

1. Introduction

As the linguistic landscape of Germany's educational system is increasingly impacted by a growing proportion of children from minority language backgrounds, the importance of understanding the differential processes involved in emerging literacy for young multilingual students grows as well. Without this knowledge, it is impossible for educators to tailor the standard monolingual curriculum to the needs of children with widely diverse linguistic backgrounds. The current state of educational science and pedagogy in Germany is based almost exclusively on theories, research, curriculum, and learning models developed for monolingual German children.

Germany is a prime example of a country that is failing to serve its immigrant population with its educational system, but it is not alone. Many countries are currently struggling with the question of how to best serve their minority language populations. However, international investigations indicate that children from immigrant backgrounds are more disadvantaged by the educational system in Germany than in any other OECD country (Baumert & Schümer, 2001; Peter, 2006). Partially as a result of these findings, a wave of research and new educational policies are currently being developed to address these deficits (e.g., Christensen, 2006).

In that literacy is a fundamental aspect of education, schools around the world are developing programs to improve literacy programs for children of immigrant and minority language backgrounds. Learning to read is the cornerstone of academic achievement that prepares children for their educational futures. Unfortunately, the knowledge base regarding literacy acquisition for second language (L2) learners is insufficient. The literature offers models of reading almost exclusively based on the cognitive and academic profiles of monolingual readers. It is unclear if the available models and theories of reading are as valid for bilingual children as they are for monolingual children. If childhood literacy acquisition is affected by speaking two languages at home or by receiving instruction in a language other than the home language, it is important to know how and why (Bialystok, Luk, & Kwan, 2005). In Germany, where the educational failure of minority language children is so apparent, it is particularly important that the educational scientific community attempt to understand the processes and components involved in acquiring literacy in a language other than that spoken at home.

To create a research framework for exploring reading abilities, the first section of this paper describes the most relevant aspects of literacy acquisition with a special emphasis on phonological and verbal skills. Through a review of the common models of reading, the essential components of the reading process are extracted and a target model is selected as a basis for the investigation. The next section of the paper summarizes the essential theoretical and empirical

literature on bilingualism and learning to read in a second language. Particular attention is paid to the linguistic and cognitive aspects of bilingualism that may affect the base components of literacy development. Finally, these topics are set into the context of the German socio-educational landscape in which minority language children play a progressively greater role.

1.1. Models and theories of reading: building a framework for research

Research on the processes of reading broadly stems from the disciplines of cognitive psychology, educational psychology, and psycholinguistics. Several key theories are outlined here with the aim of providing a concise yet comprehensive framework for understanding a wide range of literacy research. First, the models of reading will be introduced, then the essential components distilled, and finally the key concepts will be described.

A widely accepted model of reading called the “dual route theory” from cognitive psychology postulates that there are two distinct and equally vital paths for processing written words: one relying on visual-orthographic (printed characters) properties of a stimulus and one depending on the phonological (sound or phoneme) structures of a word. A substantial amount of research has ensued aimed at determining which of the two routes is stronger. Models emphasizing the particular importance of the phonological route have received a great deal of attention in the debate (for a review, see Rapp, Folk, & Tainturier, 2001).

One well established phonologically based theory of reading is the *Hypothesis of Mandatory Phonological Mediation*, which posits that the visual component of the dual route model is secondary to the phonological component (e.g., Frost, 1998). The *Hypothesis of Mandatory Phonological Mediation* assumes that meaning can only be extracted from print if the written stimulus is first mentally recorded in phonological form. Thus, phonological recording is often thought to precede access to meaning (see Rapp et al., 2001). A very basic schematic model of a mandatory phonological mediation is presented in Figure 1. The “Orthography to Phonology Conversion System” transforms the visual image of the word into a phonological representation. The “Phonological Lexicon” decodes the phonological stimulus into a word, which travels through the “Semantic System” where meaning is extracted. Phonological recoding is considered to be both automatic and mandatory for accessing meaning from print.

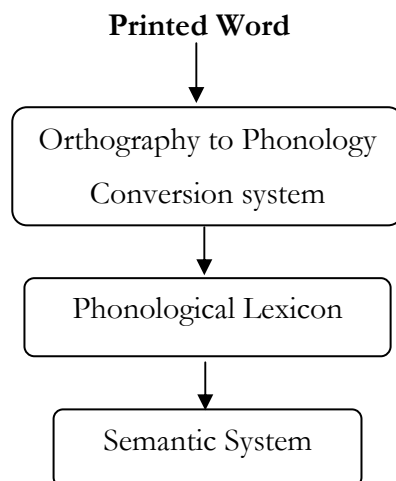


Figure 1. A mandatory phonological mediation model of accessing meaning from print

Note. Adapted from “Word Reading” by B. Rapp, J. Folk, & M.J. Tainturier, 2001, In B. Rapp (Ed.) *The Handbook of Cognitive Neuropsychology* (p. 241). Ann Arbor, MI: Edwards Brothers.

Indeed, there is a substantial amount of evidence supporting the Mandatory Phonological Mediation model indicating the automaticity of phonological activation from a written stimulus (for a review, see Rapp et al., 2001). For example, recognition of the word ‘FROG’ was equally facilitated by the presentation of a semantic associate (TOAD) and homophonic associates (TOWED and TODE; Lukatela, Eaton, Lee, Carello, & Turvey, 2002; Lukatela & Turvey, 1994a, 1994b). Since the target words were primed by orthographically unrelated stimuli, studies such as these provide strong evidence that phonological recoding is the primary means for accessing meanings of words (Rapp et al., 2001).

In the field of reading research, a larger range of processes and influences is considered in determining the skills required for reading comprehension. In order to concretely understand the underlying processes involved in children’s reading abilities, more specific models than that proposed by Rapp and colleagues (2001) are required. Lundberg (2002b) developed a dual strand model that flushes out more specific factors related to phonological processing and verbal semantics (Figure 2). The Lundberg model outlines essential paths toward reading competence: a phonological path and a vocabulary and syntax path. This model provides good examples of the types of skills that are believed to contribute to emerging reading comprehension abilities. Although it includes a wide range of variables, the Lundberg model places more emphasis on the phonological and semantic components of reading than the visual orthographic aspects of reading, which fits well with the mandatory phonological model proposed by Rapp and colleagues. However, the specificity of the Lundberg model makes it more feasible to investigate than the broader concepts of orthography, phonology, and semantics in Rapp’s cognitive model.

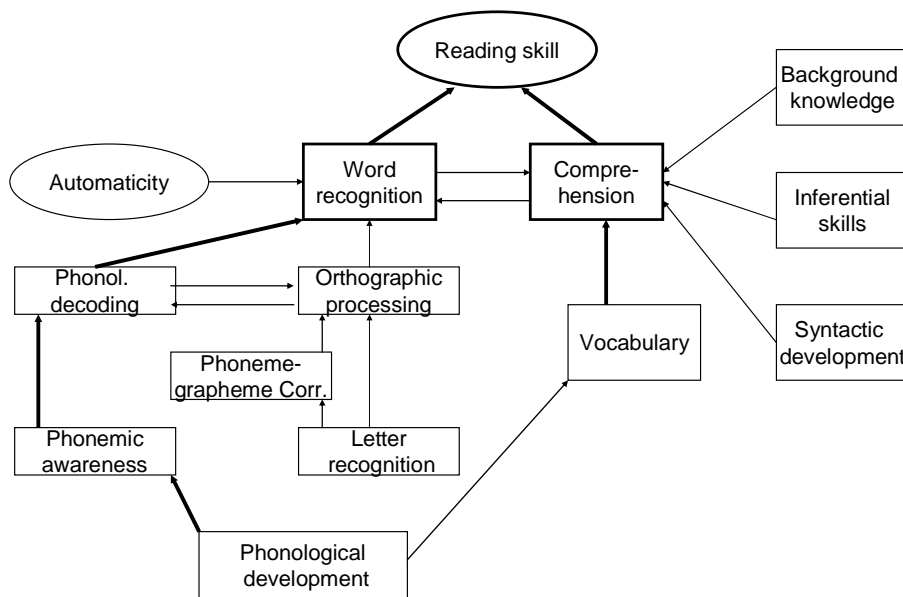


Figure 2. Two strands of reading acquisition (Lundberg, 2002b)

Note: As presented in “Frühe Entwicklung von Lesekompetenz: zur Relevanz vorschulischer Sprachkompetenzen“ by W. Schneider (2004). In U. Schiefele, Artelt, C., Schneider, W., & Stanat, P (Eds.) Struktur, Entwicklung und Förderung von Lesekompetenz. OECD.

As shown in Figure 2, different skills related to phonological, orthographic, and semantic processes are theorized to contribute to reading abilities. The four components in the lower left corner (phonological decoding, phoneme-grapheme correspondence, phonemic awareness, phonological development) encompass the phonological aspects of the model, which affect the developing reader’s ability to process the orthographic content of the written word. On the right side of the model, the semantic competencies that allow for access to meaning are represented in the form of background knowledge, inferential skills, syntactic development, and vocabulary. In this model, the phonological abilities allow for the decoding and recognition of the word, while the semantic abilities enable for understanding of what is being read.

The components proposed in the Lundberg (2002b) model as well as many others have been researched at length in the German and international literature. Numerous studies have empirically demonstrated that development of reading skills depends on the integration of multiple abilities, many of which affect a child’s capacity for literacy acquisition well before formal reading instruction begins. The reading literature is filled with studies attempting to isolate which of these or similar components are the best early indicators of children’s reading performance. Upon examining similar theoretical models (e.g., Marx & Jungmann, 2000) across a wide range of alphabetic orthographies, the most common factors responsible for successful literacy among beginning readers consistently emerged as phonological skills/awareness, verbal language skills/vocabulary, verbal memory, cognitive skills, background knowledge/parent education or reading practices.

It is often unclear what skills can be understood under the simple term, “reading.” As seen in the models above, reading must incorporate a complex series of orthographic, phonological, and semantic skills and knowledge. One well-fitting definition of reading is the *process of using information about the orthography of a written language to access meaning through print* (Chall, 1996; Snow, Burns & Griffen, 1998). This definition emphasizes the need for readers of alphabetic languages to engage in rapid and automatic grapheme-phoneme mapping in order to access word meanings while attending simultaneously to the construction of a representation of the textual meaning.

Definitions that are more specific differentiate between reading single words and reading comprehension. Reading single words is often referred to as *decoding*, and commonly understood to be *the act of extracting orthographic and phonological information from print without the integration of contextual information*. Quick and effortless recognition of the decoded words is an integral component of fluent reading (Durgunoğlu, Snow, & Geva, 2001). Also referred to as word level reading or word recognition without context, decoding can be defined as the process of putting the letters of a word together to semantically access the meaning of that word. It is a distinctly separate process from reading comprehension in that several different cognitive abilities are involved (see Pazzagli, Cornoldi, & Tressoldi, 1993). The model of reading depicted in Figure 2 shows that phonological awareness plays an essential role in decoding words. A reader must be phonologically aware and have sufficient alphabet knowledge in order to quickly and accurately recognize the grapheme-phoneme (letter to sound) relationship (Näslund & Schneider, 1991). It is not surprising that many studies confirm the importance of decoding abilities in reading comprehension performance (e.g., Muter, Hulme, Snowling, & Stevenson, 2004).

Since the comprehension of longer texts is the ultimate goal of the reading process, an additional definition of *reading comprehension* is necessary. Kintsch (1988) explains that reading comprehension inherently requires making inferences about texts that goes beyond single words. It is *a process beginning with the perception of a word, then the accessing of the word meaning, and finally the production of elaborations and inferences based on pre-existing knowledge paired with new information extracted from the text*. Kintsch’s concept of reading comprehension places a great deal of importance on the interplay between the linguistic input of written words and the reader’s knowledge and skills base. In the following section, a differentiation will be made between the technical process of word decoding and reading comprehension.

Näslund and Schneider (1991) developed a simple and frugal model focusing on reading comprehension that integrates the key components from the models (Figure 3). This theoretically and empirically developed model has the valuable advantages not only of parsimony, but also of comprehensiveness. It is simple enough to be easily verifiable yet includes the

essential components laid out by the cognitive models and the more detailed reading model proposed by Lundberg (2002b). Figure 3 shows the Näslund and Schneider model in which four abilities-- verbal abilities, verbal memory, phonological awareness, and decoding speed-- contribute to the development of reading comprehension abilities. The reading variables, decoding and reading comprehension, are defined above. Described in detail in Sections 1.1.1.-1.1.3., verbal abilities refer to vocabulary knowledge and language comprehension; verbal memory refers to the ability to keep verbal material in working memory; and phonological awareness refers to the ability to perceive and manipulate sounds. Similar to the Lundberg model, the semantic component (verbal ability) affects reading comprehension, whereas the phonological aspects (verbal memory and phonological awareness) enable the decoding of the word.

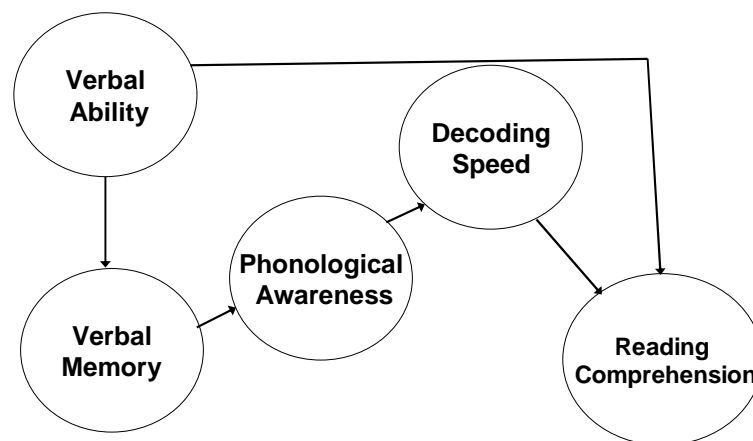


Figure 3. Structural model for predictors of reading comprehension in the second grade

Note. From “Longitudinal effects of verbal ability, memory capacity, and phonological awareness on reading performance,” by J. Näslund & W. Schneider, 1991, *European Journal of Psychology of Education*, 6, p.387.

The Näslund and Schneider (1991) model was tested longitudinally to examine its predictive power from kindergarten to second grade. Using a hypothesized model of relationships between the most frequently cited predictors of reading comprehension, the authors conducted empirical tests of the model fit with a longitudinal data set of 92 young German readers. The non-reading variables (verbal ability, verbal memory, and phonological awareness) were assessed both in kindergarten and in the second grade. Reading comprehension and decoding were measured in the second grade only. Tested with latent variables, made up of different subtests for each measure, the model demonstrated a very good fit in its original form with the predictor variables from kindergarten and the decoding and reading variables from the second grade. When using early second grade variables to predict reading skills in late second grade, the relationships among variables remained relatively stable, with the exception of the

direct path between verbal memory and reading comprehension, which disappeared when using second grade predictors.

In that reading is a cognitive process, it could be assumed that non-verbal as well as verbal cognitive abilities play a role in the process of literacy acquisition. Contrary to this conception, there is convincing North American research demonstrating that cognitive abilities measured by intelligence tests do not set limits on reading progress (e.g., Share, McGee, & Silva, 1991). In this vein, Näslund and Schneider (1991) did not incorporate non-verbal cognitive abilities in the model of reading comprehension. Many German studies also show little influence of non-verbal cognitive abilities (IQ) on reading comprehension when taking other base skills such as phonological awareness, decoding, and verbal abilities into account. In their 1992 study, Landerl, Linortner, and Wimmer discovered that cognitive abilities assessed at the beginning of first grade made no significant contribution to the prediction of reading accuracy, decoding, or spelling above and beyond the contributions of alphabet knowledge, pre-reading skills, or phonological awareness. Cognitive abilities also demonstrated negligible predictive power for estimating reading performance in second grade when phonological awareness, decoding, and verbal abilities were taken into account (Näslund & Schneider, 1996). Landerl and Wimmer (1994) and a reanalysis of an existing data set by Schneider (2004) found similar inconsequential relationships between cognitive abilities and reading and spelling in the second, third, and fourth grades. In their 1999 article, Schneider and Näslund did find that cognitive abilities measured in preschool had moderate predictive power for reading comprehension, but far less than originally anticipated. They conclude that the predictive power of general cognitive abilities has been overrated and that it is minimized when accounting for more specific reading related processes.

Although there are strong similarities in the primary predictors in the reading acquisition literature across most alphabetic orthographies, there is sufficient evidence that language or cultural specificity does play a role (e.g., Mann & Wimmer, 2002). For example, several studies have shown that in contrast to young English speakers, on which the bulk of the literature is based, young readers of German are less dependent on phoneme awareness and grapheme/phoneme correspondences for word reading (Mann & Wimmer, 2002; Näslund, 1999). German-speaking children in the early levels of primary school have also demonstrated more accurate decoding of pseudowords than do American children of the same ages (Näslund, 1999). The reasons posited for the differences in reading processes among English and German early readers include the more transparent orthography and the more simple and consistent vowel structure of German. The simpler phoneme structure of German likely allows for phonological processing to reach an automatic level for decoding more quickly. Studies such as these lead to the conclusion that models of reading may not be universal across cultures and languages. It is

therefore important to be aware of the cultural and linguistic origin of reading models before applying them to other cultural and linguistic contexts. Not only are studies with English-speaking populations over represented in the literature, they are almost exclusively based on monolingual populations.

1.1.1. Phonological skills and literacy acquisition

It is no longer assumed that children begin school with a “blank slate” when it comes to reading competencies. Instead, educators and researchers now recognize that children come into the first classroom with a wide range of prerequisites in varying developmental stages. Educators have long understood the necessity of sufficiently developed auditory, visual, motor, and verbal abilities in order to acquire literacy. Research over the last 30 years indicates that a certain level of phonological awareness is also required to learn to read efficiently (Schneider, 2004). Defined as the ability to recognize and manipulate the sound structure of speech by detecting and differentiating phonemic units in speech, phonological awareness has repeatedly demonstrated substantial importance in early literacy acquisition (Goswami & Bryant, 1992; Wagner et al., 1997).

Researchers widely accept across a variety of psychological and educational disciplines that phonological processing skills are strongly related to reading acquisition. The process of acquiring literacy requires children to realize that printed words are not arbitrary sequences of letters that can be memorized and reprinted, but rather a system of orthographic and phonological relationships that can be learned (Goswami & Bryant, 1992). A considerable body of both cross-sectional and longitudinal research shows that phonological awareness is the single most important predictor of literacy acquisition in the first language (L1; Adams, 1990; Brady & Shankweiler, 1991; Bryant, Bradley, MacLean, & Crossland, 1989; Chiappe, Siegel, & Gottardo, 2002; Durgunoğlu & Öney, 1999; Goswami & Bryant, 1990, Lundberg, Olofsson & Wall, 1980; Verhoeven, 2000; and Wagner et al., 1994). Phonological skills have also been proven to be a significantly more powerful predictor of speed and efficiency of reading acquisition than intelligence test scores (e.g., Stanovich, 1994). Phonological processes in relation to reading development and disorders are of considerable significance, and are often measured as an indicator for reading disabilities (McBride-Chang, 1995; for reviews see Brady & Shankweiler, 1991; Goswami & Bryant, 1990). Not only is a minimal level of phonological awareness required to learn to read and spell (Lieberman & Liberman, 1990; Liberman et al., 1989), but it develops further as literacy abilities advance (Olson, Wise, Johnson, & Ring, 1997; Stanovich, 1992). During the primary school years as well as into adulthood, there remains a significant relationship between phonological awareness and reading and writing skills (Bruck, 1992; Pratt & Brady, 1988)

although this relationship may become less relevant in later primary school years (e.g., Schneider & Näslund, 1999a, 1999b).

The robust relationship between phonological awareness and reading acquisition is cross-linguistic phenomenon, provided the language has an alphabetic writing system (Bruck, Genesee, & Caravolas, 1997; Caravolas & Bruck, 1993; Cossu, et al., 1988). Not only for monolingual English speakers (Bradley & Bryant, 1985; Gough, Ehri, & Treiman, 1992; Rack, Hulme, Snowling, & Whiteman, 1994; Share & Stanovich, 1995; Siegel, 1993; Wagner & Torgeson, 1987; Wagner et al., 1994) but also for native speakers of multiple other languages, phonological processing demonstrates importance in acquiring literacy skills. Orthographies other than English in which phonological awareness significantly predicts early literacy include: Czech (Caravolas and Bruck, 1993), Danish (Frost, 2001), Dutch (de Jong & van der Leij, 1999; Tijms, 2004), Finnish (Müller & Brady, 2001), French (Comeau, Cormier, Grandmaison, & Lacroix, 1999), Norwegian (Engen & Høien, 2002; Hagtvet, 1993), Persian (Arab-Moghaddam & Senechal, 2001), and Turkish (Öney & Durgunoğlu, 1997), and even in a primarily non-alphabetic orthography, Chinese (Ho & Bryant, 1997; Shu et al., 2000; McBride et al., 2004). However, as described in detail in Section 1.1.2., there is evidence that the strength of the correlations between phonological awareness and literacy likely differs depending on the structural and phonetic structures of the language in question.

German is no exception to this pattern. Many studies in the past 15 years have demonstrated the importance of phonological awareness in early German reading (e.g., Näslund & Schneider, 1991, 1996). Although some German research seems to suggest that phonological awareness does not act as a very strong predictor of reading in first grade (likely due to the difficulties of testing reading skills at such a nascent stage; Mayringer, Wimmer, & Landerl, 1998), the research with children in second through fourth grades revealed significantly stronger relationships between phonological awareness and reading (e.g., Landerl & Wimmer, 1994, Näslund & Schneider, 1996, Schneider, 2004). Furthermore, studies by both Klicpera and Schachner-Wolfram (1987) and Landerl and colleagues (1992) found that both good and poor first grade readers of German differed significantly in several aspects of phonological awareness. In a large-scale longitudinal study, Schneider and Näslund (1999a) used structural equation modeling with latent factors to explore the pre-school predictors (verbal IQ, working memory, phonological awareness, and early literacy knowledge) of reading comprehension at the end of second grade. The models distinctly indicated phonological awareness to be the strongest predictor of reading comprehension. It can therefore safely be assumed that phonological awareness is one of the most significant base competencies of reading comprehension for German students in the early primary levels of education.

There has been some debate by researchers who claim that recognition of the internal phonemic structure of spoken words is a result of learning to read in an alphabetic orthography, and therefore not a predecessor to reading abilities (see Goswami & Bryant, 1990; Morais, Bertelson, Cary & Alegria, 1986). Some evidence to this regard has also been found in Germany, in a study in which phonological awareness appeared to develop a correlation to reading skills later in the reading process (Mann & Wimmer, 2002). On the other hand, there is far more research using preschool and pre-instructional measures of phonological awareness, indicating that the predictive influence of phonological awareness does not emerge as a result of learning the tasks involved in reading. Rather, phonological awareness appears to precede and contribute toward the processes of early reading acquisition (e.g., Muter et al., 2004; for a German example see Näslund, 1990). Furthermore, if phonological awareness were a result of reading instruction, it could be expected that it would become more uniform through elementary school. Wagner and collaborators (1997), however, report that the standard deviations for phonological awareness performance remained the same in their sample of children from second to fourth grade. Since convincing evidence exists on both sides of the discussion, it seems that some kind of bidirectional link between phonological awareness and literacy development is probable (Wagner et al., 1994; Durgunoğlu & Öney, 1999). In fact, causal relations between phonological processing abilities and reading related skills are often accepted to be bidirectional (Wagner et al., 1994)

In sum, the large amount of research providing evidence for the strong relationship between phonological awareness and reading abilities shows extensive effects and uses of that link. A series of reports demonstrated the importance of phonological awareness in early childhood for later reading skills. Naturalistic studies of children who arrive in school as 5-year-olds with good phonological awareness and letter-sound correspondence suggest that those abilities may be sufficient to drive a self-teaching printed word recognition system (Share & Stanovich, 1995). Stuart & Masterson (1992) also showed that four-year-old preschoolers with good phonological awareness continued to show significantly better reading skills as 10-year-olds than did their peers who had started school unaware that spoken words are patterns of sound. Further evidence illustrating the strong link between phonological awareness and reading comes from a series of studies that demonstrated the effectiveness of phonological training programs for facilitating reading skills among young inner-city children and children from socially deprived backgrounds (Brady, Fowler, Stone, & Winbury, 1994; Blanchman, Ball, Black, & Tangel, 1994; Stuart, 1999). The effectiveness of such training programs has been demonstrated in German as well (e.g., Schneider, Küspert, Roth, Vise, & Marx, 1997).

As described above, verbal short-term memory is closely linked to phonological awareness. Many researchers in the area of phonological awareness skills (e.g., Leather & Henry, 1994, McBride-Chang, 1995; Wagner et al., 1993) suggest that short-term verbal memory is a component of phonological awareness. There is, however, evidence that verbal memory contributes a small amount of unique variance to reading achievement (Hansen & Bowey, 1994). Hansen and Bowey found that, although phonological awareness and verbal memory shared a substantial amount of variance in predicting reading performance, there were some areas in which the two skills did not overlap. Studies linking verbal memory to word reading demonstrated that phonological awareness skills contribute more to word reading than do verbal memory skills (e.g., Bowey, Cain, & Ryan, 1992).

The development of phonological awareness

Phonological awareness is a core component of a more general group of sublexical abilities termed *metalinguistic skills*. There is substantial evidence of rudimentary aspects of metalinguistic development in the earliest stages of language acquisition in very young children (for a review see Menn & Stoel-Gammon, 1995). This rudimentary ability develops into conscious metalinguistic awareness gradually during childhood and is not usually fully in place until the age of eight or nine. The development of metalinguistic abilities is shaped by four primary influences: the home environment, schooling, basic cognitive and metacognitive abilities, and the specific characteristics of the language spoken (Durgunoğlu et al., 2001). Figure 4 provides a schematic framework for understanding metalinguistic skills.

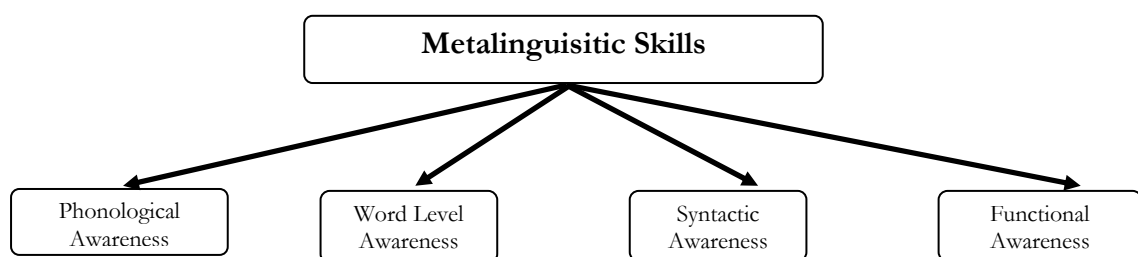


Figure 4. Phonological awareness as a component of metalinguistic skills

Note. Based on “Metalinguistic awareness and reading acquisition,” by W. Tunmer and J. Bowey, 1984, in W. Tunmer, C. Pratt, & M. Herriman (Eds.): *Metalinguistic awareness in children: Theory, research, and implications* (p. 58). Berlin: Springer.

The four aspects of metalinguistic awareness (phonological awareness, word level awareness, syntactic awareness, and functional awareness) are thought to facilitate reading skills as

well as each other. Beginning with the smallest unit, *phonological awareness*¹ refers to the comprehension of the relevant units in spoken language such as syllables, onset-rimes, and phonemes (e.g., Goswami & Bryant, 1990). *Syntactic awareness* can be described as the ability to consciously understand the grammatical structure of sentences even without being able to articulate the relevant rules. It also enables children to read an unfamiliar word or to notice when a word does not fit the ongoing representation of the text (Tunmer, 1990). *Word level awareness* is described as the ability to perceive single words as separate units of a sentence (Jansen & Marx, 1999). Finally, *functional awareness* refers to children's notions about the functions and conventions of written language, about why and when print is used (Durgunoğlu et al., 2001).

The development of phonological processing skills has been investigated across a broad range of disciplines and age groups. Infant research has shown that children are born with the ability to produce and perceive phonetic elements and can easily distinguish between words on the basis of a single phoneme at a very young age (Eimas, Siqueland, Jusczyk, & Vigorito, 1971). This does not mean, however, that children have an innate ability to intentionally manipulate phonological elements. There is some evidence that phonological awareness develops in relation to the number of words in a child's vocabulary; therefore, as the number of words the child's verbal lexicon increases, so does her ability to perceive and manipulate elements of speech (De Cara & Goswami, 2003). In many languages, phonological awareness has been shown to continually develop through primary school (even in non-alphabetic orthographic languages, e.g., Shu, Anderson, & Wu, 2000). Broader measures of phonological awareness on the level of syllables or rhymes can typically be assessed in young preschool aged children, whereas more difficult levels of phonological awareness involving individual phonemes can typically be measured after age six (Lonigan, Burgess, Anthony, and Barker, 1998; Nesdale, Herriman, & Tunmer, 1984). However, with increasing age, phonological abilities in children seem to stabilize (Lonigan et al., 1998). Wagner, Torgesen, Laughon, Simmons, and Rashotte (1993) and Wagner, Torgesen, and Rashotte (1994) propose that phonological processing abilities and phonological awareness should be conceptualized as relatively stable individual attributes, characterized by different developmental rates.

Phonological awareness can best be described as the ability to consciously break language down into distinct sound units that can be analyzed and manipulated by way of perceiving

¹ There are a host of terms used to describe the same body of phonological awareness abilities (phonological sensitivity, phonetic awareness, phonological processing skills, etc.) Since the expression "phonological awareness" has become the most common term in the international psychological literature in relation to literacy, "phonological awareness" will be used as the primary term in the present paper (similar to Stock & Schneider, 2003). "Phonemic awareness" could, however, be considered a more accurate technical description of the skills measured in the investigation. See Section 3.3.3. for more information.

sublexical speech segments through syllables, onsets, and phonemes (Treiman, 1991). When referring to the aspects of phonological awareness that are most closely associated with reading, some researchers prefer the term “phoneme awareness,” signifying the perception of phonemes as the relevant term (e.g., Morais, 2003). Others use “phonological awareness,” as a more general category of phonological processing skills encompassing the perception of phonemes as well as phoneme groups and syllables. Another way to distinguish between types of phonological awareness is with the categorizations “broad” phonological awareness (the ability to manipulate syllables and rhymes) and “narrow” phonological awareness (referring to the recognition of single phonemes; Jansen & Marx, 1999). Some researchers believe that “broad” phonological awareness develops independent of formal introduction to written language whereas “narrow” phonological skills develop primarily as a result of learning the alphabet and reading (see Schneider, 1997; Stock & Schneider, 2003).

There is a lack of consensus in the literature regarding a single model of phonological awareness skills. Wagner and colleagues (1993) proposed a model consisting of three major intercorrelated phonological processing skills, each posited to account for a unique portion of the variance in word reading abilities. These three skills include *phonological awareness*, referring to the specific skills that enable sensitivity to the sound structure of words; *lexical access*, referring to the ease with which phonological representations of written speech are accessed in decoding type tasks; and *verbal working memory*, referring to the hypothesis that phonological information is retained in working memory by continuous repetition within an articulatory loop, thus allowing phonological information to be stored long enough to be processed and synthesized into individual speech sounds, syllables, and words².

Goswami and Bryant (1990) hypothesize that phonological processing skills act on three different levels. The first level, based on *syllables*, is considered the simplest form of word deconstruction easy to recognize even for young preschool children (Liberman, Shankweiler, Fischer, & Carter, 1974). The second level involves *phonemes* and the perception of individual sound units in language. Finally, Goswami and Bryant identify a third intermediate kind of phonological awareness called *onset and rime* awareness which enables children to break each syllable into two units: a beginning sound (e.g., /sh/) and an end section consisting of a vowel and end consonant (e.g., /awl/; together /shawl/). While simple and useful, this model of phonological awareness does not yet have enough empirical evidence to be widely accepted and is

² It is interesting to note that these three interrelated aspects of phonological awareness proposed by Wagner and colleagues (1993) are strikingly similar to the verbal memory, decoding, and phonological awareness components of the Näslund and Schneider (1991) model of reading.

sometimes considered to be redundant due to the overlapping concepts of phoneme and onset-rime awareness (Bryant, 2002).

Morais (2003) presents a quite different approach to the study of phonological processing. He proposes two categories of phonology: phonetic segments (surface information) and phonemes (deep information). Morais draws on a series of studies to indicate that phonetic segments operate on a conscious level whereas the phoneme level of phonology is pre-lexical and activated unconsciously. Morais' approach is not necessarily contradictory to the approach described by the other authors. It is plausible that the ability to perceive phonological stimuli for use in reading develops from subconscious perceptual structures.

McBride-Chang (1995) attempts to provide unified testing guidelines drawn from the diverse existing measures in order to isolate the construct of phonological awareness as accurately as possible. This empirically derived concept of phonological awareness outlines a series of measures that can reliably be used to assess phonological skills. Three tasks were found to be good measures of phonological awareness: *analyzing the position of phonemes* (what comes after /r/ in /bard/?), *deletion of phonemes* (say /bed/ without the /d/), and *segmentation of phonemes* (what are the sounds you hear in /shut/?). The author found that all three task types required 1) cognitive abilities to understand what kind of performance is required, 2) verbal memory to hold the stimuli in mind long enough to process and verbalize them, and 3) the ability to hear and decipher the various aspects of speech for manipulating the stimuli (see also McBride-Chang, Wagner, & Chang, 1997). Its empirical basis and easily operationalizable characteristics make the McBride-Chang concept of phonological awareness a fitting tool for researchers designing phonological awareness investigations.

Considering the stable nature of phonological awareness and its cross-linguistic correlations with reading abilities, it could be surmised that phonological awareness is a type of base cognitive ability. Research, however, does not indicate strong links between measures of cognitive abilities and phonological awareness. Goswami and Bryant (1990) provide a detailed review of a series of studies that included measures of cognitive performance into their investigations of phonological awareness, only to conclude that most studies of phonological awareness lacked proper assessment procedures for measuring cognitive abilities. Nonetheless, the authors describe one longitudinal examination of cognitive abilities factors by Ellis and Large (1987) who first divided the participants into high and low cognitive ability groups and high and low reading groups before testing for phonological predictors of reading performance. No effects were found for cognitive abilities. While McBride-Chang (1995) found moderate correlations between cognitive abilities and phonological awareness ($r = .40$), Verhoeven (1992) found small to moderate correlations between general measures of metalinguistic skills in a

second language and the Raven test for nonverbal cognitive skills ($r = .27$) but no correlation between cognitive skills and phonological processing in first languages. From these mixed results it seems probable that phonological awareness is moderately correlated with cognitive abilities, but that non-verbal cognitive ability is a separate construct.

Language specificity and phonological awareness

As within the entire family of metalinguistic abilities, early childhood home and environmental experiences with language shape phonological awareness skills. Research has demonstrated that early life experiences (such as phoneme training and familiarity with rhymes) aid phonological development independently of reading abilities and significantly influence phonological awareness (e.g., Bradley & Bryant, 1985; Maclean, Bryant, & Bradley, 1987). For example, Maclean and colleagues (1987) found that children's knowledge of rhymes before beginning school is substantially correlated with their subsequent phonological awareness. In a similar vein, the influence of different languages on phonological awareness has been investigated in several linguistic contexts.

Durgunoğlu and Öney (1999) discusses how the spoken language to which a child is exposed has a substantial influence on the development of phonological abilities. Languages differ widely in the complexity of their phonological structures. The diversity of syllable types, the occurrence of morphophonemic alternations, and the occurrence of vowel or consonant harmony are only some of the phonological differences that exist among different languages (Durgunoğlu & Öney, 1999).

A series of studies has addressed the differential relationships between various languages and phonological awareness. Cossu, Shankweiler, Liberman, Katz, and Tola (1988) found that Italian kindergartners and first-graders demonstrated higher levels of phonological awareness than did their American counterparts. The authors attribute the Italian children's advanced phonological abilities to the simpler vowel structure in Italian. Caravolas and Bruck (1993) compared the development of phonological awareness in Czech and English children. The authors hypothesized that the variety of Czech syllabic onsets would facilitate the rate and patterns of phonological awareness during early literacy instruction. The Czech children not only showed initial higher levels of phonological awareness, they also improved more rapidly once formal literacy instruction had begun. In a Persian-English bilingual study, Arab-Moghaddam & Senechal (2001), found that although phonological awareness predicted reading abilities similarly in both Persian and English, it only predicted spelling abilities for English words. Cheung, Chen, Lai, Wong, and Hills (2001) specifically investigated the different effects of spoken language on the development of phonological awareness, finding that phonological skills differed depending

on which languages their participants spoke and wrote (logographic or alphabetic Chinese or English). Together, these studies provide clear indications that phonological awareness does not develop at the same rate for speakers of all languages, nor does it play the same role in the acquisition of literacy from language to language.

In another example, Durgunoğlu & Öney (1999) demonstrated that, although phonological awareness facilitated word recognition for both Turkish and English speaking monolingual children, the nature and development of phonological awareness differed for the two groups. The Turkish-speaking children were significantly more proficient in the manipulation of both syllables and final phonemes, thus reflecting the salient aspects of the Turkish language (see *Phonological aspects of Turkish* below).

Studies show that speakers of several languages with traditionally non-alphabetic orthography also provide indications of distinctive phonological processing patterns. Shu and colleagues (2000) demonstrated the unique developmental patterns of phonological awareness among second through sixth grade Mandarin speakers. McBride-Chang, Bialystok, Chong, and Li (2004) conducted a study comparing Chinese and English speakers in three different cultural settings to investigate the effects that language, culture, and instruction philosophies have on phonological awareness. They found that all three aspects affect phonological awareness in both languages. Such studies give credence to the supposition that specific linguistic structures of the home language affect phonological processing skills.

Characteristics of languages also affect literacy development in different ways (e.g., Goswami, Popodas, & Wheelwright, 1997; Leong & Joshi, 1997). This has been demonstrated in multiple investigations comparing the role of phonological awareness and reading among German- and English-speaking children (Landerl et al., 1992; Mann & Wimmer, 2002). The authors found that, in contrast to English speaking children, German children's ability to detect alliteration and rhyme played no meaningful role in the initial phases of reading and spelling acquisition. However, in the later phases of reading, the ability to segment phonemes predicted reading abilities for children of both languages. Studies such as these clearly indicate the importance of considering different languages individually in order to better understand the role of phonological awareness; it cannot be assumed that the same base skills predict reading for all alphabetic orthographies.

Although the evidence for differential linguistic influence on phonological skills is compelling, the research does not indicate causality. It is possible that a host of confounding cultural factors such as educational systems, parent-child interactions, and cultural practices (e.g., song or poetry in the home) play equally strong or stronger roles.

Phonological aspects of Turkish

Turkish is a particularly interesting language for investigations of phonological awareness due to its unique phonic structure. Durgunoğlu and Öney (1999) studied the effects of linguistic variation and the demands of the spoken language (Turkish or American English) on the development of phonological awareness. Because the Turkish language is primarily (98%) composed of simple syllables³ (V, VC, CV, CVC), with over 50% in the CV structure, it has very clear syllabic boundaries. Since the common syllable types do not include consonant clusters, individual phonemes are also relatively simple to identify (Öney & Durgunoğlu, 1997). Turkish may therefore lend itself more readily to awareness of syllables than languages such as English.

A further important characteristic of the Turkish language is vowel harmony. In its eight vowel system, vowel harmony proceeds in a left to right sequence in which any of the eight may appear at the beginning of the word, but the subsequent vowels are shaped by their predecessors. Being a speaker of Turkish requires constant monitoring and manipulation of subword linguistic units. The speaker is required to attend to the phonological characteristics of suffixes, choosing between alternate surface forms of the suffix based on phonological criteria. It is believed that these phonological characteristics of spoken Turkish facilitate the development of phonological awareness earlier than do the structures of spoken English (Durgunoğlu & Öney, 1999). Finally, a morphemic structure in the language requires harmonic post inflections, meaning that particular implicit attention is paid to the final phoneme in each word (Öney & Durgunoğlu, 1997).

Durgunoğlu and Öney's (1999) data support their prediction that, because a syllable is a more salient unit in Turkish, a syllable tapping task would be easier for first and second grade Turkish children than for English-speaking American children of the same age. In fact, Turkish kindergartners even performed better on tasks of syllable recognition than American first graders. Turkish-speaking children were also able to more accurately perceive phonemes, demonstrated by superior performance in phoneme tapping and phoneme deletion tasks. Although Turkish kindergartners significantly outperformed American first graders in a final phoneme deletion task, both groups performed similarly for initial phoneme deletion. The more pronounced advantage for the Turkish children in final phoneme deletion task is likely a reflection of the necessity to attend to final phonemes in speaking Turkish. This unique study suggests that being a native speaker of Turkish leads to particularly well honed phonological awareness in children.

³ V = Vowel, C = Consonant.

1.1.2. The role of verbal abilities in reading

In the context of literacy acquisition, the term *verbal abilities* encompasses the broad proficiency to express and comprehend vocabulary and language structures. Researchers typically measure verbal abilities with measures of word comprehension and oral expression (e.g., see Cain, Oakhill, & Bryant, 2004; Näslund & Schneider, 1991). In comparison to the phonological awareness literature, there is surprisingly little research geared explicitly toward understanding the role of verbal abilities in reading. However, there are several studies, especially on reading comprehension, in which verbal language abilities show strong links with reading performance. These links indicate that deficient verbal skills may lead to severe disadvantages for some young readers. Bielemiller (2003) argues that delays in oral language are reflected in low levels of reading comprehension that lead to overall low levels of academic success. There are indications in the North American literature that children who enter the fourth grade with significant vocabulary deficits show increasing difficulties with reading comprehension, even if their decoding skills are proficient (Biemiller, 2003). Pointedly, Bialystok (2002) writes, “It is almost self-evident that children’s competence in spoken language will provide some measure of prediction in determining how effectively they will read” (p. 169). Perhaps it is the self-evidence of this link that has hindered focused research in this field.

According to Stahl and Fairbanks (1986), the most salient aspect of verbal language abilities is vocabulary skills. Vocabulary skills demonstrated substantial predictive power in several studies investigating the development of reading comprehension (e.g., Cain et al., 2004). Adams (1990) found that children with higher levels of oral proficiency and more elaborated vocabulary develop reading skills more readily than do their less proficient peers. Another study particularly indicative of the impact of vocabulary skills was conducted by Carver (1994), who found that children who could not recognize more than 2% of the words in a reading text experienced deficient reading comprehension. In a two-year longitudinal study, Muter and colleagues (2004) found that although vocabulary skills was not a predictor of word recognition skills among beginning readers in the first two years of formal education, it was a significant predictor of reading comprehension. From these results, the authors surmise that phonological processing skills play a larger role in reading during the earliest stages of literacy development, but that vocabulary skills assumes greater importance at later stages. Schneider (2004) came to a similar conclusion with a reanalysis of a longitudinal data set (Ennemoser, 2003) that examined the cognitive abilities, phonological awareness, language development, and reading abilities of children from the first to third grades. Although phonological awareness was the strongest predictor of reading in Grade 1, language development became a stronger predictor of reading

abilities by Grade 3. In sum, the literature indicates a probability that vocabulary and verbal language skills grow in importance as age-appropriate texts become more complex over time.

The bulk of the literature on vocabulary and reading comprehension stems from studies investigating the effects of vocabulary training on reading skills. Stahl and Fairbanks (1986) conducted a meta-analysis of 52 experimental studies involving vocabulary instruction and reading skills. Of the studies reviewed, 15 tested the impact of vocabulary training on reading comprehension of passages in standardized tests not specifically designed to contain the words taught. The mean effect size on those measures was .30, indicating that students at the 50th percentile of instructed groups scored as well as the 62nd percentile of children in the control groups. The authors conclude from the meta-analysis that vocabulary instruction generally facilitates growth in reading comprehension, but that the effects most likely decrease over time. It is important to point out that many of the studies reviewed by Stahl and Fairbanks utilized college-aged samples that likely do not accurately reflect the role of vocabulary in emerging literacy. Nonetheless, this meta-analysis demonstrates the link between vocabulary and reading comprehension across a wide range of age groups.

Listening comprehension is not distinctly referred to in the Näslund und Schneider model of reading. It is, however, considered by many to be a component of verbal abilities and significantly related to reading comprehension (e.g., Proctor, Carlo, August, & Snow, 2005). A series of studies has confirmed strong relationships between listening and reading comprehension among monolingual children (e.g., Gough and Tunmer, 1986; Lerkkanen, Rasku-Puttonen, Aunola, & Nurmi, 2004).

A series of studies has found links between phonological awareness capacity and vocabulary as well as other verbal skills. Metsala (1999) found that growth in vocabulary may, in part, explain individual differences in emerging phonological awareness. Similarly, Engen and Høien (2002) propose that vocabulary and short-term memory are both determined to some extent by phonological abilities. Clearly, the components of literacy acquisition are interrelated on several levels. Nonetheless, there is sufficient reason to believe that the core abilities involved in early reading are indeed separate skills playing independent roles (e.g., see Rego & Bryant, 1993). This study will attempt to isolate the individual aspects of phonological awareness, verbal abilities, and reading with the aim of testing the viability of a prevalent German model of reading.

As shown by the large amount of research reviewed above, phonological awareness and verbal abilities are robust predictors of reading abilities within one's native tongue; however it is still unknown what role phonological awareness and L2 verbal skills play in the development of reading in children of diverse linguistic backgrounds (see Chiappe et al., 2002). In spite of the informative investigations of component reading skill among L2 learners, few studies have sought

to hypothesize and test a comprehensive model of L2 reading comprehension among bilingual children. The bilingual-specific aspects of the conceptual framework for this investigation are discussed in the following section.

1.2. Bilingualism and the development of literacy

1.2.1. Understanding bilingualism

Studied by an interdisciplinary collection of researchers including psychologists, educational scientists, sociologists, and linguists, bilingualism is a complex phenomenon, involving variation at both individual and social levels. For over forty years, research on bilingualism has explored the possibility that bilingualism may have facilitating effects on children's cognitive, literacy, and academic development (see Bialystok, 2002). According to Bialystok, Majumder, and Martin (2003), the results of that research are mixed, but the majority of studies report advantages for bilingual children. One reason the results of this body of research are so varied may be, in part, due to the complexity and heterogeneity of bilingualism in itself.

An important consideration in the field of bilingualism is the distinction between elite and folk bilingualism. *Elite* or *elective* bilingualism develops by choice (e.g., sending German children to English speaking schools), whereas *folk* or *circumstantial* bilingualism develops second language capacity under circumstances in which the larger society does not necessarily place value on the native language. This is typically the case among immigrant groups, a situation that usually results in a shift to the dominant elite language within one to two generations. Elite bilingualism is usually accompanied by literacy in both languages, whereas folk-bilingualism literacy is more haphazard (Hakuta, 2000). The patterns of linguistic, academic, and psychosocial development among children raised in elite bilingual or folk bilingual settings are almost certainly quite different. For example, a German child from a higher income family attending an English speaking school in Germany develops her linguistic abilities, academic language skills, and self-concept for language differently than an inner-city child from a Turkish speaking family attending a German public school. The differences in development do not stem so much from the children's individual cognitive abilities or personalities, but from their societal and linguistic contexts. Therefore, research findings from one group cannot be directly applied to the other.

1.2.2. Bilingualism in development

In order to examine the ontogenetic roots of literacy skills in the bilingual individual and to explore the facets of reading and writing that are particularly meaningful for multilingual children, it is necessary to briefly review the relevant aspects of linguistic development.

Subconscious phonological awareness and discrimination begin in the first weeks of life. Cheour,

et al. (2002) demonstrated that newborn babies can learn to discriminate between similar vowel sounds (e.g., /y/ and /y/i/) while asleep. During the first year of life, infants come to recognize the perceptual properties of their native language and develop mental maps for the speech sounds of their home language (Kuhl, 1998; Jusczyk, Friederici, Wessels, Svenkreud, & Jusczyk, 1993).

If a child acquires two languages simultaneously, it has been shown that she can develop both languages at a comparable rate to that of monolingual children (Padilla & Liebman, 1975). By 24 to 30 months, a child can differentiate between the two phonological systems (Dulay, Hernandez-Chavez, & Burt, 1978). Albert and Obler (1978) suggest that by age seven, a child can be in command of two separate languages and become truly bilingual. Aitchison (1996) on the other hand, argues that true command of a language including basic structures, complex grammar, and a rich vocabulary can take up to 20 years to develop in a bilingual context. Bilingual language learning is an intricate and extensive process with few easily isolated structures or broadly generalizable timelines (see Bialystok, 2001).

There is little evidence that acquiring a second language after age three, as most bilingual children do, decreases fluency. Before the mid to late teenage years, languages can be acquired to a level of fluency relatively rapidly (Owens, 1988). Since the child already has command of one language, she also has an already developed acoustic-perceptual system, an articulatory repertoire, and a cognitive-semantic base from which to begin learning a second language. A great deal of debate surrounds the idea of a “critical period” for second language acquisition, after which learning a new language would dramatically increase in difficulty while decreasing in potential proficiency due to an inherent biological divide between young and old language learners (Lenneberg, 1967). There is no dispute that children are generally more successful than adults in learning a second language, but the extent to which a clear critical window for acquisition exists is less clear. Snow and Hoefnagel-Höhle (1978), for example found that English-speaking children in Holland ages 8 to 10 and 12 to 15 learned Dutch more quickly than 3-5 year olds, thus indicating that younger children do not necessarily acquire an L2 more easily than older children do. Bialystok (2001) explains that there is consistent evidence pointing toward a critical period for phonology, but the period seems to shift depending on which aspect is investigated. The window for innate phonological perception in which sounds from any languages can be perceived may last until 12 months of age. Multiple languages can be learned and produced without foreign accents until age five to eight. Bialystok suggests that each of the many aspects of language (e.g., grammar, vocabulary, phonology, tone, or nuance) develops at a different rate. She concludes that overall, like most cognitive abilities, the capacity to learn quickly decreases gradually across the lifespan with no explicit drop-off or “critical period”. Some researchers interpret the gradual decrease in L2 abilities until puberty, followed by low but highly variable L2 abilities for post-

pubescent L2 learners, to be sufficient evidence of a critical period (e.g., Birdsong & Molis, 2001; Johnson & Newport, 1989; Oyama, 1982). However, testing the slope of L2 language attainment with census data from 2.3 million immigrants, Hakuta, Bialystok, and Wiley (2003) did not find the pattern of decline in proficiency to be indicative of a critical period. In sum, there is no clear definition or time span for the critical period hypothesis for second language acquisition. It is only interpretable from the literature that, in general, the acquisition of a second language before adolescence is more efficient than post-adolescent L2 acquisition.

Studies indicate that childhood development of a second language deviates little from the development patterns of a first language. Mistakes made by children learning a second language are often the same as those made by first language learners. Phonological development also follows a similar pattern in first and second languages (Owens, 1988). In a similar vein, a study by Wade-Woolley and Geva (2000) found that while new phonemes that do not exist in the child's L1 can present a specific challenge to L2 learning children, over time they do acquire these new phonemes and the frequency of L1 specific errors gradually diminishes.

There are numerous theories and terminologies explaining the processes of developing a second language. A bilingual person will rarely have command of both languages equivalently, but those who approach mastery of two languages are said to be *balanced* bilinguals. By contrast, those who remain stronger in their L1 or have shifted to a stronger L2 are described as having *dominant* bilinguality. There is very little documentation of bilingual subjects who maintain equally balanced proficiency in both languages. The language in which the bilingual receives more exposure often becomes the dominant language (see Watson, 1991). A further useful distinction is the age at which one becomes bilingual. A *simultaneous* bilingual is one who is exposed to both languages from birth. If exposure to the second language occurs before age 11, the term *consecutive* bilingual is often used (Hakuta, 2000). Hamers and Blanc (1989) provide an excellent overview of the many categorizations and terminologies related to different forms of bilingualism.

A controversial theory in bilingualism is Cummins' (1979) "theory of language interdependence" hypothesizing that a second language can only be acquired to the point of usefulness when a certain level of security is reached in the first language. Cummins writes, "To the extent that instruction in a certain language is effective in promoting proficiency in that language, transfer of this proficiency to another language will occur, provided there is adequate exposure to that other language" (p. 87, Cummins, 1979). Cummins (1991) has collected a range of empirical studies that have provided support for this hypothesis. The exact meanings of the "certain level" of language security or "adequate" language exposure are not clear with regard to concrete language proficiencies. Diaz and Klinger (1991), however, defined the two language threshold as age appropriate abilities in both languages. In other words, children with below

average development in either language would not derive the benefits of bilingual metalinguistic development. This indicates that only balanced bilingualism is useful and for L2 acquisition and developing metalinguistic benefits. As explained above, however, balanced bilingualism is not necessarily the norm.

A study conducted by Yelland, Pollard, and Mercuri (1993) put Cummin's theories into question by challenging the idea that proficiency is needed in both languages in order to reap the benefits of bilingualism. The authors reported that young children who studied Italian for six months showed better metalinguistic skills than a group of peers who received no L2 instruction. The theories of language thresholds and interdependence are still being debated, but to date there have been no conclusive studies supporting this hypothesis (Hopf, 2005). Few better-differentiated theories, however, have been formulated to take their places (see Reich & Roth, 2001).

In the realm of language development and multilingualism, 'culture' is not only a variable that has its effects upon the level of processing or practice of assessment, but it may have a direct impact upon the development and maturation of the brain and its behavioral manifestation. Neuroscientists have explored how multiple languages are represented in the human brain by using fMRI (functional Magnetic Resonance Imaging). It was found that first and second languages are separated within the frontal lobe language sensitive regions (Broca's area) when the second languages are acquired in adulthood (late bilingual subjects). However, when acquired during the early language acquisition stage of development (early bilingual subjects), both first and second languages tend to be represented in common frontal cortical areas. At the same time, both late and early bilinguals show little or no separation in the temporal lobe language areas (Wernicke's area; Kim, Relkin, Lee, & Hirsch, 1997). This seems to indicate that adult L2 acquisition requires additional structures for output and speech performance, whereas regardless of the timing of L2 acquisition, primary sound perception remains reliant on the same part of Wernicke's area. This research provides convincing scientific evidence that the full acquisition of a second language early in life has visible effects on the brain and its neural networks. It would follow that differences in cognitive and phonological processing patterns could also be expected as a result of the neurological impact of dual language acquisition.

fMRI imaging has also been used to explore unique cognitive processing abilities of bilingual persons. Rodriguez-Fornells, Rotte, Heinze, Nössel, and Münte (2002), investigated the neurological processes that enable bilingual individuals to understand and speak one language without apparent interference from the other. The investigators showed bilingual (Catalan-Spanish) and monolingual (Spanish only) participants a list of mixed words and pseudowords in both languages of proficiency and instructed them to respond only to target language words. The

bilingual participants were able to reject non-target words as quickly as pseudowords, indicating that bilinguals can effectively shut down one lexicon when necessary. This is particularly remarkable when considering the findings indicating that the neuro-anatomical representations of both languages overlap and could point to an exceptional cognitive capacity of bilingual persons. More important were the unique fMRI activation patterns of bilinguals compared to monolinguals in the Rodriguez-Fornells and colleagues study (2002): A number of areas previously indicated in phonological processing showed activation, suggesting that bilinguals may use different phonological access routes when accessing their target language than do their monolingual counterparts.

1.2.3. A bilingual advantage?

It has been claimed with relative certainty that bilinguals possess a different and sometimes even sharper, better-honed sense of language awareness than monolingual persons do (see Bialystok, 1984, 1988, 1997; Reich & Roth, 2001). For example, Cummins (1989) wrote:

It is not surprising that bilingual children should be more adept at certain aspects of linguistic processing. In gaining control over two language systems, the bilingual child has had to decipher much more language input than the monolingual child who has been exposed to only one language system. Thus the bilingual child has had considerably more practice in analyzing meanings than the monolingual child. (p. 20)

For many years, the idea that the acquisition of more than one language at an early age promotes metalinguistic awareness has been debated (see Hakuta & Diaz, 1985). Proponents claim that having command of multiple languages creates a more intentional approach to language and sharper metalinguistic competencies (e.g., Bialystok, 1991). It is also believed that bilingualism provides a form of contrastive linguistics instruction that enables bilingual children to analyze language structures in more advanced ways than monolingual children (e.g., Cummins, 1979). Another explanation is that the bilingual experience directs thought to the essential aspects of the environment by quickly distinguishing the verbal unit from the object it denotes, thus promoting a more analytic orientation towards language. In essence, the process of becoming bilingual requires the child to regard language as an object of thought (Gönz & Kodzopeljić, 1991). A number of studies have found enhanced metacognitive abilities among bilinguals, such as a more pronounced awareness of semantic features of words, earlier recognition of connections between words, and sharper phonological processing abilities such as phonemic segmentation (e.g., Carlisle, Beaman, Davis, & Sparim, 1999; Ianco-Warrall, 1972; Gönz & Kodzopeljić, 1991).

Not only are metalinguistic abilities surmised to be more highly advanced in bilingual children, but a range of other literacy relevant skills as well (for reviews see Bialystok & Ryan, 1985 and Hakuta & Diaz, 1985). There is evidence of better performance among bilinguals in

symbol conceptualization (i.e., naming and renaming objects; Oren, 1981), working memory (in adults; Bialystok, Craik, Klein, & Viswanathan, 2004), and high-control problem solving (Bialystok, 1986, 1999). Kormi-Nouri, Moniri, and Nilsson (2003) found that bilingual children in three different age groups (8.5, 10.5, and 12.5) demonstrated significantly better skills on tasks of both episodic and semantic memory than did their monolingual counterparts. The authors hypothesize that bilingual children have a heightened ability to organize information as a result of their dual language capacity. Hakuta and Diaz (1985) found that proficiency in a first and second language contributed to growth in non-verbal cognitive abilities for children in the first few years of school. Using two different models to test the direction of causality with their longitudinal data set, Hakuta and Diaz (1985) discovered that a model indicating the degree of bilingualism to be the causal link was more consistent with their data than the model claiming cognitive abilities to be the causal variable. Nonetheless, these studies cannot conclusively prove causality and there are, of course, studies that deviate from this trend (e.g., Verhoeven, 1996).

Although there is a fair amount of international research regarding language acquisition among children growing up with two languages, there is a striking dearth of studies examining the development of language structures in children learning German as a second language (Reich & Roth, 2001). Considering the large number of minority language children in Germany (see Section 1.3.), there has been very little research conducted on their language practices and characteristics. No information was available regarding the degree of linguistic similarity or difference between the Turkish and German languages and what, if any, bilingual benefits might occur as a result of competence in both.

1.2.4. The role of bilingualism in literacy development

There is strong evidence that bilingualism in itself has no negative consequences for the development of reading skills in general (e.g., Chiappe & Siegel, 1999; da Fontoura & Siegel, 1995). At the same time, there are many studies indicating that minority language children are at greater risk of poor literacy development than their majority language peers (e.g., August & Hakuta, 1997; Durgunoğlu, 1998; Verhoeven & Aarts, 1998). There is no question that the challenges to minority language children learning to read in the majority language can be substantial as they work not only to master the acquisition of an L2 but also its application in a new academic environment (see Bialystok, 2002). However, only a handful of studies have attempted to explain what cognitive processes work to overcome those challenges. Leading researchers call for work focusing explicitly on how the growing numbers of L2 learners develop reading skills (e.g., August & Hakuta, 1997; Durgunoğlu et al., 2001). In reference to the

evidence regarding the link between verbal abilities and reading comprehension, Bialystok (2002) explains the reasoning behind this important area of research:

Bilingual children may or may not have better oral competence than monolinguals, but they certainly have different oral competence. If the early experience of knowing two languages influences the acquisition of literacy, one avenue of that influence may be through the type of oral competence established by these children. (p.170)

In other words, Bialystok suggests (as the neurological investigations suggest as well) that having command of two languages creates differences in the way people experience and produce language. Bialystok suggests that if this difference influences literacy acquisition, oral competence (verbal abilities) should be examined as a possible reason for that difference. It has not yet been determined whether the factors involved in reading acquisition in an L1 are the same as those necessary for learning literacy skills in a language other than that spoken in the home. According to researchers such as Fitzgerald (1995), it is essential for both educators and scientists to examine the differential strengths, weaknesses, and needs of bilingual children in their emerging literacy. This section will look at the general topics related to bilinguals' ability to read in their second languages.

Fitzgerald (1995) conducted a literature review of children's cognitive processes in L2 reading. Based on the literature review, Fitzgerald proposes two essential factors that affect L2 reading processes. First, the similarities or differences between the first and second languages are hypothesized to be relevant for L2 reading acquisition. Fitzgerald suggests that the second fundamental influence on the second language learners' reading abilities is the socio-political context in which the L2 is being learned (e.g., elective bilinguals living in their home cultures who choose to add a second language, compared with circumstantial bilinguals such as immigrants, who must learn a new language). Fitzgerald concludes that there was substantial individual variability in two areas: vocabulary skills and psycholinguistic strategies, although L2 readers follow substantively the same reading processes as native speakers. She does find, however, that these processes differ in speed and magnitude between bilingual and monolingual readers.

Due to several methodological issues, the results of the Fitzgerald literature review are indeterminate for understanding emerging literacy among bilingual children. Although the author reviewed 67 U.S. research reports, only 19 were conducted with early readers. Furthermore, even though the L2 for all participants was English, the home languages varied widely. In sum, Fitzgerald determines that "the most pointed statement that can be made is that there was no single pattern in the use of psycholinguistic strategies across [L2] readers" (p.171). Considering the linguistic and age heterogeneity of the studies reviewed, the lack of consistent results is not surprising.

Although a comprehensive theory of bilingual literacy acquisition does not yet exist, there are four commonly mentioned distal factors that are thought to strongly influence bilingual literacy language skills: sociopolitical factors, structural language similarities, individual traits and literacy culture in the home (Reich & Roth, 2001). When measuring academic development of any kind in children, it is essential to consider the robust role of SES (socioeconomic status) and parental education. Children come to school with widely varying levels of literacy proficiencies as a result of their experience with both oral and written language. Home experiences with language influence children's familiarity with the characteristics of language and create different development patterns for understanding the functions of literacy. For example, lower SES families may use a great deal of language, but that language is less likely to match the decontextualized nature of the language spoken at school. This often poses additional problems for children when confronted with the new form of language used in the classroom. Conversely, typical middle-class home activities such as rhyming games, songs, and storybook reading can positively contribute to development of linguistic insights (Durgunoğlu et al., 2001). Differences in SES can affect not only linguistic development, but literacy and academic progress as well (Duncan & Seymour, 2000). In that a substantial proportion of first generation language minority families live in lower SES environments, it is important not to confuse the developmental outcomes related to sociocultural variables with those caused by the presence of an L2. Many recent studies emphasize the powerful influence of access to books and written material in immigrant families' homes as well as the support of parents in encouraging a successful school experience and providing good literacy examples for their children (e.g., Verhoeven & Aarts, 1998). It is probable that these aspects play a distal role by influencing base skills and attitudes, not reading abilities directly. These factors are essentially identical to those affecting literacy skills of native speaking students; they are not unique for L2 readers.

There are similarly conflicting results of studies that have examined correlations between intelligence tests and literacy skills in bilingual children. While both Swain (1986) and Verhoeven (1994) found positive correlations between IQ tests and literacy related skills, Verhoeven found no relationship between IQ and vocabulary or morphosyntactic knowledge which has been described as a basis for literacy development. The relationship between cognitive abilities and other base literacy skills in bilinguals requires further examination.

Despite the lack of conclusive empirical research directed at understanding the unique reading processes of bilingual children (for a discussion see Proctor et al., 2005), several theorists have discussed the processes involved in reading in a second language. For example, Cummins' (1979) theory of language interdependency (see Section 1.2.1.) predicts that reading instruction in one language leads not only to improved literacy skills in that language, but also to a deeper

conceptual understanding and linguistic proficiency that is related to literacy and academic skills in the other language (Cummins, 1991; Verhoeven & Aarts, 1998).

There is, in fact, some evidence that proficiency in aspects of reading in one language may be helpful for gaining proficiency in another. Several studies have shown cross-linguistic transfer among primary school children for phonological awareness (Comeau et al, 1999; Durgunoğlu et al., 1993; Verhoeven, 1994). Ordóñez, Carlo, Snow, and McGlaughlin (2002) also found indications for cross-language transfer for certain aspects of vocabulary development. Research such as this gives the impression that verbal and base reading skills in one language are not independent of those in a second language. In other words, development of base reading skills in one language seems to have influence on the other; abilities in the two languages do not develop separately from one another (for a more thorough review of cross-language transfer in bilingual reading, see Durgunoğlu & Hancin, 1992). The hypothesis of language interdependency still needs to be tested in more languages and linguistic contexts. For example, being a speaker of Dutch might facilitate the acquisition of German reading skills, but may not contribute to learning reading in Mandarin.

Several researchers investigating biliteracy in Germany have focused on the possibility of cross-language transfer of base reading skills. Reich (2000) found that over 80% of the Turkish-German children had learned sound-oriented writing and could apply it to both languages. The Turkish language likely facilitates this, especially because of the consistent letter-sound relationships (discussed in depth above) and similar alphabet used in the Turkish language. Berkemeier (1997) demonstrated in a small-scale study that Greek-German bilingual children apply what they have learned in their first language alphabet to the second language.

In a comprehensive study measuring many of the key components of reading delineated above (see Section 1.1.), Bialystok and collaborators (2005) explored the impact of three different language combinations of bilingualism (Spanish-English, Hebrew-English, Chinese-English) and English monolingualism on the base reading skills of first graders. The authors hypothesize that literacy could proceed differently for bilingual and monolingual children for two reasons. First, they propose that bilinguals develop the necessary background skills (vocabulary, phonological awareness, memory) for literacy differently than do monolingual children. Secondly, they suggest that literacy skills can be transferred from one written language to another when the bilingual child is biliterate. The authors found strong support for their hypotheses with significantly stronger reading (decoding) skills amongst their Spanish-English and Hebrew-English bilingual groups. This result held even after progress in literacy-related skills (phonological awareness, verbal memory, and vocabulary knowledge) was controlled for. The study uncovered a pattern indicating a clear divide between the groups of bilingual children, most likely due to the non-

English language spoken at home. The children's L1s appeared to create a different experience in learning to read for the children of each language combination group. In Bialystok et al.'s sample, where the participants were all learning literacy in both their first and second languages, the bilingual children also transferred literacy skills across languages when both were written in the same alphabetic system. It is possible that the (unusual) biliteracy of the children in the Bialystok et al. (2005) sample produced results that would differ from "circumstantial bilinguals" (see Section 1.2.1.) in typical minority language populations.

In sum, the literature on bilingual children and their literacy development is not only diverse, but also inconclusive. This is in part due to the wide range of language combinations, political, social, and economic situations of those groups being studied; it would be unrealistic to expect a single message on how bilingual children learn to read. However, one thing is clear: There is no evidence that bilingual children acquire literacy in the same way as monolingual children. The models of reading developed with monolingual children in mind, therefore, may not necessarily fit a bilingual population with the same precision. Differences in reading models between bilinguals and monolinguals have been investigated in a small handful of studies (e.g., Verhoeven, 2000), but none were investigated in Germany.

1.2.5. Phonological skills in bilingual children

As described above, the role of phonological processes in the development of literacy has been studied extensively in monolingual children (e.g. Wagner & Torgeson, 1987; Wagner et al., 1993; Wagner et al., 1994; Wagner et al., 1997). However, there are only a handful of studies examining the links between phonological awareness and literacy development among bilingual children (e.g., Comeau et al., 1999; Mumtaz & Humphreys, 2001). If specific languages affect the nature of phonological development in children, it can be assumed that the acquisition of two languages in early childhood would have an effect on phonological skills as well. Also, as hypothesized in the theoretical bilingualism literature, several studies indicate that children exposed to more than one phonological system may indeed have heightened levels of phonological awareness (Bruck & Genesee, 1995; Campbell & Sais, 1995; Oren, 1981).

Bruck and Genesee (1995) conducted one of the key studies on phonological awareness in a sample of children learning a second language. Based in part on the studies mentioned above that point to the specific influence of phonological characteristics of language on phonological processing skills, the authors examined three separate aspects of phonological awareness (syllable awareness, onset rime awareness, and phoneme awareness) to test the possibility that bilingualism affects the development of specific phonological awareness skills depending on the structures that are salient in the second language relative to the first. At the onset of the study, the

participants were native English speakers in kindergarten. Half of the sample attended a French immersion kindergarten (bilingual group, $N = 91$) while the other half (monolingual group, $N = 72$) attended monolingual English schools. The bilingual group scored higher on phonological awareness items measuring the ability to perceive onset phonemes at the first time of measurement. One year later, Bruck and Genesee's (1995) data showed clear differences in the phonological awareness profiles between children exposed to two languages and the monolingual children. Bilingual children scored better on some aspects of phonological awareness than their monolingual (English-speaking) peers (i.e., syllable segmentation) and in turn, there were some skills in which the monolingual children seemed to excel (e.g., phoneme awareness). Thus the phonological awareness profiles of bilingual children seemed to reflect the salient units of both languages. In other words, the acquisition of a second language changed ways in which participants in the bilingual group perceived phonological stimuli.

Bialystok and collaborators (2003, 2005) found that superior phonological awareness among bilinguals may depend on the languages involved. Bialystok and collaborators (2005) recently conducted another noteworthy investigation of the phonological abilities of bilingual children compared to their monolingual peers. The authors hypothesized that the precursors to literacy develop differently for bilinguals and lead to an advantage for the bilingual children on measures of reading compared to their monolingual counterparts. This study of three different groups of first grade bilingual children reported significantly higher scores on phonological awareness tasks (phoneme counting) among Hebrew-English and Spanish-English bilinguals compared to Chinese-English bilinguals and monolingual English speakers. This finding echoed the results of the Bialystok et al. (2003) investigation of Spanish-English and Chinese-English bilinguals, in which only the Spanish-English bilinguals showed superiority on a phoneme segmentation task compared to the monolingual control group. Since adult speakers of Chinese (Cantonese) were not able to solve phoneme counting tasks, it seems that the linguistic characteristics of Cantonese do not require or promote phonological awareness. The authors suggest that "the bilingual advantage in phonological awareness may reflect a positive consequence of bilingualism [...] or an outcome of speaking two oral systems that are phonologically related" (p.58). Another important finding of this study was that the groups (Spanish-English bilingual, Hebrew-English bilingual) with the highest scores on the phonological awareness task also obtained the highest decoding scores.

There is, however, some evidence indicating limited duration of any phonological advantage for bilingual children. Several studies have reported a diminished effect of enhanced phonological abilities by age six or after onset of formal reading instruction (Bruck & Genesee, 1995; Campbell & Sais, 1995; Yelland et al., 1993). It is possible that the duration of the effects

may also be related to the commonalities or phonological characteristics of the languages involved (see Bialystok et al., 2005; Bruck & Genesee, 1995). Nonetheless, there are several studies indicating bilingual advantages for children beyond ages six or seven.

In line with the Bialystok 2005 findings, a study investigating the reading abilities of seven to eight-year-old bilingual Urdu-English and monolingual English speaking children found that while the bilingual children were less proficient at reading irregular English words, they were better at reading regular words and non-words (Mumtaz & Humphreys, 2001). The poorer performance on the irregular word reading proved to be related to (unexplained) deficient visual memory skills, whereas the superior performance in non-word reading appeared to be dependent on enhanced phonological skills.

Whether or not bilingual children have enhanced phonological awareness, there is evidence that phonological awareness helps bilingual readers to acquire literacy in their second language. Research involving children learning to read concurrently in both their L1 and L2 (e.g., Comeau et al., 1999; Geva & Siegel, 2000) as well as studies with English as a second-language learners acquiring English literacy only (e.g., Durgunoğlu, Nagy, & Hancin-Bhatt, 1993; Gottardo, 2002; Lesaux & Siegel, 2003; Manis, Lindsey, & Baily, 2004) show that phonological awareness is an important component process which helps learners to read and spell in the L2 even when general linguistic proficiency in the L2 is still emerging. It has not only been shown phonological awareness can advance general reading skills among bilingual readers, but very specific aspects of reading and spelling as well (e.g., Cormier & Kelson, 2000).

The benefits of phonological awareness for early bilingual readers are also reflected in the literature on cross-linguistic transfer of phonological awareness skills. Many studies across a variety of languages have reported evidence of cross-language transfer of phonological awareness in children becoming literate in a second language (e.g., Chiappe & Siegel, 1999; Cisero & Royer, 1995; Dickinson, McCabe, Clark-Chiarelli, & Wolf, 2004; Durgunoğlu et al., 1993; Gottardo, Yan, Siegel, & Wade-Woolley, 2001; Manis et al., 2004; Verhoeven, 1994). Lafrance & Gottardo (2003) found that L1 phonological processing skills predicted L2 reading among French-English bilingual children and Gottardo (2002) found that a combination of Spanish phonological processing skills and oral vocabulary were strongly related to English reading skills in Spanish-English bilinguals. Even when L2 (English) language proficiency is still developing, Geva, Yaghoub-Zadeh, and Schuster, (2000) found the individual differences in L1 phonological awareness to be related to basic reading and spelling skills in the L2. Similarly, Gottardo and colleagues (2001) drew the conclusion from their investigation of Cantonese-English bilingual children that phonological skills from a child's L1 can influence reading performance in any alphabetic orthography, "regardless of the orthography used to represent the child's L1" (p. 540).

Studies such as these could be interpreted as evidence that a general ability to perceive phonological input, shaped by the languages to which one is exposed, is not exclusive or specific to that language. This general phonological ability seems to contribute to the ability to perceive phonemes and decode an L2 orthography. It should be noted, however that many of the cross-linguistic transfer studies have been conducted with children learning two alphabetic systems, which is not the case in most bilingual or L2 populations.

Not surprisingly, literature in the field of bilingualism and phonological awareness is far from cohesive. A series of studies also points to deficiencies in bilingual children's phonological processing. A study described by Chiappe and collaborators involved diverse group of bilingual and second language learning children with several different home languages and found that bilingual children performed more poorly than monolingual children on several measures of phonological awareness (Chiappe et al., 2002; Chiappe, Siegel, & Wade-Woolley, 2002). This did not, however, impair or cause deviations in the bilingual children's patterns of literacy development. Verhoeven (1996) also found that minority children in the Netherlands significantly lagged behind their Dutch peers on standardized tests for auditory discrimination (similar to phonological awareness), vocabulary, sentence imitation, and discourse comprehension from ages four to eight. Furthermore, Verhoeven (2000) suggested that L2 learners might have particular difficulties with the phonemic recording of letter strings or phonic mediation and that (linguistically heterogeneous) L2 children in the Netherlands tend to lag behind their Dutch peers when it comes to decoding difficult words over time, although the two groups performed equally for orthographically simpler words. Verhoeven surmises that this is due in part to limited awareness of phoneme distribution and deficient auditory discrimination of phonemes that hamper the inductive mechanism used to organize grapheme-phoneme or phoneme patterns for reading. Both studies, however, investigated mixed groups of bilingual children; it is not possible to differentiate the effects of specific language combinations.

Lesaux and Siegel (2003) conducted an intervention study comparing a mixed group of L2 learners with a group of monolingual children. Both groups received phonological awareness instruction in kindergarten and phonics instruction in first grade. In kindergarten, the L2 learners performed significantly worse than the monolingual students on most measures. By the second grade, however, those deficits disappeared and in fact, the L2 readers performed significantly better than their monolingual counterparts on several tasks, including word reading, rapid naming, real word and non-word spelling, and arithmetic. Both the monolingual and L2 readers scored equally on measures of word reading and reading comprehension in the second grade. The authors draw the conclusions that a phonologically based intervention is beneficial for L2 beginning readers and that the effects of bilingualism on the acquisition of early reading skills

may be positive. Unfortunately, the authors did not include a control group to measure the effects of normal classroom instruction in comparison to the phonological training intervention. Without a control group, it is unclear how the L2 learners would have developed without training.

It is apparent that the existing literature offers a wide breadth of contradictory information regarding second language literacy acquisition and phonological awareness. Undisputed is only the fact that phonological skills play an important role in the process of learning to read. It should, however, be taken into consideration that many of the studies cited here have examined the phonological skills of bilingual Spanish-English, French-English, or mixed groups of bilingual children. As Cummins (1989) points out, it is important to practice caution when attempting to apply the results of studies conducted in languages other than that of one's target population. For example, findings from French-English bilingual populations in Montreal cannot directly be applied to a Turkish-German population in Berlin due to differences in sociohistorical contexts, parental attitudes, and linguistic differences.

1.2.6. Second language abilities and bilingual children

For monolingual children, phonological awareness has repeatedly been shown to be the strongest predictor of reading performance, particularly among early readers. Although the studies reviewed in the previous section seem to indicate that phonological awareness is also important for learning to reading in an L2, some research has found vocabulary to be a critical factor for minority language children learning to read. According to Carlo and colleagues (2004), the gaps in reading performance between L1 and L2 readers in the United States are largely a result of deficient vocabulary skills. Metsala and Walley (1998) propose that L2 learners may particularly benefit from strengthening their L2 oral proficiency skills, which leads them to be able to recognize more words and lexical structures.

For children speaking their native language, verbal abilities in the school language are usually already well honed by the time they begin school. Yet the level of expressive and receptive vocabulary skills required for reading comprehension go beyond the understanding of the semantic and syntactic aspects of spoken foreign language (Durgunoğlu et al., 2001). Decontextualized school language (e.g., Gee, 1999) as well as relevant specific vocabulary and background knowledge are necessary for the comprehension of texts (Durgunoğlu et al., 2001). Verhoeven (2000) indicates the relevance of vocabulary as a measure of background knowledge. These vocabulary-related aspects of language present particular challenges for children learning to read in an L2. Durgunoğlu and colleagues admit that there seems to be an increment of risk for children learning to read in a language they do not know reasonably well. In essence, vocabulary

skills represent more than a large repertoire of words at a child's disposal; they are a reflection of the child's background knowledge and ability to comprehend decontextualized academic language.

A number of factors influence the L2 vocabulary development of the minority language child. It is internationally well documented that parent reading behaviors and pre-primary education play an important role in the development of language skills, particularly for minority language and lower income children (e.g., Golova, Alario, Vivier, Rodriguez, & High, 1999; Grimley & Bennet, 2000; High, LaGasse, Becker, Ahlgren, & Gardner, 2000; Spiess, Büchel, & Wagner, 2003). Composition effects within a classroom or school, particularly with regard to the proportion of minority language students, have also demonstrated influences on the academic and literacy performance of minority language children in a wide variety of cultural settings (see Stanat, 2006 for a review and analysis)⁴. The composition effects are not specifically linked to the proportion of minority language children in a school, but rather typically entangled with a series of SES-related characteristics and cognitive abilities (Stanat, 2006)⁵. Furthermore, there is little to no data directly linking composition effects to L2 development among minority language children.

Research with Spanish-speaking minority language children in the U.S. indicates that a lack of knowledge of the middle- and lower frequency "academic words" encountered inhibits comprehension of the texts, in turn impeding the natural acquisition of new words during the reading process in a vicious cycle with dramatic effects for minority language students (Stanovich, 1986). Stanovich's finding is supported by a host of studies involving bilingual preschool children that show the bilingual children as having command of smaller vocabularies than monolingual speakers of either of the two languages (Ben-Zeev, 1977; Bialystok, 1988; Merriman & Kutlesic, 1993). A large-scale study by Cobo-Lweis, Pearson, Eilers, and Umbel (2002) demonstrated with a sample of Spanish-English speaking bilinguals, that this gap did not disappear until fifth grade, even when controlling for SES. A similar finding was reported by Bialystok and Herman (1999) for French-English bilinguals. In a cultural and linguistic context similar to Germany, Verhoeven (2000) found large differences (more than 2 standard deviations) in vocabularies of the L1 and L2 early readers in the Netherlands and in their reading

⁴ See Baumert, Stanat, and Watermann (2006) for a thorough overview of the international and German literature on composition effects.

⁵ It should be noted that according to Gayle Christensen and Petra Stanat, analyses of PISA 2003 data show that there "is not a significant association between the size of the immigrant student populations in the case countries and the size of the performance differences between immigrant and native students. This finding contradicts the assumption that high levels of immigration will generally impair integration" (OECD, 2006).

comprehension levels. These differences in vocabulary levels may create a substantial disadvantage for bilingual children in their early processes of literacy development.

The link between verbal abilities and reading among bilingual children was demonstrated in several studies conducted in a range of different linguistic and cultural contexts. Carlisle and collaborators (1999) showed that among first through third grade Spanish-English speaking bilinguals, L2 vocabulary and phonological awareness both made independent contributions to reading comprehension, but a substantially stronger effect emerged for vocabulary skills. Interestingly, a regression analysis with English reading comprehension as the dependent variable showed a significant effect for vocabulary in both Spanish and English, each accounting for 15% of the total explained variance, and phonological awareness accounting for only about 6% of the remaining variance. In a similar study in the Netherlands, Verhoeven (2000) explored the interactions of verbal abilities and decoding in a structural equation model with a mixed home language group of first and second grade minority language children and a comparison group of monolingual Dutch speaking children. He found that creating separate models for the two groups resulted in a much better fit, attributing the large differences in the model to the substantially stronger role of vocabulary within the bilingual group. Carlo and colleagues (2004) also demonstrated the importance of verbal abilities for bilingual children in their evaluation of a program aimed at systematic vocabulary instruction for Spanish-English L2 learners in the fifth grade. They found superior reading comprehension performance among L2 learners who participated in the intervention compared to a monolingual control group after only 15 weeks of in-depth vocabulary training. All three of these studies provide evidence of substantial links between vocabulary and reading for bilingual children.

Experts on bilingualism have argued that oral language abilities grow in importance for reading as decoding becomes more automatic and reading processes shift toward requiring greater levels of inference in context-reduced texts (e.g., Cummins & Swain, 1986). The research of Gough and Tunmer (1986) as well as Proctor and colleagues (2005) provide some indication that for L2 readers, oral language abilities increase in importance in later primary school, while the influence of decoding and other base skills decreases. Thus, one would expect vocabulary abilities not to play a prominent role in emerging literacy, but as comprehension of texts became more important, vocabulary would grow in importance as well.

Two studies explicitly investigated cross-language transfer of vocabulary skills among bilingual children. Ordóñez and colleagues (2002) conducted an investigation of children's depth of knowledge (production of superordinates, definitions, and descriptions) for Spanish nouns in relation to their depth of knowledge of English nouns. Although the authors found some support for their hypothesis that vocabulary knowledge in the two languages was related, neither

they, nor any other studies that could be found, provided “empirical evidence that L2 word knowledge develops more efficiently in the presence of L1 knowledge” (p. 727). In contrast to the findings of Carlisle et al. (1999), who found that both English and Spanish vocabulary skills predicted English reading comprehension, Manis and colleagues (2004) found no meaningful cross-language transfer from Spanish to English verbal performance for the prediction of reading comprehension among their large sample of K-2 Spanish-English bilinguals. The authors conclude that verbal abilities in the form of expressive language may have stronger within- than across-language relationships to later reading. To summarize the findings on the development of verbal abilities among bilinguals, no empirical studies indicated that either the L1 or L2 acts as a barrier for vocabulary development in the other language. However, there was also no indication that L1 abilities act as catalysts for L2 reading abilities either.

Similar to the work on listening comprehension and reading comprehension with monolingual children, there is a small number of studies that have found relationships between the listening and reading skills of bilingual children. A study by Royer and Carlo (1991) examined the predictive power of listening comprehension for reading comprehension. Their longitudinal study indicated that English listening comprehension was indeed an important predictor of English reading comprehension among Spanish speaking L2 learners. Proctor and colleagues (2005) put forth and tested a model of L2 reading comprehension incorporating the component processes listening comprehension, vocabulary skills, and decoding. In their sample of Spanish speaking students in the United States from both transitional bilingual and regular English-speaking monolingual classrooms, the strongest predictor of English reading comprehension was, in fact, listening comprehension. Vocabulary skills were both significant proximal and distal predictors of reading comprehension (mediated by listening comprehension). In general, this study found a relatively good fit for a monolingual model of reading using data from a Spanish-American population of fourth grade children. However, the omission of data on phonological awareness, the cross-sectional nature of the study, and the lack of a monolingual comparison group are substantial weaknesses that leave many questions unanswered (e.g., Does phonological awareness play a different role in early reading for bilingual compared to monolingual students? Do the same variables predict reading over time for both monolingual and bilingual children?).

Lesaux and Siegel (2003) speculate that L2 reading development “is not predetermined by lack of proficiency in [the L2] upon entering school” (p. 1016). If, as proposed by Metsala and Walley (1998), L2 learners can improve their L2 literacy skills by strengthening their L2 oral proficiency skills, then curricula aimed at L2 verbal abilities should boost performance on measures of reading comprehension. In fact, a handful of intervention studies of this nature have been conducted to test the efficacy of different instructional methods with minority language

children. A purely vocabulary based program designed to enhance fifth graders' L2 academic vocabulary was evaluated by Carlo and collaborators (2004). The intervention consisted of 30-45 minute instruction with 10-12 new words introduced each week over a 15-week period.

Intervention effects on measures of vocabulary were as large for the L2 readers as for the L1 readers, but not larger. The authors did not, however, administer measures of reading. In sum, the effectiveness of such theoretically based interventions for boosting bilingual children's academic success hints at the potential benefits of evening out initial deficits in L2 vocabulary.

In sum, there is a great deal of evidence that bilingual children develop unique metalinguistic and linguistic abilities through the acquisition of a second language. The particular strengths and weaknesses of bilingual children are most likely mitigated by the structural linguistic characteristics of the languages involved. Since few, if any, comprehensive facts can be established about bilingual children in general, it is important for researchers to investigate high frequency bilingual language combinations separately; not in mixed groups, and not blindly applying results from one socio-linguistic context to another. Research shows that explicit training programs in verbal abilities or phonological awareness may be able to boost the deficient areas and help educators make substantial changes in the speed and proficiency of their bilingual children's literacy acquisition.

1.3. Multilingualism and the German socio-educational landscape

1.3.1 Migration and education in Germany

A large proportion of the world's population knows and uses more than one language regularly. According to the 1990 Census, 32 million people in the United States lived in households where a language other than English was spoken (see Hakuta, 2000). This trend is also growing exponentially in Western Europe, where in many countries well over 10 percent of students attending schools speak a language at home other than the national language (Lundberg, 2002a). Germany, particularly the former West German states, has also developed into a land of immigration. Although this has happened gradually in waves over the past half century and the dynamics of migration and immigration have been considerable, the trend is now undeniable. Today, German public schools are a realistic reflection of this societal change. Many children with immigrant backgrounds face special challenges in literacy acquisition with serious risks of failures in educational and working life. Thus, as European societies become increasingly multilingual, it is critical for educators to understand the language and literacy development of L2 learners in order to best support them.

According to data collected for the PISA 2000 study, over 15% of 15-year-olds in German schools grew up in families in which *both* parents were born outside of Germany. More than 20% of 15-year-olds and over 22% of primary school children had at least *one* parent not born in Germany (Baumert & Schümer, 2001; Baumert et al., 2002; see also IGLU: Bos, Lankes, Prenzel, Schwippert, Walter, & Valtin, 2003). Schwippert and colleagues (2003) reported that one in five primary school children comes from a minority background, whereas a recent report cited the percentage of immigrant background children to be over 30% (Spiewak, 2006). As in the rest of the world, the proportion of multilingual students is growing: By 2025, more than one in five school graduates in Germany will be come from a minority background (Jeschek & Schulz, 2003). Although it is unknown exactly how much of the parent's native language is spoken at home in these families, these data indicate that a large proportion of German children grow up in multilingual households⁶. Nonetheless, Germany's minority language children usually spend their entire educational career in the German childcare and school system from preschool on. There are exceptions to this, but they are few; the number of children beginning German school in later grades is small (Baumert et al., 2002; Bos et al., 20003). It can therefore be assumed that the large majority of children in multinational and multilingual households are being exposed to the German language well before beginning formal education and have achieved some level of bilingualism by the first day of school.

Generally, the families of minority language children, regardless of duration of their residence in Germany, deviate significantly from the middle-class social structure of Germany. Parents and guardians in families with a history of migration typically work in jobs of lower socio-economic status (SES) in unskilled labor positions (Baumert & Schümer, 2001). Just as children from homes with a lower SES are less likely to go to a university preparatory school (*Gymnasium*), children from families with a history of migration are also more likely to graduate with basic secondary school degrees from vocational or trade schools instead of academic diplomas from college preparatory schools. Phenomena such as this often blur the lines between factors related to immigrant status (such as language competencies) and those related to SES. For migrant families, SES is an even more complicated factor and far more difficult to measure, in that vocation and financial situation in the reception country may differ drastically from that of the origin country (see Merckens & Morgenroth, 1997).

⁶ Schwippert, Bos, and Lankes (2003) used fourth grade children's self-report data to determine the amount of German and their parent's native languages spoken at home. Based on that data, they concluded that around 35% of children were growing up multilingual. Ninety percent of the sample reported speaking German *always* or *almost always*; only 1 percent of the sample reported *never* speaking German at home (See Table VIII.7, p. 279).

Further structural complications for minority language children are rooted in the German school system and policies themselves. The probability of being retained for a grade in Germany is high, particularly for minority language children. Throughout their school career, children from immigrant families have two to three times the risk of being retained in comparison to their “native” German classmates. According to Britz (2005), that risk is four times as high as for the “native” German children during primary school. U.S. research has overwhelmingly shown retention practices to have negative and no positive long-term effects on students’ academic performance or emotional development (e.g., meta-analysis by Jimmerson, 2001; McCoy & Reynolds, 1998; Westbury, 1994). The outcomes of retention include lower reading scores, higher risk of dropping out of school, higher rates of health compromising behaviors, and higher rates of unemployment. It is difficult to imagine that retention practices in Germany would have an opposite effect and result in positive outcomes for minority language learners’ academic development. Furthermore, even under conditions of similar SES, a child from a monolingual German family has a 1.7 better chance of receiving a recommendation to proceed to the *Gymnasium* than a minority language child from an immigrant family (Bos et al., 2003; Britz, 2005).

Several studies show that the majority of children from Turkish families in the German school system can be said to have almost equal dominance in both the Turkish and German language (Baur & Meder, 1992; Dietzel-Papakyriakou, 2002; Reich, 2000). The Hamburger Investigation (2000) found that by the end of the first grade, 69% of children from Turkish families had equal language skills in both Turkish and German. Hepsöyler and Liebe-Harkort (1988) found similar patterns when investigating the Turkish and German vocabularies of Turkish-German children. Although in early primary grades, their Turkish vocabulary was stronger, by the later grades in primary school, the children’s languages abilities had equaled out. However, in a similar socio-linguistic context, Dutch studies show that children from Turkish-speaking families often do not achieve the same level of language performance as their monolingual peers even after several years in primary school (e.g., Droop & Verhoeven, 2003).

1.3.2. Minority language children and international school assessment

The PISA study, conducted in 2000, has served as a strong catalyst for deeper examinations of the reading competencies and deficiencies of students in Germany. Internationally, students in 32 countries were assessed for their academic competencies in reading, math, and natural sciences. To the dismay of politicians, parents, employers and educators, Germany ranked far lower in the international comparisons of reading literacy than

expected, with the percentage of German students at or below the lowest proficiency level markedly higher than that of many other countries (Baumert & Schümer, 2001).

Based on reading performance, children who participated in the PISA study were grouped into 5 proficiency levels: Level I indicating primary competence and Level V indicating expert competence (Baumert & Schümer, 2001). Researchers and educators have placed particular attention on children from immigrant families who, according to PISA, are disproportionately found to be among the students at or below Proficiency Level I, and thus considered functionally illiterate. The PISA study found that among 15-year-olds from families with a history of migration, half do not reach the primary level of reading literacy even though most have spent their school years exclusively in German schools (Baumert & Schümer, 2001).

Discrepancies between language minority and language majority students were found in most countries. It is important to note, however, that Germany showed greater discrepancies between the reading scores of children with high and low SES backgrounds, and between minority language and majority language students than any other participating country. The difference between the highest and lowest SES children reached 1.5 Proficiency Levels or 1.2 standard deviations. One possible explanation is simply that other countries have been significantly more successful in balancing out the effects of culture, multilingualism and socio-economic status. It has been recommended that, in order to decrease the social disparities and simultaneously raise performance, steps must be taken to help children from households of lower SES and minority language backgrounds reach a higher level of reading literacy (Baumert & Schümer, 2001).

A closer examination of the PISA data showed that by removing the children of immigrant families from the analysis, Germany would have ranked around the middle of the other countries instead of below the median (Stanat, 2003). Further analyses have also shown that schools with high proportions of minority language students had lower average scores than schools with fewer minority language students (Stanat, 2006).⁷ Families with Turkish roots make up the largest proportion of Germany's immigrant population (25.6%; Bundesministerium des Innern, 2006). Children from Turkish-speaking families therefore make up the majority of the multilingual school-aged children.

The international primary school study, IGLU, investigated academic performance among fourth graders (Bos et al., 2003). The study showed that the gap between minority language children and native German-speaking children is not as wide as among the 15-year-olds in the

⁷ Findings such as these have shaped negative views on language minority children and families in the school system. It has not been investigated to what extent these critical views have affected the educational climate in schools or classrooms. Exploratory studies of this nature are needed.

PISA study. Germany, in general, did not perform as poorly in comparison to other European countries as in the PISA study either. Still, the children with one or both parents born in a country other than Germany performed significantly below their native speaking peers on measures of reading, math, and science. The discrepancy was most dramatic for children with two parents born abroad (Bos et al., 2003). Again, the gap was very large in Germany compared to other participating countries.

The international assessment reports have spurred great interest in educational research within the German schools. It has become imperative to explore the roots of these discrepancies, particularly among children with immigration histories (Baumert & Schümer, 2001). Findings have also been heatedly discussed in the press and in political circles. The popular media extensively covered the results of PISA in Germany, with over 800 articles published from December 2001 to January 2002 alone (OECD, 2002). Based on the PISA and IGLU reports, the German president publicly argued for improving the educational opportunities for young children from immigrant families (Andrusz, 2002). Despite the often negative criticism of foreign students in German schools, some educators and academics have also called to broaden views of multilingualism to include the benefits and additional resources of diverse cultural heritage and languages (Auernheimer & Bade, 2002).

1.3.3. Current education research on minority language children

Among researchers in Germany, the sub-optimal performance of minority language children has often been attributed to the lack of academic support available within the school system (see Hopf, 2005). Although a range of different curricular programs involving German as a second language or structured immersion types of instruction are currently in place (for a complete list of programs see Gogolin, Neumann, Roth, 2003), none has been seriously investigated with regard to their efficacy for minority language children. This failure of the German education scholars has been strongly criticized (e.g., Hopf, 2005, Reich & Roth, 2001)⁸. Two recent reviews of the German and international literature on programs designed to support the L2 learning and literacy have confirmed the lack of rigorous program evaluations and empirically sound interventions (Limbird & Stanat, 2006; Söhn, 2005).

⁸ There were two exceptions at the time this manuscript was prepared: 1) An empirically sound three year longitudinal study with a matched control group design was recently conducted at the Free University of Berlin with over 100 children from inner-city programs in Berlin found slightly enhanced performance for Turkish-German children who took part in a maintenance-type bilingual program with regard to reading comprehension (Limbird, Heintze, Merken, manuscript in preparation); 2) The Jacobs Summer Camp Project developed by Stanat, Müller, and Baumert (2005) showed that explicit German instruction provided as part of a summer camp led to significant gains in reading performance for children from minority language families compared to a control group six months after the end of the intervention.

A shift in the direction of “time on task” theories is beginning to emerge in Germany (see Hopf, 2005). Educators and researchers are putting more emphasis on lengthening the duration of German language instruction and exposure, as well as investigating its effects on the literacy development of minority language children. This can be seen in the recent intervention research projects with a focus on earlier language development (e.g., Project FörMig; BLK, 2005), extending the school day (Project Steg; Deutsches Institut für Internationale Pädagogische Forschung, 2005), developing summer intervention programs (Project Jacobs Summer Camp; Stanat, Müller, & Baumert, 2005), and testing after-school reading programs (Project Lesen lernen–Lernen lernen; University of Potsdam, 2005). Still, these are projects in very early phases and no data regarding long-term outcomes are available to date.

1.4. Synopsis and open questions

By examining the breadth of literature on the development of reading and the characteristics of bilingual children, several conclusions can be drawn with relative certainty. The models of reading typically found in the literature have strong phonological components (e.g., Rapp et al., 2001). They suppose that phonological processing is one of the key abilities responsible for decoding and accessing semantic properties of a word (e.g., Lundberg, 2002a). In addition to phonological awareness, verbal abilities, verbal memory, and decoding are hypothesized to be the strongest predictors of reading comprehension. Näslund and Schneider (1991) developed a particularly concise model integrating those key components. The only comprehensive models describing the process of developing reading skills found in the literature, however, were developed based on theories of and research on monolingual readers.

Also clear from the literature review is the predictive power of early phonological awareness in emerging reading skills (e.g., Bryant et al., 1989; Wagner et al., 1994). Sufficient research shows that phonological awareness is shaped by early experiences with language such as rhymes and songs (e.g., Maclean et al., 1987). In the same vein, different languages have various effects on the development of phonological awareness (e.g., Caravolas & Bruck, 1993). Native speakers of Turkish, in particular, have unique abilities to perceive syllables and phonemes at an earlier age than do English speaking children (Durgunoğlu & Öney, 1999).

The comparatively smaller amount of literature on the role of verbal abilities in developing reading abilities seems to indicate that there is a link between reading comprehension and verbal abilities (e.g., Stahl & Fairbanks, 1986) that may grow in strength over time (Muter et al., 2004). Verbal abilities seem to be best measured with tests of vocabulary (Stahl & Fairbanks) and possibly listening comprehension as well (e.g., Gough & Tunmer, 1986).

Another finding that was relatively consistent in the literature indicated a *bilingual difference* if not a *bilingual advantage* for children who acquire a second language early in life (see Bialystok, 1991). Compared to monolinguals, bilinguals show unique neurological development (e.g., Rodriguez-Fornells et al., 2002), enhanced performance on certain cognitive tasks (see Bialystok & Ryan, 1985), and there is evidence that certain bilingual language combinations are related to heightened phonological awareness (e.g., Bialystok et al., 2005). However, bilingual children appear to perform more poorly on measures of L2 vocabulary than their monolingual peers (see Carlo et al., 2004). Two clear messages emerged from the review of bilingual research. First, there is no reason to believe that bilingualism in itself would impede literacy development (e.g., Chiappe & Siegel, 1999). And second, few generalizations can be made about linguistic strengths, weaknesses, or relationships since each language has its own specific linguistic characteristics that shape the bilingual person's abilities accordingly (e.g., Bialystok et al., 2005).

Finally, examining the academic performance of children in Germany clearly shows underperformance by minority language children (e.g., Bos et al., 2003; Baumert & Schümer, 2001). There is an obvious dearth of understanding of the linguistic attributes of minority language children in Germany and a lack of knowledge about their potentially unique literacy acquisition processes.

The number of questions left open by this literature review almost outnumbers the conclusions that can be drawn. It is unknown if the monolingual models of reading are appropriate for use in a bilingual population. More specifically, do those same component processes (phonological awareness, verbal memory, verbal abilities, and decoding) predict reading in the same way for bilingual and monolingual children? Does the bilingual advantage for phonological awareness apply to a Turkish-German population?

Poor mastery of literacy skills in our society has serious consequences and puts a child at risk for the future. In order to take proper preventative measures, it is of critical importance to understand the conditions and prerequisites for learning to read and write and to identify the primary obstacles for children at risk (Lundberg, 2002a). To address the challenges of integrating children of diverse linguistic backgrounds into monolingual school systems, many questions need to be answered. Directly in line with the questions left open by this literature review, Durgunoğlu and colleagues (2001) encourage researchers to investigate bilingual children in their early stages of literacy development by investigating the following questions: How does bilingualism help or hinder literacy development in a second language? What are the universal, as opposed to language-specific, characteristics of literacy development?

Since Turkish immigrants make up the largest minority population in Germany, the impact of bilingualism on the acquisition of literacy among children from families of Turkish

immigrants must be examined. There are no empirical longitudinal studies on bilingualism in Germany examining populations of Turkish-German children (Limbird & Stanat, 2006; Reich & Roth, 2001). If both bilingualism and command of the Turkish language enhance phonological awareness, there is strong reason to surmise that Turkish-German bilingual children will have a better sense of phonological awareness than will their monolingual German counterparts. This possible bilingual advantage, combined with an expected deficit in German vocabulary, is likely to lead to differences in the model and predictors of reading abilities between Turkish-German bilingual and German monolingual children. In light of the current discourse in German educational circles regarding minority language students and academic performance, an investigation of bilingualism and literacy of this nature is long overdue.

Results from this doctoral thesis will be used to draw pedagogical implications for the respective linguistic strengths and weaknesses of bilingual Turkish-German children. The findings may indicate a need to draw upon the potential phonological strengths of these bilingual children to boost their success in L2 literacy acquisition. In that phonological awareness and vocabulary skills training programs for younger children have been shown to have positive effects on later reading skills in diverse samples of young children, this study may uncover a need to implement such programs in preschools with large proportions of bilingual children. Most importantly, however, this investigation will begin the search for a model of reading development appropriate for a Turkish-German bilingual sample of early readers. An improved understanding of the interplay among the base literacy skills will enable researchers and educators alike to develop fitting pedagogical and research approaches for this integral population of bilingual children in the German school system.