in the use of teaching techniques [in FLT vs. bilingual teaching] cannot necessarily be derived from the instructional approaches, since, as described above, bilingual teaching is not based on any "special" kind of instruction. One possible explanation could be that the teaching of subject content in bilingual programs requires a particularly intensive use of L2 teaching techniques, and thus bilingual teachers might use them more frequently. This is not necessarily the case for each individual profile, as is shown in the scores of single regular FLT teachers from our SMILE sample that exceed the average of immersion teachers in the TIOS scores (Kersten et al. 2019).[6] On the other hand, the implementation of bilingual programs can also lead to self-selection, where mainly teachers with good L2 language skills and high methodological competence are recruited who are motivated to take on the task. These are crucial questions for bilingual teaching practice that need to be tested empirically.

However, the number of bilingual primary schools in Germany is still comparatively low, in spite of the fact that the potential of bilingual programs has frequently been documented, and that the EU language policy guidelines ("Investment in the future," cf. Wildhage 2000) requests bilingual teaching to be included as a profile element in teacher training. According to a study by FMKS [www.fmks.eu] in 2014, there were 287 registered bilingual primary schools (with a rising trend), 44% of which had English as L2. Only about half of them are public primary schools.

In its 2006 report (KMK, p. 25f), the *Kultusministerkonferenz* already advocated for the expansion of bilingual instruction to primary schools, encompassing a wide range of subjects and foreign languages, to incorporate bilingual education into teacher training programs and provide academic supervision.

> Teacher Education: The specific (linguistic, didactic, and methodological) challenges of bilingual instruction need to be considered more strongly in the initial and advanced phases of teacher training. Approaches to providing future teachers with suitable subject combinations an additional qualification during their teacher training should be further developed. (KMK 2006: 26 [translation by the author])

5. Conclusion

As the research review has shown, the development of individual linguistic abilities is closely intertwined with cognitive abilities and diverse external contextual factors. Here, it is useful and important to distinguish between *proximal* and *distal* external factors: A causal effect on the individual learner can be assumed primarily through the direct stimulation of proximal factors in personal interactions (*proximity of stimulation* approach, Kersten 2020 [postscript: Kersten 2023]). External factors should therefore be identified and distinguished from proximal ones in empirical studies, with particular attention to proximal factors as those factors with immediate effects.

In research studies, the connection between (foreign) language learning and cognitive development is considered in two directions. The discussion about the effects of bilingualism on cognition within the framework of the *bilingual advantage hypothesis* (Bialystok et al. 2009) is currently very controversial. Research findings in this area are heterogeneous, leading to

[6] For example, one teacher who teaches both immersion and mainstream classes used significantly more L2 techniques in the mainstream class, which has a lower L2 level, than in the immersion class. Another teacher with a very high TIOS score changed to teach at an immersion school abroad shortly after the study, which underlines the above-mentioned considerations.

increasing demands for a stronger differentiation between specific cognitive abilities, individual degree of bilingualism, the nature of language use, and the need to control for social aspects. Even though the majority of studies currently focus on simultaneous bilingualism, there are some positive findings on sequential second language acquisition in bilingual school programs. Effects on intelligence, working memory and cognitive control abilities appear to be particularly evident in intensive L2 programs and after longer periods of exposure. An increase in L2 contact duration and intensity can contribute to this. Aiming for a high degree of bilingualism, as fostered in bilingual programs, thus appears to be beneficial for aspects of cognitive development. Differential effects between regular FLT and bilingual immersion programs (see below) may also indicate that other cognitively stimulating teaching techniques contribute to these findings beyond the bilingual use of language.

Studies on the opposite direction of effects are less controversial and less heterogeneous. They identify specific cognitive abilities as predictors more consistently than in the opposite direction. Nevertheless, there are some differences between regular and immersion programs in this regard, as well. They document advantages in the L2 for children who have higher cognitive abilities, especially in regular FLT. However, this also raises the question of whether the promotion of comprehension and contextual integration are more accessible to children in general in bilingual classes. This could help to promote them in other ways and through other channels, thus reaching a wider group of learners.

A similar distinction applies to social differences and frequently documented disadvantages for children with migration status. The influence of social background on general school achievement is documented in all large-scale educational studies. Similar results are described for children from immigrant families, although in recent years there has been an increased awareness that these contextual factors are often confounded. Yet, these disadvantages are not found or are significantly less pronounced in the (so far limited) studies on early bilingual education. In light of these findings, it is essential to pay much greater attention to the potential of bilingual instruction and to investigate which (proximal) factors could contribute to this support.

Comprehension-enhancing teaching techniques and strategies of meaning-based tasks and content, as operationalized in the *Teacher Input Observation Scheme* (Kersten et al. 2018a [postscript: Kersten 2021]), are effective means to develop language and subject knowledge. Even though they are derived from general FLT approaches, they seem to be used significantly more often in bilingual classes. Presumably, in bilingual classes it is more important to use them to ensure subject-specific knowledge gains. However, data of the SMILE project (Kersten et al. 2019) on exceptional FLT teachers who score higher than immersion teachers show that this is not necessarily the case for each individual teacher. Nevertheless, this basic tendency is one explanation for the broad positive effects of bilingual programs. These findings, if further corroborated, have important practical implications.

However, in terms of these sociopolitically relevant questions, both research and practical implementation are still in relatively early stages. The L2 teaching techniques discussed here are indispensable for the teacher training of *all* teachers. As shown in this contribution, these techniques are likely to have effects that extend far beyond just language learning to promote comprehension, general learning processes, and cognitive development. They can also, as argued elsewhere (Kersten 2019: 57), “be transferred to other forms of pedagogical intervention, such as the teaching of German to children with limited knowledge of German” [postscript: for empirical evidence, see Kersten et al. 2023].

The attainment of higher bilingual skills also has the potential to train cognitive skill. To achieve this, helpful approaches include increased interdisciplinary instruction and the intro-

duction of bilingual modules, e.g., initially as limited units or projects, as classroom management, or through recurring routines. These are measures that can be implemented individually within the regular curriculum. Helpful approaches also involve observing existing programs through on-site visits and engaging in teamwork with other colleagues to exchange materials and strategies. That way, teachers and learners can gain experiences and increase the chance of gradually expanding their bilingual approach.

As depicted in this article, such support, if maintained over several years, appears to contribute to mitigating the negative effects found in academic performance studies for learners from low socioeconomic status or with a "migrant background" [postscript: Kersten et al. 2023]. Such a finding has important implications for educational policy decisions. Further research is necessary to clarify these relationships, carefully controlling for various individual and external factors to help enhance the linguistic and cognitive development of young learners.

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References

Adesope, O.O., Lavin, T., Thompson, T., Ungerleider, C. (2010). A systematic review and meta-analysis of the cognitive correlates of bilingualism. *Review of Educational Research, 80*(2), 207-245.

Adler, M., Trebits, A., Kersten, K., (2018). The role of cognitive variables, socioeconomic background and parenting style in the L2 acquisition of young learners. Paper presented at EUROSLA 28, University of Münster. https://www.researchgate.net/publication/349604715_The_role_of_cognitive_variables_socioeconomic_background_and_parenting_style_in_the_L2_acquisition_of_young_learners

Antón, E., Duñabeitia, J.A., Estévez, A., Hernández, J.A., Castillo, A., Fuentes, L.J., Davidson, D.J., Carreiras, M. (2014). Is there a bilingual advantage in the ANT task? Evidence from children. *Frontiers in Psychology*, 5, 398.

Baddeley, A. D. (2000).The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences, 4*(11), 417-423.

Baddeley, A. D. (2007). *Working Memory, Thought, and Action*. Oxford: OUP.

Baker, C., Wright, W.E. (2017). *Foundations of Bilingual Education and Bilingualism (6th ed.)*. Bristol: Multilingual Matters.

Bialystok, E., Barac, R. (2012). Emerging bilingualism: Dissociating advantages for metalinguistic awareness and executive control. *Cognition*, *122*, 67-73.

Bialystok, E., Craik, F. I. M., Green, D.W., Gollan, T. H. (2009). Bilingual minds. *Psychological Science, 10*(3), 89-129.

Bialystok, E., Peets, K. F., Moreno, S. (2014). Producing bilinguals through immersion education: Development of metalinguistic awareness. *Applied Psycholinguistics, 35*(1), 177-191.

Blank, I. (2017). *Subjective Theories of Headmasters About Bilingual Programmes in Primary School.* Masterarbeit: Universität Hildesheim.

Blom, E., Küntay, A.C., Messer, M., Verhagen, J., Leseman, P. (2014). The benefits of being bilingual: Working memory in bilingual Turkish-Dutch children. *Journal of Experimental Child Psychology, 128*, 105-119.

Böttger, H. (2016). *Neurodidaktik des frühen Sprachenlernens. Wo die Sprache zuhause ist.* Stuttgart: UTB.

Bracken, S. S., Fischel, J.E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education and Development, 19*(1), 45-67.

Brohy, C. (2001). Generic and/or specific advantages of bilingualism in a dynamic plurilingual situation: The case of French as official L3 in the school of Samedan (Switzerland). *International Journal of Bilingual Education and Bilingualism, 4*(1), 3849.

Burmeister, P. (2006). Frühbeginnende Immersion. In U.O.H. Jung (Ed.), *Praktische Handreichungen für Fremdsprachenlehrer*. Frankfurt a.M.: Peter Lang, 385-391.

Burmeister, P., Massler, U. (Eds.) (2010). *CLIL und Immersion. Fremdsprachiger Sachfachunterricht in der Grundschule*. Braunschweig: Westermann.

Carlson, S.M., Meltzoff, A. (2008). Bilingual experience and executive functioning in young children. *Developmental Science, 11*, 282-298.

Cenoz, J. (2013). The influence of bilingualism on third language acquisition: Focus on multilingualism. *Language Teaching, 46*, 71-86.

Cenoz, J., Valencia, J.F. (1994). Additive Trilingualism: Evidence from the Basque country. *Applied Psycholinguistics, 15*, 195-207.

Couve de Murville, S., Lenz, F. (2012). Englisch als Unterrichtssprache: Lernstandserhebungen in einer immersiven Grundschule. In F. Lenz (Ed.), *Bilinguales Lernen – Unterrichtskonzepte zur Förderung sachbezogener und interkultureller Kompetenz*. Frankfurt a.M.: Peter Lang, 79-102.

Couve de Murville, S., Kersten, K., Maier, E., Ponto, K., Weitz, M. (2016). Rezeptiver L2 Wortschatz in der Grundschule. In A.K. Steinlen, T. Piske (Eds.), *Wortschatzlernen in bilingualen Schulen und Kindertagesstätten*. Frankfurt a.M.: Peter Lang, 85121.

Coyle, D., Hood, P., Marsh, D. (2010*). CLIL. Content and Language Integrated Learning*. Cambridge: CUP.

Cummins, J. (2000). The threshold and interdependence hypotheses revisited. In J. Cummins (ed.), *Language, Power and Pedagogy: Bilingual Children in the Crossfire*. Clevedon, England: Multilingual Matters, 173-200. de Bot (2008). Second language development as a dynamic process. *The Modern Language Journal, 92*(2), 166-178.

De Bruin, A. (2019). Not all bilinguals are the same: A call for more detailed assessments and descriptions of bilingual experiences. *Behavioral Sciences, 9*(33).

De Bruin, A., Treccani, B., Della Salla, S. (2015). Cognitive Advantage in Bilingualism. An example of Publication Bias? *Psychological Science, 26*(1), 99-107.

De Houwer, A. (2009). *Bilingual First Language Acquisition.* Bristol, UK: Multilingual Matters.

DeLuca, V., Rothman, J., Bialystok, E., Pliatsikas, C. (2019a). Redefining bilingualism as a spectrum of experiences that differentially affects brain structure and function. *Proceedings of the National Academy of Sciences, 116*(15), 7565-7574.

DeLuca, V., Rothman, J., Pliatsikas, C. (2019b). Linguistic immersion and structural effects on the bilingual brain: a longitudinal study. *Bilingualism: Language and Cognition, 22*(5), 1160-1175.

DeTemple, J.M. (2001). Parents and children reading books together. In D.K. Dickinson, P.O. Tabors (Eds.). *Beginning Literacy with Language: Young Children Learning at Home and School*. Baltimore, MD: Brookes.

Dewaele, J.-M. (2013). Individual differences in second language acquisition. In W.C. Ritchie, T.K. Bhatia (Eds.), *The New Handbook of Second Language Acquisition*. Leiden: Brill, 623-646.

Dörnyei, Z. (2005). *The Psychology of the Language Learner: Individual Differences in Second Language Acquisition*. Mahwah, NJ: Lawrence Erlbaum.

Dörnyei (2009). Individual differences: Interplay of learner characteristics and learning environment. *Language Learning, 59*(1), 230-248.

Dörnyei, Z., Ryan, S. (2015). *The Psychology of the Language Learner Revisited*. New York: Routledge.

Douglas Fir Group (2016). A transdisciplinary framework for SLA in a multilingual world. *The Modern Language Journal, 100*(S1), 19-47.

Dunabeitia, J.A., Hernández, J.A., Antón, E., Macizo,P., Estévez,A., Fuentes, L.J., Carreiras, M. (2014). The inhibitory advantage in bilingual children revisited: myth or reality? *Experimental Psychology, 61*(3), 234-251.

Ellis, N.C. (2002). Frequency effects in language processing. *Studies in Second Language Acquisition, 24*(2), 143-188.

Ellis, R. (2003). *Second Language Acquisition.* Oxford: Oxford University Press.

Ellis, R. (2008). *The Study of Second Language Acquisition (2nd edition).* Oxford: Oxford University Press.

Ellis, R., Shintani, N. (2014). *Exploring Language Pedagogy through Second Language Acquisition Research.* London: Routledge.

Elsner, D. (2007). *Hörverstehen im Englischunterricht der Grundschule: Ein Leistungsvergleich zwischen Kindern mit Deutsch als Muttersprache und Deutsch als Zweitsprache*. Frankfurt a.M.: Peter Lang.

Farnia, F., Geva, E. (2011). Cognitive correlates of vocabulary growth in English language learners. *Applied Psycholinguistics, 32*(4), 711-738.

Festman, J. (2019). The psycholinguistics of bilingualism. In D. Singleton, L. Aronin (Eds.), *Twelve Lectures on Multilingualism*. Bristol: Multilingual Matters, 233-269.

Festman, J., Kersten, K. (2010). Kognitive Auswirkungen von Zweisprachigkeit. In P. Burmeister, U. Massler (Eds.), *CLIL und Immersion. Fremdsprachiger Sachfachunterricht in der Grundschule*. Braunschweig: Westermann, 38-52. https://www.researchgate.net/publication/309513986_Kognitive_Auswirkungen_von_Zweisprachigkeit

French, L.M. (2006). *Phonological Working Memory and Second Language Acquisition: A Developmental Study of Francophone Children Learning English in Quebec.* Lewiston, N.Y: Edwin Mellen Press.

Gathercole, S.E., Willis, C.S., Emslie, H., Baddeley, A.D. (1992). Phonological memory and vocabulary development during the early school years: A longitudinal study. *Developmental Psychology, 28*(5), 887-898.

Gebauer, S.K., Zaunbauer, A.C.M., Möller, J. (2012). Erstsprachliche Leistungsentwicklung im Immersionsunterricht: Vorteile trotz Unterrichts in einer Fremdsprache? *Zeitschrift für Pädagogische Psychologie, 26*, 183-196.

Gebauer, S.K., Zaunbauer, A.C.M., Möller, J. (2013). Cross-language transfer in English immersion programmes in Germany: Reading comprehension and reading fluency. *Contemporary Educational Psychology, 38*(1), 64-74.

Genesee, F. (1987). *Learning Through Two Languages: Studies of Immersion and Bilingual Education*. Cambridge, Mass.: Newbury house.

Genesee, F. (2007). French immersion and at-risk students: A review of research evidence. *The Canadian Modern Language Review, 63*(5), 655-688.

Genesee, F., Hamayan, E. (1980). Individual differences in second language learning. *Applied Psycholinguistics, 1*(1), 95-110.

Green, D. W. (1998). Mental control of the bilingual lexico-semantic system. *Bilingualism: Language and Cognition, 1*(2), 67-81.

Grundy, J.G., Timmer, K. (2017). Bilingualism and working memory capacity: A comprehensive meta-analysis. *Second Language Research, 33*(3), 325-340.

Hackman, D.A., Farah, M.J. (2009). Socioeconomic status and the developing brain. *Trends in Cognitive Sciences, 13*(2), 65-73.

Hämäläinen, S., Joutsa, J., Sihvonen, A. J., Leminen, A., Lehtonen, M. (2018). Beyond volume: a surface-based approach to bilingualism-induced grey matter changes. *Neuropsychologia, 117*, 1-7.

Hamid, M.O. (2011). Socio-economic characteristics and English language achievement in rural Bangladesh. *Bangladesh E-journal of Sociology, 8*(2), 31-120.

Hasselhorn, M., Gold, A. (2006). *Pädagogische Psychologie: Erfolgreiches Lernen und Lehren.* Stuttgart: Kohlhammer.

Hayakawa, S., Marian, V. (2019). Consequences of multilingualism for neural architecture. *Behavioral and Brain Functions, 15*(1): 6.

Henry, L. (2011). *The Development of Working Memory in Children*. London: Sage Publications Ltd.

Hesse, H.G., Göbel, K., Hartig, J. (2008). Sprachliche Kompetenzen von mehrsprachigen Jugendlichen und Jugendlichen nicht-deutscher Erstsprache. In E. Klieme (Ed.), *Unterricht und Kompetenzerwerb in Deutsch und Englisch. Ergebnisse der DESI Studie*. Weinheim and Basel: Beltz, 208-230.

Hiver (2015). Attractor states. In Z. Dörnyei, P.D. MacIntyre, A. Henry, A. (Eds.), *Motivational Dynamics in Language Learning*. Bristol: Macmillan, 20-28.

Hopp, H., Kieseier, T., Vogelbacher, M., Thoma, D. (2018). Einflüsse und Potenziale der Mehrsprachigkeit im Englischerwerb in der Primarstufe. In G. Mehlhorn, B. Brehmer (Eds.), *Potenziale von Herkunftssprachen: Sprachliche und außersprachliche Einflussfaktoren.* Tübingen: Stauffenburg, 57-80.

Husfeldt, V., Bader Lehmann, U. (2009). *Englisch an der Primarschule. Lernstandserhebung im Kanton Aargau.* Institut für Forschung und Entwicklung.

Hu, C.-F. (2003). Phonological memory, phonological awareness, and foreign language word learning. *Language Learning, 53*(3), 429-462.

Hu, C.-F. (2008). Rate of acquiring and processing L2 color words in relation to L1 phonological awareness. *The Modern Language Journal, 92*(1), 39-52.

Hu, C.-F. (2014). Extracting phonological patterns for L2 word learning: The effect of poor phonological awareness. *Journal of Psycholinguistic Research, 43*, 569-585.

Jaekel, N., van Ackern, I., Schurig, M., Ritter, M. (2018). Investigating the long-term effects of early foreign language learning from elementary school into 9th grade. Paper presented at EUROSLA 28, University of Münster.

Jessner, U. (2008). Teaching third languages: Findings, trends and challenges. *Language Teaching, 41*(1), 15-56.

Jongejan, W., Verhoeven, L., Siegel, L. (2007). Predictors of reading and spelling abilities in first- and second-language learners. *Journal of Educational Psychology, 99*(4), 835851.

Kempe, V., Brooks, P. (2011). Individual differences in adult second language learning: A cognitive perspective. *Scottish Languages Review, 23*, 15-22.

Kersten, K. (2009a). Profiling child ESL acquisition: practical and methodological issues. In J.-U. Keßler, D. Keatinge (Eds.), *Research in Second Language Acquisition: Empirical Evidence Across Languages*. Cambridge: Cambridge Scholars Press, 267294.
https://www.researchgate.net/publication/309547299_Profiling_child_ESL_acquisition_Practical_and_methodological_issues

Kersten, K. (2009b). *Verbal Inflections in L2 Child Narratives: A Study of Lexical Aspect & Grounding.* Trier: WVT.
https://www.researchgate.net/publication/306091532_Verbal_Inflections_in_L2_Child_Narratives_A_Study_of_Lexical_Aspect_and_Grounding

Kersten, K. (2015). Bilingual pre-primary schools: Language acquisition, intercultural encounters and environmental learning. In S. Mourão, M. Lourenço (Eds.), *Early Years Second Language Education: International Perspectives on Theories and Practice.* London: Routledge, 29-45.
https://www.researchgate.net/publication/306091310_Bilingual_pre-primary_schools_language_acquisition_intercultural_encounters_and_environmental_learning

Kersten, K. (2019). Einflussfaktoren im bilingualen Fremdsprachenerwerb. In A. Rohde, A.K. Steinlen (Eds.), *Sprachenvielfalt als Ressource begreifen: Mehrsprachigkeit in bilingualen Kindertagesstätten und Schulen (Band II).* Berlin: dohrmann, 35-70.
https://www.researchgate.net/publication/329483678_Einflussfaktoren_im_bilingualen_Fremdsprachenerwerb

Kersten, K. (2020). The interplay of cognitive, linguistic and instructional factors in early language acquisition. Paper presented at the Interdisciplinary Symposium *Variables Affecting (Language) Learning Processes)*, Hildesheim University, January 17, 2020.
https://www.researchgate.net/publication/340104905_The_interplay_of_cognitive_linguistic_and_instructional_factors_in_early_language_acquisition

Kersten, K. (2021 [postscript]). L2 input and characteristics of instructional techniques in early foreign language classrooms - Underlying theory and pedagogical practice. *The European Journal of Applied Linguistics and TEFL, 10*(2), 27-59.
https://www.researchgate.net/publication/356918956_L2_input_and_characteristics_of_instructional_techniques_in_early_foreign_language_classrooms_Underlying_theory_and_pedagogical_practice

Kersten, K. (accepted [postscript: 2023]). The Proximity of Stimulation Hypothesis: Investigating the interplay of social and instructional variables with the cognitive-linguistic skills of young L2 learners. In K. Kersten, A. Winsler (Eds.), *Understanding variability in second language acquisition, bilingualism, and cognition: A multi-layered perspective*. London: Routledge, 131-159.
https://www.researchgate.net/publication/364254916_The_Proximity_of_Stimulation_Hypothesis_Investigating_the_interplay_of_social_and_instructional_variables_with_the_cognitive-linguistic_skills_of_young_L2_learners

Kersten, K., Greve, W. (accepted [postscript: 2023]). Investigating cognitive-linguistic development in SLA – Theoretical and methodological challenges for empirical research. In K. Kersten, A. Winsler (Eds.), *Understanding variability in second language acquisition, bilingualism, and cognition: A multi-layered perspective.* London: Routledge, 3-38.
https://www.researchgate.net/publication/364254696_Investigating_cognitive-linguistic_development_in_SLA_Theoretical_and_methodological_challenges_for_empirical_research

Kersten, K., Rohde, A., Schelletter, C., Steinlen, A.K. (Eds.). (2010). *Bilingual Preschools. Vol. I: Learning and Development.* Trier: WVT.
https://www.researchgate.net/publication/306091560_Bilingual_Preschools_Volume_I_Learning_and_Development

Kersten, K., Rohde, A. (2015). Immersion teaching in English with young learners. In J. Bland (Ed.), *Teaching English Language to Young Learners: Critical Issues in Language Teaching with 3-12 Year Olds.* London: Bloomsbury, 71-89.
https://www.researchgate.net/publication/306091401_Immersion_teaching_in_English_with_young_learners

Kersten, K., Bruhn, A.-C., Ponto, K., Böhnke, J., Greve, W. (2018a). Teacher Input Observation Scheme (TIOS). *Studies on Multilingualism in Language Education,* 4, Hildesheim University.
https://www.researchgate.net/publication/340096869_Teacher_Input_Observation_Scheme_TIOS_and_Manual

Kersten, K., Steinlen, A.-K., Schüle, C. (2018b). Variables affecting early foreign language learning: Evidence from bilingual preschools. Paper presented at EUROSLA 28, University of Münster.
https://www.researchgate.net/publication/349604941_Variables_affecting_early_foreign_language_learning_Evidence_from_bilingual_preschools

Kersten, K., Bruhn, A.-C., Koch, M.J., Schriek, J. (2019). The effect of L2 input and cognitively stimulating tasks on second language acquisition. Paper presented at EUROSLA 29, Lund University.

https://www.researchgate.net/publication/335662896_The_Effect_of_L2_Input_and_Cognitively_Stimulating_Tasks_on_Second_Language_Acquisition

Kersten, K., Blackman, A., Funke, F.L., Akram, T., Kliebisch, M., Koch, M.J. (2023 [postscript]). Input quality affects L1 and L2 proficiency and moderates the effect of socioeconomic status. In H. Böttger, N. Schlüter (Eds.), *Fortschritte im frühen Fremdsprachenlernen. Band zur 5. Konferenz.* Salzburg: Schriftbild, 255-280. https://www.researchgate.net/publication/359267154_Input_quality_affects_L1_and_L2_proficiency_and_moderates_the_effect_of_socioeconomic_status

Kersten, K., Bruhn, A.-C., Ponto, K., Koch, M.J., Greve, W. (submitted b [postscript]). *Assessing L2 input using the Teacher Input Observation Scheme (TIOS): Input predicts L2 acquisition of young learners differentially*. https://www.researchgate.net/publication/371834830_Assessing_L2_input_using_the_Teacher_Input_Observation_Scheme_TIOS_-_PREPRINT

Kersten, K., Steinlen, A.K., Schüle, C., (submitted b). *The effect of internal and external variables on early foreign language acquisition: Evidence from bilingual preschools*. [postscript: See also Kersten, K., Steinlen, A.K., Schüle, C. (2018b). Variables affecting early foreign language learning: Evidence from bilingual preschools. Paper presented at EUROSLA 28, University of Münster. https://www.researchgate.net/publication/349604941_Variables_affecting_early_foreign_language_learning_Evidence_from_bilingual_preschools)

Kishiyama, M.M., Boyce, W.T., Jimenez, A.M., Perry, L.M., Knight, R.T. (2009). Socioeconomic disparities affect prefrontal function in children. *Journal of Cognitive Neuroscience, 21*(6), 1106-1115.

Klieme, E., Eichler, W., Helmke, A., Lehmann, R.H., Nold, G., Rolff, H. -G., Schröder, K., Thomé, G., Willenberg, H. (2006). *Unterricht und Kompetenzerwerb in Deutsch und Englisch. Zentrale Befunde der Studie Deutsch Englisch Schülerleistungen International (DESI).* Frankfurt a.M.: DIPF.

KMK (2006). *Konzepte für den bilingualen Unterricht – Erfahrungsbericht und Vorschläge zur Weiterentwicklung*. Bericht des Schulausschusses vom 10.04.2006. Bonn: Kultusministerkonferenz.

Krashen, S. (1985). *The Input Hypothesis: Issues and Implications.* New York: Longman.

Kristiansen, I. (1990). *Nonverbal Intelligence and Foreign Language Learning*. Helsinki: Department of Education, University of Helsinki.

Laine, M., Lehtonen, M. (2018). Cognitive consequences of bilingualism: Where to go from here? *Language, Cognition and Neuroscience, 33*(9), 1205-1212.

Laurie, S.S. (1890): *Lectures on Language and Linguistic Method in the School. Delivered in the University of Cambridge, Easter Term 1889*. Cambridge: University Press.

Lawson, G.M., Hook, Cayce J., Hackman, D.A., Farah, M.J. (2016). Socioeconomic status and the development of executive functions: Behavioral and neuroscience approaches. In J.A. Griffin, L. Freund, P.D. McCardle (Eds.), *Executive Function in Preschool-Age Children: Integrating Measurement, Neurodevelopment, and Translational Research*. Washington, DC: American Psychological Association.

Lazaruk, W. (2007). Linguistic, academic, and cognitive benefits of French immersion. *The Canadian Modern Language Review, 63*, 605-628.

Lee, P. (1996) Cognitive development in bilingual children: A case for bilingual instruction in early childhood education. *The Bilingual Research Journal*, *20*, 499-522.

Lehtonen, M., Soveri, A., Laine, A., Järvenpää, J., de Bruin, A., Antfolk, J. (2018). Is bilingualism associated with enhanced executive functioning in adults? A metaanalytic review. *Psychological Bulletin* 144(4), 394-425.

Lenzing (2015). Exploring regularities and dynamic systems in L2 development. *Language Learning*, *65*(1), 89-122.

Lerner, R.M. (2002). *Concepts and Theories of Human Development.* Mahwah, NJ: Lawrence Erlbaum.

Liebeskind, K.G., Piotrowski, J.T., Lapierre, M.A., Linebarger, D.L. (2013). The home literacy environment: Exploring how media and parent-child interactions are associated with children's language production. *Journal of Early Childhood Literacy, 14*(4), 482-509.

Linck, Jared A.; Osthus, Peter; Koeth, Joel T.; Bunting, Michael F. (2014). Working memory and second language comprehension and production: a meta-analysis. *Psychonomic Bulletin & Review 21(*4), 861-883.

Lippert, S. (2010). *Sprachumstellung in bilingualen Familien. Zur Dynamik sprachlicher Assimilation bei italienisch-deutschen Familien in Italien.* Münster: Waxmann.

Long, M.H. (1996). The role of the linguistic environment in second language acquisition. In W.C. Ritchie, T.K. Bhatia (Eds.), *Handbook of Second Language Acquisition*. New York: Academic Press, 413-468.

Long, M.H. (2015). *Second Language Acquisition and Task-Based Language Teaching.* Malden, MA: Wiley Blackwell.

Lyster, R., Saito, K. (2010). Oral feedback in classroom SLA: A meta-analysis. *Studies in Second Language Acquisition, 32*(2), 265-302.

Mady, C. (2015). Examining immigrants' English and French proficiency in French immersion. *Journal of Immersion and Content-Based Language Education, 3*(2), 268284.

Mady, C. (2017). The bilingual advantage for immigrant students in French immersion in Canada: Linking advantages to contextual variables. *International Journal of Bilingual Education and Bilingualism*, *20*(3), 235-251.

Maier, E., Neubauer, L., Ponto, K., Couve de Murville, S., Kersten, K. (2016). Assessing linguistic levels of L2 English in primary programs. In J.-U. Keßler, A. Lenzing, M. Liebner (Hrsg.), *Developing, Modelling and Assessing Second Languages*. Amsterdam: John Benjamins, 163-192. https://www.researchgate.net/publication/304702579_Assessing_linguistic_levels_of_L2_English_in_primary_school_programs

Maluch, J. T., Kempert, S., Neumann, M., Stanat, P. (2015). The effect of speaking a minority language at home on foreign language learning. *Learning and Instruction*, *36*, 76-85.

Mayer, M. (1969). *Frog, Where Are You?* New York: Dial Press.

Marsh, D., Langé, G. (Eds.) (2000). *Using Languages to Learn and Learning to Use Languages. An Introduction to Content and Language Integrated Learning for Parents and Young People*. Jyväskylä: Univ. of Jyväskylä.

McBride-Chang, C., Cheung, H., Chow, B. W.-Y., Chow, C. S.-L., and Choi, L. (2006). Metalinguistic skills and vocabulary knowledge in Chinese (L1) and English (L2). *Reading and Writing*, *19*, 695-716.

Mehisto, P., Marsh, D., Frigols, M.J. (2008). *Uncovering CLIL: Content and Language Integrated Learning in Bilingual and Multilingual Education.* Oxford: Macmillan Publishers Ltd.

Meinke, S., Meisner, S. (2016). *Attitudes of Elementary School Children Towards Content-And-Language-Integrated-Learning (CLIL).* Masterarbeit. Universität Hildesheim.

Morales, J., Calvo, A., Bialystok, E. (2013). Working memory development in monolingual and bilingual children. *Journal of experimental child psychology*, *114*(2), 187202.

Miyake, A., Friedman, N.P. (1998). Individual differences in second language proficiency: working memory as language aptitude. In A.F. Healy, L.E. Bourne, Jr. (Eds.*), Foreign Language Learning. Psycholinguistic Studies on Training and Retention.* New York: Psychology Press, 339-364.

Murphy, V.A. (2018). Literacy development in linguistically diverse pupils. In D.

Miller, F. Bayram, J. Rothman, L. Serratrice (Eds.), *Bilingual Cognition and Language: The State of the Science Across Its Subfields*. Amsterdam: John Benjamins, 155-182.

Nicolay, A.-C., Poncelet, M. (2013). Cognitive advantage in children enrolled in a second-language immersion elementary school program for three years. *Bilingualism: Language and Cognition, 16*(3), 597-607.

Nicolay, A.-C., Poncelet, M. (2015). Cognitive benefits in children enrolled in an early bilingual immersion school: A follow up study. *Bilingualism: Language and Cognition, 18*(4), 789-795.

Nord, C.W., Lennon, J., Liu, B., Chandler, K. (1999). *Home Literacy Activities and Signs of Children's Emerging Literacy 1993 and 1999 (NCES No. 2000-026).* Washington, DC: U.S. Department of Education.

OECD. (2010). *PISA 2009 results: Overcoming social background: Equity in learning opportunities and outcomes*. Bd. II.

OECD (2016). *PISA 2015 Ergebnisse im Fokus*. (www.oecd.org/pisa)

Paap, K. R., Myuz, H. A., Anders, R. T., Bockelman, M. F., Mikulinsky, R., Sawi, O. M. (2017). No compelling evidence for a bilingual advantage in switching or that frequent language switching reduces switch cost. *Journal of Cognitive Psychology, 29*(2), 89-112.

Paradis, J., Grüter, T. (2014). Introduction to "Input and experience in bilingual development." In T. Grüter, J. Paradis (Eds.), Input and Experience in Bilingual Development. Amsterdam: John Benjamins.Peal, E., Lambert, W. W. (1962). The relation of bilingualism to intelligence. *Psychological Monographs, 76*(27), 1-23.

Pienemann, M. (1998). *Language Processing and Second Language Development: Processability Theory (Vol. 15).* Amsterdam: John Benjamins.

Pienemann, M., Keßler, J.-U., Liebner, M. (2006). Englischerwerb in der Grundschule: Untersuchungsergebnisse im Überblick. In M. Pienemann, J.-U. Keßler, E. Roos (Eds.), *Englischerwerb in der Grundschule. Ein Studien- und Arbeitsbuch.* Paderborn: Ferdinand Schöningh, 67-89.

Pliatsikas, C. (2019). Multilingualism and brain plasticity. In J.W. Schwieter (ed.), *The Handbook of the Neuroscience of Multilingualism*. Malden, MA: Wiley Blackwell, 230251.

Poarch, G. J., Bialystok, E. (2015). Bilingualism as a model for multitasking. Developmental Review*, 35*, 113-124. http://dx.doi.org/10.1016/j.dr.2014.12.003

Poarch, G. J., van Hell, J. G. (2012). Executive functions and inhibitory control in multilingual children: Evidence from second-language learners, bilinguals, and trilinguals. *Journal of Experimental Child Psychology, 113*, 535-551. http://dx.doi.org/10.1016/j.jecp.2012.06.013

Pungello, E.P., Iruka, I.U., Dotterer, A.M., Mills-Koonce, R., Reznick, J.S. (2009). The effects of socioeconomic status, race, and parenting on language development in early childhood. *Developmental Psychology*, *45*(2), 544-557.

Rotter, D. (2015): *Der Focus-on-Form-Ansatz in der Sprachförderung. Eine empirische Untersuchung der Lehrer-Lernende-Interaktion im DaZ-Grundschulkontext.* Münster: Waxmann.

Rumlich, D. (2019). Bilingual education in monolingual contexts: a comparative perspective. *The Language Learning Journal*, doi: 10.1080/09571736.2019.1696879

Saer, D.J. (1923): The effect of bilingualism on intelligence. *British Journal of Psychology. General Section, 14*, 25-38.

Sanz, C. (2000). Bilingual education enhances third language acquisition: evidence from Catalonia. *Applied Psycholinguistics, 21*, 23-44.

Schmidt, R.W. (1990). The role of consciousness in second language learning. *Applied Linguistics, 11*, 129-158.

Schnitzler, C.D. (2008). *Phonologische Bewusstheit und Schriftspracherwerb*. Stuttgart: Thieme.

Schründer-Lenzen, A. (2013). *Schriftspracherwerb*. Wiesbaden: Springer Verlag für Sozialwissenschaften.

Shah, P., Miyake, A. (1999). An introduction. In A. Miyake and P. Shah (Eds.), *Models of working Memory. Mechanisms of Active Maintenance and Executive Control*. Cambridge: CUP, 1-27.

Shamim, F. (2011). English as the language for development in Pakistan: Issues, challenges and possible solutions. In H. Coleman (ed.), *Dreams and Realities: Developing Countries and the English Language*. London: British Council.

Sheridan, M.A., Sarsour, K., Jutte, D., D'Esposito, M., Boyce, W.T. (2012). The impact of social disparity on prefrontal function in childhood. *PloS One, 7*(4), e35744.

Simonis, M., Van der Linden, L., Galand, B., Hiligsmann, P., Szmalec, A. (2019). Executive control performance and foreign-language proficiency associated with immersion education in French-speaking Belgium. *Bilingualism: Language and Cognition*, 1-16. https://doi.org/10.1017/S136672891900021X

Skehan, P. (2002). Theorising and updating aptitude. In P. Robinson (ed.), *Individual Differences and Instructed Language Learning.* Amsterdam, Philadelphia: John Benjamins.

Sorenson Duncan, T., Paradis, J. (2018). How does maternal education influence the linguistic environment supporting bilingual language development in child second language learners of English? *International Journal of Bilingualism, 27*, 1367006918768366.

Stackhouse, J., B. Wells (1997). *Children's Speech and Literacy Difficulties. A Psycholinguistic Framework.* London: Whurr.

Stanat, P., Christensen, G. (2006). *Where Immigrant Students Succeed: A Comparative Review of Performance and Engagement in PISA 2003*. Organisation for Economic Cooperation and Development.

Statistisches Bundesamt (2013). *Bevölkerung mit Migrationshintergrund: Ergebnisse des Mikrozensus 2012, Fachserie 1, Reihe 2.2.* Wiesbaden: Statistisches Bundesamt.

Steinlen, A.K., Piske, T. (2013). Academic achievement of children with and without migration backgrounds in an immersion primary school: A pilot study. *Zeitschrift für Anglistik und Amerikanistik, 61*(3), 215-244.

Steinlen, A.K., Piske, T. (2016). *Minority Language Students as At-Risk Learners: Myth or Reality? Findings from an early German-English partial immersion program.* In C. Ehland, I. Mindt, M. Tönnies (Eds.), *Anglistentag Paderborn 2015 - Proceedings of the Conference of the German Association of University Teachers of English, Vol. 37.* Trier: WVT: 9-28.

Steinlen, A.K., Kersten, K., Piske, T. (2019). Mehrsprachige Jungen als Problemfall in bilingualen Kitas? Zur Rolle von Geschlecht und sprachlichem Hintergrund. In A. Rohde, A.K. Steinlen (Eds.), *Sprachenvielfalt als Ressource begreifen: Mehrsprachigkeit in bilingualen Kindertagesstätten und Schulen (Band II).* Berlin: dohrmann, 71-88.

Swain, M., Johnson, R.K. (1997) Immersion education: a category within bilingual education. In R.K. Johnson and M. Swain (Eds.), *Immersion Education: International Perspectives*. Cambridge University Press, 1-16.

Swain, Merrill (1995). Three functions of output in second language learning. In G. Cook, B. Seidlhofer (Eds.), *Principle and Practice in Applied Linguistics*. Oxford: OUP, 125-144.

Thee, I.L. (2006). *Englischunterricht in der Grundschule unter besonderer Berücksichtigung von Kindern mit Migrationshintergrund. Schriftenreihe des Interdisziplinären Zentrums für Bildung und Kommunikation in Migrationsprozessen (IBKM).* BIS Verlag.

Trebits A., Koch, M.J., Ponto, K., Bruhn, A.-C., Adler, M., Kersten, K. (submitted [postscript: 2021]). Cognitive gains and socioeconomic status in early second language acquisition in immersion and EFL learning settings. *International Journal of Bilingual Education and Bilingualism, 25*(7), 2668-2681. https://www.researchgate.net/publication/352366029_Cognitive_gains_and_socioeconomic_status_in_early_second_language_acquisition_in_immersion_and_EFL_learning_settings

Truscott, J., Smith, M.S. (2019). *The Internal Context of Bilingual Processing.* Amsterdam: John Benjamins.

van Geert, P. (1991). A dynamic systems model of cognitive and language growth. *Psychological Review, 98*(1), 3-53.

Veenstra, A. (2016). The impact of bilingualism on working memory in pediatric epilepsy. *Epilepsy Behavior, 55*, 6-10.

Wegner, A. (in prep. [postscript: 2022]). *Die Implementierung von CLIL als pädagogische Innovation: Eine methodenintegrierende Untersuchung zu Einflussfaktoren bei der Umsetzung bilingualer Unterrichtskonzepte an der Grundschule*. Dissertationsmanuskript, Universität Hildesheim.

https://hildok.bsz-bw.de/frontdoor/index/index/searchtype/authorsearch/author/Alina+Weg-ner/docId/1294/start/0/rows/10

Weitz, M. (2015). *Die Rolle des L2-Inputs in bilingualen Kindergärten.* Frankfurt a.M.: Peter Lang.

Weitz, M., Pahl, S., Flyman Mattsson, A., Buyl, A., Kalbe, E. (2010). The Input Quality Observation Scheme (IQOS): The nature of L2 input and its influence on L2 development in bilingual preschools. In K. Kersten, A. Rohde, C. Schelletter, A.K. Steinlen (Eds.), *Bilingual Preschools: Learning and Development (Vol. 1).* Trier: WVT, 544.

Wen, Z. (2014). Theorizing and measuring working memory in first and second language research. *Language Teaching, 47*(2), 174-190.

Werkmeister, N. (2015). The relation between cognitive variables and receptive second language skills. *Studies on Multilingualism in Language Education,* 2*,* Hildesheim University. https://www.uni-hildesheim.de/smile-publications/

Wesche, M. B. (2002). Early French immersion: How has the original Canadian model stood the test of time? In P. Burmeister, T. Piske, A. Rohde (Eds.), *An Integrated View of Language Development: Papers in Honor of Henning Wode*. Trier: WVT, 357379.

Wilden, E., Porsch, R. (2015). Die Hör- und Leseverstehensleistungen im Fach Englisch von Kindern am Ende der Grundschulzeit unter besonderer Berücksichtigung von lebensweltlicher Ein- und Mehrsprachigkeit. In M. Kötter, J. Rymarczyk (Hrsg.), *Englischunterricht auf der Primarstufe*. Frankfurt a.M.: Peter Lang, 59-80.

Wildhage, M. (2000). Bilingualer Unterricht in Niedersachsen. *Neusprachliche Mitteilungen aus Wissenschaft und Praxis, 53*(4), 212-219.

Winner, Anna (2007). *Kleinkinder ergreifen das Wort: Sprachförderung mit Kindern von 04 Jahren.* Mannheim: Cornelsen Scriptor.

Winsler, A., Burchinal, M.R., Tien, H.-C., Peisner-Feinberg, E., Espinosa, L., Castro, D.C., LaForett, D.R., Kim, Y.K., de Feyter, J. (2014). Early development among dual language learners: The roles of language use at home, maternal immigration, country of origin, and socio-demographic variables. *Early Childhood Research Quarterly, 29*(4), 750-764.

Wolff, D. (2002). *Fremdsprachenlernen als Konstruktion: Grundlagen für eine konstruktivistische Fremdsprachen-didaktik.* Frankfurt a.M: Peter Lang.

Woumans, E., Surmont, J., Struys, E., Duyck, W. (2016). The longitudinal effect of bilingual immersion schooling on cognitive control and intelligence. *Language Learning, 66*(S2), 76-91.

Woumans, E., Ameloot, S., Keuleers, E., Van Assche, E. (2019). The relationship between second language acquisition and nonverbal cognitive abilities. *Journal of Experimental Psychology: General, 148*(7), 1169-1177.

Zaunbauer, A., Möller, J. (2006). Schriftsprachliche und mathematische Leistungen in der Erstsprache: Ein Vergleich monolingual und teilimmersiv unterrichteter Kinder der zweiten und dritten Klassenstufe. *Zeitschrift für Fremdsprachenforschung, 17*, 181200.

Zaunbauer, A., Möller, J. (2010). Schulleistungsentwicklung immersiv unterrichteter Grundschüler in den ersten zwei Schuljahren. *Psychologie in Erziehung und Unterricht, 84*, 30-45.