5

General Discussion

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In his comprehensive book "*Progress in understanding reading*", Keith Stanovich (2000) states that we make progress by accumulating evidence from a host of interlocking studies, each of which may be of fairly low diagnosticity but that, taken together, present a coherent picture and warrant firm conclusions. He postulates: "We are a science that is custom-made for meta-analysis" (p. 3). The three comprehensive meta-analyses in this thesis are among approximately 120 meta-analyses that are conducted within the field of reading research thus far.

Hereafter, I will embed the findings of our meta-analyses in the broad variety of meta-analyses that have been published until September 2010. I will also present a meta-analysis of meta-analyses on interventions that aim to enhance the development of reading abilities in children. What do we know thus far and, specifically, how can we increase our understanding of the role of book reading in reading development from infancy to early adulthood?

A Brief History of Meta-Analysis

A century ago, Karl Pearson (1904) reported on one of the first meta-analytic combinations of the outcomes of a set of medical studies, and during the past few decades the approach became extremely popular in the so-called evidence-based medical science. It was the educational researcher Glass (1976) who coined the concept "meta-analysis" some 25 years ago and introduced it into the educational and behavioral science. He provided one of the most controversial examples of its application on psychotherapy studies, arguing that, in general, psychotherapy had considerable effect but that no specific treatment modality stood out (Smith & Glass, 1977).

To our knowledge, one of the first meta-analyses in reading was conducted by Kavale on correlates of reading: visual perceptual skills, auditory perceptual skills, and auditory-visual integration. He simply provided average correlations across studies between these predictors and success or failure in reading (Kavale, 1980, 1981, 1982; Kavale & Forness, 2000). During the past 15 years, meta-analysis has become widely used and hotly disputed in educational science. In fact, it seems that it has been applied on a much wider scale in education than in any other social or behavioral science. The reason may be that educational policy decisions (such as medical decisions) are supposed to be based on a firm foundation of empirical data (Slavin, 2002). Every decade the number of scientific papers is doubling (Garfield, 1979), and it becomes impossible even for the specialists – let alone the policymakers and practitioners – to keep track of the literature in their own field. More importantly, meta-analyses are increasingly being used to monitor new developments in any area of the social and behavioral sciences (Sutton & Higgins, 2008).

In the past, narrative reviews were considered the royal road to the synthesis of literature, and some narrative reviews indeed were very powerful in shaping

the future of a field of inquiry (e.g., Adams, 1990). In a narrative review of high standards, the author tries to make sense of the literature in a systematic and, at the same time, creative way. In formulating a hypothesis for review in a precise manner, and in collecting systematically the pertinent papers to address the issue, the narrative reviewer does not act much differently from the meta-analyst. It is in the stage of data analysis that the narrative and meta-analytic reviewer go separate ways. Narrative reviewers may have the focus of telling readers what the field has and has not investigated more than what has been found. Insofar as they focus on conceptual analysis of studies, these might not include numerical results at all – as in a review of ethnographies of home literacy practices in different communities. The meta-analysts, on the contrary, proceed in a statistically rigorous way, analyzing studies that include numerical results. Effect sizes, quantitative indexes of relations among variables, are used to compare and communicate the strength of the summarized research findings (Hedges, 2008).

Cooper and Rosenthal (1980) showed experimentally that narrative reviewers are more inclined to commit type II errors (i.e., they tend to not reject the null hypothesis although it should be rejected on statistical grounds). Cooper and Rosenthal asked 41 graduate students and senior researchers to review a set of seven studies on the association between sex and persistence in performing rather dull tasks. Half of the reviewers were randomly assigned to a course on meta-analysis. Seventy-three percent of the untrained narrative reviewers found no association; only 32% of the meta-analysts came to this conclusion. The correct outcome was that female participants are significantly more persistent in performing boring tasks than males. In particular, in cases in which studies show insignificant trends, the accumulated effect size across these studies tends to be underestimated. Besides, narrative reviews are also more vulnerable to psychological factors. Bushman and Wells (2001) had 280 undergraduate students review 20 fictional studies, of which the salience of the title and serial order were manipulated. Interestingly, salient titles for the positive results led to overestimates of the actual relation, whereas salient titles for the negative results led to an underestimation of the effect magnitude (Bushman & Wells, 2001). It should be noted that despite this potential bias, narrative reviews remain indispensable, in particular in those areas in which a restricted number of empirical studies have been conducted or in the absence of strong research programs that unify the empirical approaches and make them comparable for meta-analytic purposes. Researchers sometimes persist in conducting a meta-analysis even when the exhaustive literature search results in the inclusion of only two or three studies (e.g., Jeynes, in press; Sénéchal & Young, 2008; Torgerson, Porthouse, & Brooks, 2003; Zucker, Moody, & McKenna, 2009).

On the other hand, not all research domains are ready for meta-analysis despite numerous studies. For example, the National Reading Panel (NRP) did not succeed in finding sufficient studies to meta-analyze effects of all formal

efforts to increase the amounts of independent or recreational reading that children engage in, including sustained silent reading programs, because of a lack of studies that meet NRP standards such as experimental or quasi-experimental designs, including a control group (NRP, 2000). They concluded that it would be difficult to interpret the small collection of studies that remained as representing clear evidence that encouraging students to read more actually improves reading achievement. Only three of the 14 remaining studies reported any clear reading gains from encouraging students to read. However, one may wonder to what extent the selection criteria were responsible for this (counterintuitive) result. The selection of studies did not include a screening of studies in order to ensure that the participants needed what the treatment was designed to influence. The NRP routinely selected and analyzed studies that experimentally tested the efficacy of encouraging students to read more without ensuring that the participants in the selected studies indeed did not have the ability and opportunity outside of school to read independently (cf. Cunningham, 2001). Interestingly, the number of studies that correlated leisure-time reading activities to students' reading abilities is largely sufficient to synthesize quantitatively. In chapter 2 of this thesis, we included 40 studies targeting children attending grades 1 to 12 and 30 studies targeting undergraduate and graduate students. The correlation between leisure-time reading and students' reading comprehension and technical reading and spelling skills became stronger with age, which seems to be in line with a model of reciprocal causation. More skilled readers are more likely to choose to read more frequently which, in turn, will improve their reading abilities, whereas poor readers may not succeed in comprehending text, become less eager to read, and as a result, show stagnation in their reading development (Stanovich, 1986).

State of the Art in Meta-Analyses on Reading

We applied a computer search of PsycInfo and ISI, with the key words *literacy and meta-analysis* and *reading and meta-analysis* to trace relevant meta-analyses in the field of reading research. After excluding book chapters and dissertations, a relevant set of about 120 meta-analyses on reading resulted (see Appendix 5.1 for a summary of the about 100 reviews we could trace). Assuming that since 1966 approximately 130,000 research studies on reading have been conducted, with perhaps another 15,000 appearing before that time (NRP, 2000), only a small part of all available studies is meta-analyzed. The 120 meta-analyses in the reading domain upto 2010 cover at most 10% of all available studies on reading.

Most meta-analyses on reading synthesize the results of intervention studies. In an attempt to settle an ongoing debate on the best method to teach beginning reading skills, studies contrast whole language with basals (Stahl & Miller, 1989; Jeynes & Littell, 2000), systematic phonics instruction with no or incidental instruction in phonics (Ehri, Nunes, Stahl, & Willows, 2001), or reading instruction in the first

or second language for bilingual children (Greene, 1997; Rolstad, Mahoney, & Glass, 2005; Slavin & Cheung, 2005). Other studies synthesize effects of special measures: programs to instruct phonemic awareness (Bus & van IJzendoorn, 1999; Ehri, Nunes, Willows, et al., 2001), guided oral reading (NRP, 2000), book reading in groups (Blok, 1999; chapter 4 of this thesis), question generation (NRP, 2000), repeated reading (Therrien, 2004), reading engagement (Guthrie, McRae, & Klauda, 2007), classroom discussion (Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009), or learning to derive word meaning from context (Fukkink & De Glopper, 1998). Furthermore, it is evaluated how direct and strategy instructions support groups with learning disabilities (Edmonds et al., 2009; Sencibaugh, 2007; Swanson & Sachse-Lee, 2000), and whether one-to-one tutoring in reading (D'Agostino & Murphy, 2004; Elbaum, Vaughn, Hughes, & Moody, 2000; Ritter, Barnett, Denny, & Albin, 2009; Torgerson, King, & Sowden, 2002) or instruction in small groups especially stimulates these children's reading development (Elbaum, Vaughn, Hughes, & Moody, 1999; Elbaum, Vaughn, Hughes, Moody, & Schumm, 2000). Few studies test effects of school organization on reading achievement: class size (McGiverin, Gilman, & Tillitski, 1989) or summer holiday (Cooper, Nye, Charlton, & Lindsay, 1996). The effectiveness of children's learning experiences outside the classroom are examined by evaluating studies on parent involvement (Sénéchal & Young, 2008; NELP, 2008) and out-of-school programs (Cooper, Charlton, Valentine, & Muhlenbruck, 2000; Lauer et al., 2006). Only a few studies focus on interventions in the preschool ages and test effects of book reading in the family (Bus, van IJzendoorn, & Pellegrini, 1995; chapter 3, this thesis; NELP, 2008) or preschool intervention programs (Goldring & Pressbrey, 1986; Leseman, Otter, Blok, & Deckers, 1998, 1999; NELP, 2008; Manz, Hughes, Barnabas, Bracaliello, & Ginsburg-Block, in press; Marulis & Neuman, 2010; Piasta & Wagner, 2009). Recently, the increasing number of single studies that explore the opportunities of the computer for language instruction made some (preliminary) meta-analyses possible (Blok, Oostdam, Otter, & Overmaat, 2002; Moran, Ferdig, Pearson, Wardrop, & Blomeyer, 2008; Torgerson & Elbourne, 2002; Zucker et al., 2009).

Meta-Analyses about Meta-Analyses

Meta-analyses have not been positioned in a more crucial role than any other systematic form of inquiry. Meta-analyses are part of a series of connected steps in the description and explanation of human behavior that never reaches a final point (van IJzendoorn, 1994). Because meta-analyses are based on numerous decisions about collecting, coding, and analyzing the pertinent studies, meta-analytic results, in their turn, need to be replicated as well (Lytton, 1994). Even if replications of meta-analyses yield the same results, the most fruitful meta-analyses will lead to new hypotheses for further primary study (Eagly & Wood, 1994). By combining the results of several meta-analyses, researchers are able to

construct models of associations between theoretically important variables which are not yet combined in any separate empirical study, and to show at what point the model still is incomplete.

A relatively small set of meta-analyses that we traced report about effects of instruction on reading comprehension (n = 19) and on word recognition (n = 11). From the stem-and-leaf display (see Figure 5.1), it appears that both word recognition and reading comprehension are susceptible to specific forms of instruction. Insofar as several dependent measures were available, we selected tests with established (by the experimenter or someone else) construct validity and reliability (using multiple measures of reliability) above experimenter tests. When a series of word-recognition outcomes were reported, we left out outcomes for selected words (e.g., pseudo- or only regularly spelled words).

For both word recognition and reading comprehension, outcomes are homogeneous according to an analysis on this data set with Comprehensive Meta-Analysis (Statistical Solutions Limited), even though the interventions cover a variety of instructions varying in form (group vs. one-to-one tutoring) and ranging from phonemic awareness to deriving meaning from context. Only a meta-analysis on the effects of reading comprehension interventions revealed outlying results (d = 1.23; Edmonds et al., 2009). As outlined in the introduction (see step 1), a rather diverse mix of intervention types might result in summary effects that are hard to interpret theoretically.

Another notable result is that effect sizes for word recognition skills exceed those for reading comprehension. With word recognition as a dependent variable, the median effect size of interventions is about half a standard deviation. With reading comprehension as the dependent measure, it is about a third of a standard deviation. These outcomes are similar whatever the focus of the study: improving word recognition, practicing comprehension skills, or one-to-one tutoring. In other words, word recognition is more susceptible to instruction than text comprehension. Reading comprehension is more strategic and based on higher level skills and may, therefore, be less trainable than decoding that is based on low-level skills. Interventions that include strategic and other higher level processes promise progress in comprehension (Pressley & Harris, 1994), but not to the same extent as a training of lower level skills warrants progress in word recognition. Because the interventions varied so much, we were unable to test characteristics of instruction. For instance, assuming that instruction on comprehension supports skills beyond those stimulated by word recognition, one may expect that the effect of comprehension instruction on comprehension is quite a bit higher than the effect of word-recognition instruction on comprehension, particularly after the early grades.

Figure 5.1
Stem-and-Leaf Display of d*-Indexes for Effects of Interventions on Achievement Test Scores in Word Recognition and Reading Comprehension.*

Word Recognition		Reading Comprehension
	1.2	3
	1.1	8
	1.0	
	.9	15
2	*.8*	
5	*.7*	2
	.6	7
7554	*.5*	
10	*.4*	133
2	*.3*	01245666
70	*.2*	58
	.1	
	0	

Note. Combine the stem (.1, .2, .3, etc.) with the leaves to the left and to the right to find *d* values. Stem combined with leaves to the right represents reading comprehension and stem combined with leaves to the left word recognition. For instance, in the range .2 to .3 one intervention caused an ES of .28 on reading comprehension and another caused an ES of .27 on word recognition. Note that many *d*s for reading comprehension concentrate between .3 and .4 and *d*s for word recognition between .5 and .6.

Quality of Meta-Analyses

Most syntheses of research satisfy the criterion that effect sizes across comparisons are independent (68%). Intercoder reliability for coding the set of studies on these methodological characteristics and hereafter discussed measures was satisfactory. Reliabilities of moderator variables are not always reported (36%) and neither do meta-analysts always make an estimate of a publication bias (21%). To prevent independence of effect sizes various strategies were used. Some adjusted sample size for significance tests so that a single subject's data did not count more than once (e.g., Ritter et al., 2009). In other studies a combined effect is estimated, and subsequent contrasts between two or more kinds of interventions are not tested (e.g., Bus & van IJzendoorn, 1999). Some studies ignore the problem and use the same control group more than once (e.g., Ehri, Nunes, Willows, et al., 2001).

In most cases, *Q* statistics are reported (70%), but a majority of studies applied a fixed model even though the populations did not involve a common effect size estimate as is indicated by the tests of homogeneity (e.g., Bus et al., 1995; Elbaum, Vaughn, Hughes, & Moody, 2000) or did not report which model was used at all (e.g., Sencibaugh, 2007; Therrien, 2004). Sometimes authors may draw strong

conclusions and bold implications for practice from a combined effect size even though the point estimate is not representative of the central tendency in the total set of studies. In that case, conclusions are at least premature. Large variation in effect sizes requires a random-effects model, which implies a broader confidence interval and a higher chance that the effect size is not significantly different from zero. This scenario, however, not always holds, as can be illustrated for the book-reading study. We reanalyzed the data of the book-reading meta-analysis with a random-effects model because the overall point estimate of effect size was not based on a homogeneous set of studies (Bus et al., 1995) and found outcomes that were very similar to those resulting from a fixed model. A point estimate of $r = .27$ for the overall effect of book reading on emergent literacy, reading achievement in school age, and language skills remains significant as is indicated by a 95% CI ranging from .21 to .32. Our meta-analytic update of parent-child book reading, covering studies between 1994 and 2008, showed almost identical random effects: $r = .34$ (*95%* CI = .26, .40) for oral language and $r = .28$ (*95%* CI = .22, .36) for emergent literacy (see chapter 2, this thesis).

Future of Reading

Academic achievement trajectories are rather stable from early childhood to adolescence: Children who are among the lower third of their class when they start formal schooling are likely to remain the lower-achieving students in high school (Entwisle, Alexander, & Olson, 2005). Ideally, offering young children a stimulating home environment prevents them from starting school already lagging behind, and thereby positively influences their academic achievement trajectory. Training parents or preschool and kindergarten teachers how to read interactively (e.g., ask story-related questions) seems a promising venue to expand children's oral language (see chapter 3 and 4) as well as knowledge about the basics of reading (see chapter 4). In conventional readers, chances at academic success may also increase when students are offered interventions that improve technical reading and reading comprehension skills as appears from our meta-analysis about meta-analyses (see chapter 5). However, the development and implementation of successful interventions takes considerable amounts of money and research efforts, and programs often stop as soon as the researcher has left the side. As the number of books that are published for children and adults keeps on increasing, and as our meta-analysis shows that mere exposure to books significantly relates to not only comprehension and technical reading and spelling skills throughout development but also to more general achievement measures such as intelligence and eligibility tests for university (see chapter 2), we wonder: What are promises and pitfalls of approaching "just" reading books as an intervention in itself?

One of the major challenges is to get age-appropriate books in the homes and hands of parents and children (e.g., Guo & Harris, 2000; Neuman & Celano,

2006). As a means, books not only offer a meaningful context for words but also communicate more general knowledge. Books often describe events, cultures, or reasoning that readers are not likely to experience in daily life. Fiction, in particular, stimulates and develops imagination by offering readers the opportunity to "try on" mental states, values, and/or life experiences of characters (Harding, 1962; Oatley, 1999; Zunshine, 2006). Furthermore, reading fiction is thought to cause catharsis – a relief of burdensome emotions (Hakemulder, 2000). Enjoying books and learning from reading, however, also depends on the match between the difficulty level of a book and a reader's ability level (Carver & Leibert, 1995; Kim & Guryan, 2010). In school, children with reading difficulties often find themselves in materials that are too difficult for them, whereas the books they may choose to read during their leisure time are way too easy and/or not interesting thematically (Spear-Swerling, Brucker, & Alfano, 2010). When children get help from their parents and/or teachers in selecting stimulating books, they may get encouraged to keep on reading independently (Allington & McGill-Franzen, 2008; Kim & White, 2008).

A fascinating question that is hardly studied in the field of reading research thus far is: How may reading books lead to a book reading routine in which proficient as well as poor readers choose to read during leisure time? First, introducing books to very young children seems to stimulate interest in the world of stories, words, and written text later on (Fletcher & Reese, 2005). As early gaps in language skills reduce children's capacity to benefit from book sharing when they are 3- to 5-years old, nowadays more practitioners believe that a very early start with book reading (i.e., in the first year of life) may be of vital importance (Bus, Leseman, & Neuman, in press). Exemplary examples that promote such an early start are the American project "*Reach Out and Read* (ROR)" (Needlman & Silerstein, 2004; Needlman, Toker, Dreyer, Klass, & Mendelsohn, 2005) as well as the UK project *BookStart* (e.g., Hall, 2001) that is adopted by several other European countries among which the Netherlands. However, we have to acknowledge that reading to children in their first two years of life is especially demanding for caregivers as it requires them to react promptly and adequately to signals of distress of their young child (e.g., Bus & van IJzendoorn, 1997; Bus, Belsky, van IJzendoorn, & Crnk, 1997; DeLoache & DeMendoza, 1987). We expect therefore that the success of early interventions is uncertain when parents receive a package of books for their baby or infant without further support. Especially when parents do not use books as a source of entertainment themselves, they may not succeed to pass on pleasure in reading to their children and, hence, their children may be less likely to enjoy reading when they are able to read themselves (Bus, Leseman, & Keultjes, 2000).

Second, interactive reading has a positive effect on comprehension and thereby most likely also on reading interest. Therefore, numerous early intervention studies promote interactive book reading. However, our findings reveal several

drawbacks for such an approach. On the one hand, children who were at risk for language and literacy impairments did not benefit from the interventions when their parents read to them interactively (see chapter 3). On the other hand, in a set of classroom-based studies with predominantly children at risk, most explicit effect sizes were found for experiments that were highly controlled and executed by researchers, whereas teachers who delivered interventions seemed to have difficulty with fostering the same growth in young children's language and literacy skills as researchers (see chapter 4). We hypothesized that teachers are not successful in incorporating and internalizing dialogic strategies because they are less well educated in theories of how children can benefit most from exposure to books (Dickinson & Sprague, 2001). To stimulate the use of an interactive book reading style at home and at school, it may be critical that the social component of the implementation process is emphasized more with several opportunities for feedback and positive reinforcement next to the training in more technical aspects such as the theory behind the intervention (e.g., Shernoff & Kratochwill, 2007).

Third, when children get older, their preferences for leisure-time activities may be determined increasingly less by their home environment and may depend increasingly more on their reading abilities and their attitudes and motivation towards reading books (Harlaar, Dale, & Plomin, 2007; Petrill, Deater-Deckard, Schatschneider, & Davis, 2005). However, promotion of book reading seems to remain important in all age groups. A promising finding in the first meta-analysis in this thesis is that all readers can benefit from reading books, regardless of their reading abilities. Further research is required to highlight why some poor readers are inclined to read books despite of their reading problems and get better in reading as a result of print exposure while other poor readers hardly read and increasingly fall behind.

In sum, whether children develop a book reading routine depends not only on the presence of books in children's homes and/or classrooms. Young children need help to understand stories and some parents and teachers seem to need training to get the most out of book reading. When children have become conventional readers, leisure time reading seems to make a huge difference for their cognitive development. A growing number of alternative activities in the present computer era may decrease the amount of reading time and, consequently, cause negative effects on students' language proficiency, reading skills, and broader cognitive development. Apart from the question how book reading behavior can be promoted for both proficient and poor readers, there are other fascinating questions to be studied. One of the most fascinating issues for future research might be how sharing books in infancy turns into choosing to read as a leisure-time activity in adolescence and adulthood. The answer to this question can have far-reaching consequences for education and educational policy and need to be high on the current research agenda.

Appendix 5.1

Focal Questions in Meta-Analyses in the Domain of Reading

Book reading

- Is there a relation between parent-preschooler book reading and emergent and conventional reading? (Bus et al., 1995; chapter 2, this thesis)
- Does book reading in schools affect oral language and reading skills? (Blok, 1999)
- Does dialogic reading intensify the effects of parent-child picture storybook sharing? (chapter 3, this thesis)
- Does trained interactive teacher behavior as a part of book reading improve young children's language and print-related skills? (chapter 4, this thesis)
- Do shared-reading interventions impact young children's early literacy skills? (NELP, 2008, Chapter #4)

Phonemic awareness instruction

- Does phonemic awareness training affect learning-to-read processes in a positive and substantial way, and are programs combining phonemic awareness training with letters and words more effective? (Bus & van IJzendoorn, 1999)
- Is phonemic awareness instruction effective in helping children learn to read? If so, under what circumstances and for what children? (Ehri, Nunes, Willows, et al., 2001)

Preschool intervention

- Do preschool intervention programs cause a positive effect on reading achievement? (Goldring & Pressbrey, 1986; NELP, 2008, Chapter #6)
- What are the effects of preschool programs on children's intellectual, socio-emotional, and language abilities? (Leseman et al., 1998, 1999)
- Are vocabulary interventions effective for teaching words to preschool and kindergarten children, and can vocabulary training narrow the achievement gap? (Marulis & Neuman, 2010)
- Are emergent literacy interventions with a family-component applicable for low-income, ethnic-minority, or linguistically-diverse preschool children? (Manz et al., in press)

Beginning reading methods

- Are whole-language or language experience approaches more effective than basal readers? (Stahl & Miller, 1989)
- Is whole-language instruction effective compared with basal instruction for kindergarten to third-grade students with low socioeconomic status? (Jeynes & Littell, 2000)
- Does systematic phonics instruction help children learn to read more effectively than nonsystematic phonics instruction or instruction teaching no phonics (i.e., language activities)? (Camilli, Vargas, & Yurecko, 2003; Camilli, Wolfe, & Smith, 2006; Ehri, Nunes, Stahl, & Willows, 2001; Hammill & Swanson, 2006; Stuebing, Barth, Cirino, Francis, & Fletcher, 2009)
- What are the effects of alphabet training (i.e., letter name and/or letter sound instruction with or without phonemic awareness instruction) in preschool, kindergarten, and early elementary school on the acquisition of emergent literacy skills? (Piasta & Wagner, 2009)

Reading comprehension instruction

- Does vocabulary instruction affect reading comprehension? (Stahl & Fairbanks, 1986)
- Does sentence-combining promote reading comprehension? (Fusaro, 1992)
- Does instruction in question asking affect reading comprehension? (Rosenshine, Meister, & Chapman, 1996)
- Which forms of comprehension instruction improve reading comprehension? (NRP, 2000)
- How effective is repeated reading on comprehension and what are essential instructional components? (Therrien, 2004)
- Does enhancing students' reading engagement increase reading comprehension? (Guthrie et al., 2007)
- What is the role of classroom discussion on students' text comprehension? (Murphy et al., 2009)

Acquiring vocabulary through reading

- Does instruction in deriving meaning from context improve skills to derive meaning from context? (Fukkink & De Glopper, 1998)
- Do children incidentally derive new words from texts? (Swanborn & de Glopper, 1999)

Effects of multimedia

- Does the Lightspan program (computer games to improve school-based achievement) improve reading comprehension, reading vocabulary, sounds/letters, and word reading? (Blanchard & Stock, 1999)
- How effective are computer-assisted instruction programs in the phase of beginning reading? (Blok et al., 2002)
- What is the effectiveness of information and communication technology on the teaching of spelling? (Torgerson & Elbourne, 2002)
- How effective is the use of technology (e.g., electronic books) in language education and language learning? (Zhao, 2003; Zucker et al., 2009)
- What is the effect of using glosses (e.g., level of instruction, text type) in multimedia learning environments for enhancing L2 reading comprehension? (Abraham, 2008; Taylor, 2006)
- What is the impact of digital tools on the reading performance of middle school students? (Moran et al., 2008)

Other aspects of reading instruction

- Does some form of guided oral reading stimulate reading achievement? (NRP, 2000)
- What is the impact of summer school programs (i.e., remedial, acceleration) on students' reading skills? (Cooper et al., 2000)
- Do cognitive paradigms targeting domain-specific learning activities improve effectiveness of reading instruction? (Seidel & Shavelson, 2007)
- What is the effect of morphological instruction in elementary school on reading and spelling development? (Bowers, Kirby, & Deacon, in press)

Bilingual children

- Does learning to read in the native language promote reading achievement in the second language? (Greene, 1997; Rolstad et al., 2005; Slavin & Cheung, 2005; Willig, 1985)
- Is bilingualism related to cognitive variables such as literacy and metalinguistic awareness (Adesope, Lavin, Thompson, & Ungerleider, 2010)

Instruction of children with reading disabilities

- What is the overall effectiveness of sight word teaching for individuals with moderate and severe disabilities? (Browder & Xin, 1998)
- Does direct instruction yield higher effect sizes than strategy instruction in groups with learning disabilities? (Swanson, 1999; Swanson & Hoskyn, 1998)
- Do studies using strategy instruction or direct instruction yield higher effect size estimates than studies using competing models? (Swanson & Sachse-Lee, 2000)
- Do instructional components predict positive outcomes for adolescents with learning disabilities on measures of higher order processing? (Swanson, 2001)
- How effective is the Reading Recovery program for low-performing first-grade students? (D'Agostino & Murphy, 2004)
- Does treatment to improve expressive or receptive phonology, syntax, or vocabulary affect children with primary developmental speech and language disorders? (Law, Garrett, & Nye, 2004)
- What is the supplemental effect of out-of-school programs on reading achievement of at-risk students from kindergarten to high school? (Lauer et al., 2006)
- Do metacognitive strategies improve the reading comprehension levels of students with learning disabilities? (Sencibaugh, 2007)
- How do interventions targeting decoding, fluency, vocabulary, and comprehension influence comprehension outcomes for secondary students with reading difficulties? (Edmonds et al., 2009)

Effects of grouping and tutoring

- Does one-to-one tutoring on reading promote reading skills? (Elbaum, Vaughn, Hughes, & Moody, 2000)
- Is effect size of reading instruction related to grouping format (e.g., pairing, small groups)? (Elbaum et al., 1999; Elbaum, Vaughn, Hughes, Moody, et al., 2000)
- Is parental involvement related to children's academic achievement (i.e., reading)? (Fan & Chen, 2001; Jeynes, 2002, 2005; NELP, 2008, Chapter #5; Sénéchal & Young, 2008)
- Do volunteer tutoring programs in elementary and middle school improve reading skills? (Ritter et al., 2009; Torgerson et al., 2002)

Effects of school organization

- Do second graders who have received 2 years of instruction in smaller classes score significantly higher in reading than second graders in larger classes? (McGiverin et al., 1989)
- Does reading achievement decline over summer holiday? (Cooper et al., 1996)
- Does homework improve academic achievement (i.e., reading)? (Cooper, Robinson, & Patall, 2006)

Processes explaining reading (dis)abilities

- Are auditory perception skills related to reading? (Kavale, 1980, 1981)
- Is visual perception an important correlate of reading achievement? (Kavale, 1982)
- Which of six variables (language, sensory skills, behavioral-emotional, soft neurological, IQ, and teacher ratings) provide the best early prediction of later reading difficulties? (Horn & Packard, 1985)
- Do dyslexic readers and normal readers differ in terms of phonological skill despite equivalent word-recognition abilities? (Herrmann, Matyas, & Pratt, 2006; van IJzendoorn & Bus, 1994)
- Do measures that tax the processing as well as the storage resources of working memory predict reading comprehension better than measures that tax only the storage resources? (Daneman & Merikle, 1996)
- Is a regularity effect also present in a group with learning disabilities? (Metsala, Stanovich, & Brown, 1998)
- Do children with learning disabilities differ from normal-achieving children in immediate memory performance, and does this difference continue? (O'Shaughnessy & Swanson, 1998)
- Do underachieving students with and without a learning disabilities label differ in reading performance? (Fuchs, Fuchs, Mathes, & Lipsey, 2000)
- Do children with reading disabilities and low achievers share a common deficit in phonological processing, memory, and visual-spatial reasoning? (Hoskyn & Swanson, 2000)
- What is the relative importance of auditory and visual perception in predicting reading achievement? (Kavale & Forness, 2000)
- Is it valid to use IQ discrepancy for the classification of reading disabilities? (Steubing et al., 2002)
- Which brain areas are consistently activated during aloud single word-reading tasks? (Turkeltaub, Eden, Jones, & Zeffiro, 2002)
- Are rapid naming and phonological awareness as strong predictors of word reading as related reading abilities? (Swanson, Trainin, Necoechea, & Hammill, 2003)
- What is the influence of school mobility in the United States on reading achievement in the elementary grades? (Mehana & Reynolds, 2004)
- Can the relative variability of psychophysical performance in dyslexic readers compared with normal readers be attributed to general nonsensory difficulties? (Roach, Edwards, & Hogben, 2004)
- Does sampling affect studies linking genes to complex phenotypes such as reading ability/disability and related componential processes? (Grigorenko, 2005)
- What are the patterns of convergence in neuroanatomical circuits underlying phonological processing in reading alphabetic words and logographic characters? (Tan, Laird, Li, & Fox, 2005)
- Are gender differences present in reading achievement, and do these change with age? (Lietz, 2006; Lynn & Mikk, 2009)
- What is the magnitude and consistency of balance difficulties in the dyslexia population and which sampling or stimulus characteristics modulate this effect? (Rochelle & Talcott, 2006)

- Do children with and without specific language impairments show performance differences in nonword repetition? (Graf Estes, Evans, & Else-Quest, 2007)
- What are the links between school entry skills or school readiness and later school reading achievement? (Duncan et al., 2007; La Paro & Pianta, 2000)
- What is the role of executive functioning measures (e.g., task modality) in distinguishing between performance of children with and without reading difficulties? (Booth, Boyle, & Kelly, 2010; Carretti, Borella, Cornoldi, & De Beni, 2009)
- Do children with type I diabetes perform lower than children without diabetes on a variety of cognitive domains including reading and writing? (Naguib, Kulinskaya, Lomax, & Garralda, 2009)
- What is the association between the Oral Reading measure of Curriculum-Based Measurement and other standardized measures of reading achievement for students in grade 1 to 6? (Reschly, Busch, Betts, Deno, & Long, 2009)
- What functional abnormalities in the brain are consistently associated with dyslexia? (Richlan, Kronbichler, & Wimmer, 2009)
- To what extent and in what manner do adults with reading disabilities differ from adults without reading disabilities on measures assumed to relate to overall reading competence? (Swanson & Hsieh, 2009)
- Does the magnitude of cognitive processing differences (e.g., reading, oral language) between students with specific learning disabilities and typically achieving peers justify inclusion in classification of SLD? (Johnson, Humphrey, Mellard, Woods, & Swanson, 2010)

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