THE EFFECTS OF PHONOLOGICAL-AWARENESS INSTRUCTION ON PHONOLOGICAL AWARENESS AND READING SKILLS

A Thesis in
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by
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ABSTRACT

Phonological-awareness skills have been found to predict children’s reading skills, and phonological-awareness instruction has been found to improve their phonological awareness and reading skills. Markviss málörven (MM) is such an instructional program, and is based on Ingvar Lundberg’s theories on phonological awareness. Follow-up studies had been conducted on MM instruction in Scandinavia, Germany, and the United States but prior to this study not in Iceland. Traditionally, the MM program has been delivered as a classroom package in Grade 1. Of the 160 Icelandic preschool children who participated in this study of the effects of phonological-awareness instruction, 123 received either traditional or an adapted MM instruction. In the adapted instruction, 96 children got assignments commensurate with their skills (3 levels). Measures of their reading skills at the end of preschool were of limited value, however, because approximately 4 out of 5 children could not read at the time.

Results of this study indicate that phonological awareness can be taught. Comparing the children who had received MM instruction with children who had not, revealed differences between their phonological-awareness skills in preschool and their reading skills in first grade. Indications of reduced need for remedial reading in the group that had received MM instruction were found, but further research is needed accordingly. More research on gender differences is also required because the question was raised on the basis of data obtained in this study as to whether boys might profit more than girls from MM. A comparison of the use of adapted and traditional instruction indicated that children receiving the adapted MM did better on first grade reading. Differences in
language development and grapheme knowledge between the two groups, both before and after the MM intervention, were indicated. When reading skills in first grade were predicted from preschool measures, grapheme recognition was the strongest predictor, followed by language skills and age. Because phonological awareness overlaps other skills, the overall conclusions based on phonological awareness only, might imply differences where detailed empirical evidence is missing. The overall assumptions derived from this study might also have hidden valuable gender differences in the effects of phonological-awareness instruction.
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CHAPTER ONE

Introduction

The purpose of this study was to evaluate whether Icelandic five-year-old children could be taught phonological awareness and whether it helped them acquire better reading skills. Traditionally, most Icelandic children start learning to read in first grade, beginning in August-September of the year they become six years old. Therefore, only a limited number of four to five-year-old children can read, and have not, by reading, learned to become phonologically aware. The teaching protocol for this study was based on the program Markviss málörvun, which has been used for more than a decade in Icelandic schools (Helga Friðfinnsdóttir, Sigrún Löve & Þorbjörg Þóroddsóttir, 1988).

Markviss málörvun was originally a Danish phonological-awareness instruction program, designed by Jørgen Frost (1987, 1989; Adams, Foorman, Lundberg, & Beeler, 1998; Amtorp, 1985) and based on Ingvar Lundberg’s theories on phonological awareness and other metalinguistic skills. In this study, the participating preschool children (ages four and five) were grouped according to their phonological abilities. An experimental group received different parts of the program, depending on the skills of the children, that is, the instruction was adapted to the children’s phonological skills. A control group received the traditional Markviss málörvun. This was a follow-up study on the children’s reading instruction, with three objectives: First, to assess differences between the adapted instruction of phonological awareness and the traditional, or undifferentiated, instruction—for example, whether the instruction form would be
reflected in the children’s reading progress. Second, to compare phonologically instructed children with children who received no phonological-awareness instruction, and, third, to map predictors of Icelandic children’s reading skills.

In the first part of this thesis, before the description of the actual research, various theories and models of reading and reading development will be introduced. Reading will be described as a linguistic phenomenon, and research on phonological awareness as an early reading intervention will be introduced. The phonological awareness approach and traditional reading instruction will be compared and contrasted. The issue of prevention versus treatment of reading difficulties will be described. The last part of this background information will be devoted to various research problems and the ethical dilemmas that can be encountered.

**Reading – Theories and Models**

Through the main character, Ólafur Kárason, in the book *Heimsljós (World Light)*, Halldór Laxness (1937/1969) described reading as only an artist can do. His description is quoted here as follows because it provides a human and realistic background for the theoretical account on reading:

Magnina, the daughter of the house, taught him [Ólafur] to read from a tattooed [*sic*] old spelling book they had there. She loomed over him like a mound and pointed at the letters with a knitting needle. She cufféd him on the ear if he got the same letter wrong thrice, but never hard and never in anger . . .

When he was eight years old he had read the book of *Icelandic Folktales*, and Bishop Peter’s *Short Stories*, and St. Luke’s Gospel, which made him cry
because Jesus was so alone in the world. On the other hand he could never get used to thinking of Vidalin’s *Book of Sermons* as a book at all. He had a great longing to read more but there were no other books there except one, *The Felsenborg Stories*, which Magnina had inherited from her father. No one else was allowed to read that book; it was a secret book. He had a great longing to read *The Felsenborg Stories* and all the books in the world - except the *Book of Sermons*.

“If you mention *The Felsenborg Stories* once again, I’ll thrash you!” said Magnina.

Early on, he had come to suspect that in books in general, but especially in *The Felsenborg Stories*, was to be found that indefinable solace he yearned for but could not name. Magnina wrote out the alphabet for him, but only once; she had not time for more because it took her so long to form each letter. In any case there was no paper, and even when there was, no one was allowed to waste it. He would furtively scratch letters with a stick on bare patches of earth or in the snow, but he was forbidden to do that and was told he was writing himself to the devil. (Halldór Laxness, 1937, 1969, pp. 4 - 5)

We, the readers of this text, have some idea of the struggle involved in learning to decode the letters, figuring out the meaning of the text, both in the spelling book and the more touching St. Luke’s Gospel. We also understand the need to read, to get away from the harsh real world for a while, and the excitement involved in trying to read a forbidden book. In the previous quotation, the author Laxness also connected writing and reading as
if the two were vital parts of the same phenomenon, the world of books. But how do scientists describe reading?

The purpose of theories and models is to give adequate explanations of a phenomenon, which implies that researchers must generate hypotheses that can be tested. But reading is not a simple procedure or phenomenon. Various reading phenomena that theories and models should explain have been documented (e.g., Carroll, 1985). Among these are the acquisition of reading, processes of decoding, and metareading. Metareading refers to the cognitive processes used when people direct, monitor, test, and evaluate their own reading. Other important factors listed by Carroll were knowledge acquisition, interaction between affective, cognitive, and perceptual processes, and the reader’s goals and the nature of the text. Theories and models of reading also need to explain procedural changes when shifting between easy and difficult material, when reading familiar versus unfamiliar words, various types of content, the procedures used by reading experts versus reading novices, and whether a certain theory or model provides pedagogical insights.

Various theories and models of reading have been proposed. Singer (1985a) attributed the origin of these to Holmes, a pioneer who developed reading theories in the early 1950s. Holmes assumed that the reader organized various skills and processes to attain efficient reading, depending on the demands of the task. Although Javal had “initiated the scientific study of reading,” beginning in 1879, reading research in the United States was atheoretical, according to Singer (1985a, p. 8).

In *Theoretical Models and Processes of Reading*, Singer and Ruddell (1985) describe various types of reading models. It is interesting to note that few or none of the
models skip information processing altogether, possibly because the idea of reading without information processing is a contradiction in terms. To provide an alternative to information-processing models, which will be visited later, a short introduction of a developmental model, a transactional-psycholinguistic model, and an affective model follows, just to demonstrate that there is more to reading than meets the eye.

Holmes’ theory (Singer, 1985b) was based on a developmental model. The origin of this theory stemmed from statistically analyzing research data on reading. The main assumption was that individuals mobilized a working system of subcomponents to obtain speed and comprehension when reading. These components varied, depending on, among other things, the reader’s reading development or skills.

The idea behind the transactional-psycholinguistic model was to connect what various disciplines have found on reading. Scholars in the fields of psychology, education, anthropology, linguistics, language development, cognitive science, semiotics, rhetoric, literature, philosophy, neuroanatomy, and genetics have studied reading, but the communication among these disciplines has been sparse (Goodman, 1985; Shuy, 1986).

Matthewson (1985) suggested an affective model with the criticism that the reader’s emotions have been neglected in the research on reading. A prominent attitude of both behavioral and cognitive psychologists of the twentieth century was to avoid considering the affective dimension in human behavior. This dimension, which involves a person’s feelings, influences their decision to read and their reading behavior, not only their motivation and attitudes, but also their feelings like pleasantness-unpleasantness; their moods, sentiments, and emotions, so well illustrated by Halldór Laxness, in the
passage quoted earlier. Psychological researchers still have more problems operationalizing emotions than behavior and cognition. There are universally recognized methods for studying cognition, for example, measuring the time used for information processing of varying complexity. The focus on information processing and behavior instead of on emotions might thus be a consequence of certain shortcomings in psychological research methodology. For instance, it is difficult to sort out whether a child reads fluently because reading stories is fun, or whether reading is fun as a consequence of fluent reading. Even more difficult to figure out is what fun is in regard to reading and how to measure it.

A related critique by Goleman (1996), in his bestseller *Emotional Intelligence*, challenged psychological researchers for ignoring the power of emotions. According to Goleman, the main arguments for respecting and studying the power of emotions were linked to emotional influence on human information processing, bringing attention to the current zeitgeist in psychological research: information processing.

Each theory or model of reading exemplifies some aspect or aspects of the complex reading process. Their sheer number implies that reading is not easy to explain. Some reading researchers have been reductionists, tending to study a part or parts of the reading process, while others have looked at the overall picture (Stanovich, 1992). Regardless of various theories and methodologies, researchers agree with the pioneer reading theorist Holmes that the subject is multifaceted and lends itself to the necessity of partitioning it into subcomponents. Currently, however, it seems that no single study will ever include all the factors involved; yet it is also important to study how single factors
operate. A possible interaction between various components of reading must be considered where appropriate. When studying reading, it is important to keep in mind as well as to avoid over-simplification, which was well described by Stanovich (1993), who wrote, “. . . a gain for one hypothesis (e.g., phonological processing deficits) was automatically seen as a loss for another (e.g., visual processing deficits)” (p. xxii).

The information-processing approach challenges researchers to figure out how the mind operates. Reading researchers have frequently focused on linguistic processes, mainly phonological processing. Biological factors are increasingly being considered (e.g., Duane & Gray, 1991; Lyon, 2002), accompanying the development of more precise research instruments, for example, in genetics and cognitive neuroscience. How reading and visual and other sensory processes are related has been studied with varying emphasis, but more research seems to be needed in this area (see, e.g., Willows, Kruk, & Corcos, 1993). The importance of considering visual information processing in reading was, for example underscored by Carr (1985), who criticized the existing reading models. The implicit assumption of these models was that “information is available simultaneously or nearly so from all the letter positions of any word that the system is processing” (Carr, p. 708). However, according to studies on eye movements, the typical reader had been found to fixate two or more times on long words during reading. Because information about the whole word was not available at once, the assumption of most reading models, prior to 1985, was shattered.

Stanovich (1991) described the modeling of word recognition that was used between 1970 and 1990. Such models had, according to him, developed from being “nine
parts speculation to one part information” (p. 19), questioning whether reading was a top-down or a bottom-up process, tending towards more empirical research. Bottom-up reading refers to starting with the sound-letter unit, combining such units to get to the words, and combining words to get the meaning of the text. Top-down reading means that the reader can read efficiently by starting with the context, reading the words as wholes, and, perhaps later, if necessary, focus on details like individual letters. Recent research, as summarized by Stanovich (1992), has shown that a skilled reader processes visual and phonetic details efficiently and has the cognitive capacity to attend to the context. Regarding reading models, Stanovich (1991) said, “Considering them does serve as a caution, however, that theories of reading should probably always rest more on empirical facts about the process of reading than on the latest theoretical fashion in cognitive psychology and artificial intelligence” (p. 22). Empirical studies of phonological processing blossomed during the last decade of the twentieth century, and studies of readers who do not read up to par are voluminous. However, many questions are still worth asking.

**Reading as Information Processing**

Information-processing models (Gough, 1985; LaBerge & Samuels, 1985) are intended to capture what goes on in the reader’s mind, at least from the moment the eye is initially fixated on the text until a read word is understood or uttered. Therefore, artificial intelligence (AI) models of reading are also considered information-processing models because this process might be described, at least hypothetically, by a computer program for a reading robot. AI models will not be covered here, however.
An important element in information-processing models of reading is the concept of phonological processing. A standard information-processing model, the dual-route model, will be described, and its strengths and weaknesses discussed. Before considering information processing and reading, however, some specific, but frequently used phonological concepts need to be defined.

**Basic Phonological Concepts**

Currently, as indicated above, phonological processing is considered to be a key factor in reading. Many concepts from phonology are frequently encountered in this and other studies on reading research. Therefore, it is important to clarify some of those concepts. The main sources are Lass (1984) and Eiríkur Rögnvaldsson (1989, 1993), who have given a clear description of some basic concepts in phonology. An article by Wagner and Torgesen (1987) is a source here too because, as reading researchers, they have explained various concepts related to phonological awareness and reading. The linguist Höskuldur Þráinsson (personal communication, May 24, 2002) provided important comments and advice on this topic as well.

The phone is a basic concept in phonetics and phonology. The word phone means sound or voice. Phones are thus the exhaustive set of speech sounds. A spectrograph that physically graphs the sound waves can be used for making spoken language visible. The resulting graph does not show bits corresponding to what people hear as different sounds in a word, or as Wagner and Torgesen (1987) put it, “The apparent segmentation of the speech stream is a cognitive/perceptual phenomenon, not a characteristic of the acoustic stimulus itself” (p. 194). This nature of speech sounds can be depicted as a dimension
ranging from what the sounds objectively are to people’s perception of those sounds. This
dimension from the unsegmented acoustic waves to people’s certainty in regarding words
as rows of separate, interpretable sounds represented by letters can be described by a
simple illustration (Figure. 1). The meaningless acoustic waves are placed on the left-
hand side of Figure 1. If our children, that is American or Icelandic children, produce a
sound by having their uvulas vibrate rapidly, we hear a funny noise, potentially useful,
such as the sound of an old-time fantasy car, but without having any meaning. We would
indicate this funny noise on the left side of this illustration. These two extreme levels are
connected by a phonetic level containing a certain systematization of speech sounds, or
phonemes. The phonetic level is a linguistic phenomenon where people realize, for
example, that the word *ban* is different from the word *pan*.

![Figure 1. Speech-sounds dimension from airwaves to words.](image)

The acoustic stimulus and the phonetic level have a certain congruity. Some
phones have a relatively fixed form on the spectrograph, while the visible picture of
others depends mainly on which sounds surround the phone in question. In the illustration
above, the phonological level is on the right. People, at least if they are literate, interpret
the sounds on the phonological level according to a perceived classification; for example, all variants of the phoneme /t/ are interpreted as t, even though they can sound quite different from one word to another and produce different visual images on the spectrograph. The t in tap and the t in step (Icelandic examples: tappi, stór) do not have exactly the same phonetic properties in the two words, even though people classify them together. The categories (here: t) in such a classification are called phonemes, and the variants within a category are allophones. Thus the t in tap (tappi) and the t in step (stór) would be two separate allophones of the phoneme /t/. A phoneme requires human interpretation of the phones and, therefore, belongs to the phonological level. The funny sound mentioned above, the uvular r, is a phoneme in Danish and many other languages. In those languages, the sound would be placed to the right in the illustration (Figure 1).

In many writing systems there is a fairly direct relationship between the phonemes and the letters or graphemes. The grapheme can be thought of as the written symbol for a phoneme. In the examples above, the grapheme t symbolized the phoneme /t/. The grapheme-to-phoneme correspondence is not always a one-to-one relationship, however. In Icelandic phonology, the graphemes ð and þ are frequently considered to indicate the same phoneme, one resembling the phoneme represented by the English grapheme th. Writing systems do not necessarily have a grapheme-to-phoneme correspondence. Various other forms exist. Chinese characters exemplify a nonphonological writing system (Shu, Anderson, & Wu, 2000). The Chinese characters contain a semantic (explained below) component accompanied by information regarding pronunciation.
Writing systems with semantic components are called morphemic. The concepts semantic and morphemic, introduced above, are defined by the following.

In reading as well as in spoken language, a meaning is conveyed. The smallest meaningful unit is called a morpheme. The concept of a morphemic writing system refers to writing systems directly linked to the meaning of the word. The three words meaningful, meant, and meaning have the morpheme mean in common. Icelandic examples would be lesa, lestur, lesbók having the morpheme les (Engl.: read) and þráður, þræða, þrædd having the morpheme þráð (Engl.: thread) in common. The last example shows a single morpheme represented by two different forms. In an extremely simplified morphemic writing system, writers might draw a picture of a cat to represent the word cat. A morpheme would be a semantic unit, and semantic refers to the meaning of the text.

The adjective lexical refers to the lexicon of a language. The lexicon is the inventory of all the morphemes of a language. Syntax and the adjective syntactic refer to the building of sentences constructed of words in various roles, which help determine the meaning of the sentence.

Another important unit at the phonological level is a syllable. Obtaining a clear definition of this concept is complicated, and Lass’s (1984) book is recommended for the reader who wants to know more about the problems involved. Here, it is sufficient for the reader to recognize a syllable, for example, by clapping the rhythm of words, finding two syllabi in the word reading and four in recognition. Most often a syllable consists of one vowel or a vowel-like consonant and one or more consonants.
A vowel, such as $a$, $e$, or $i$, is a speech sound uttered without closure or constriction of the vocal apparatus. With a vowel, the only constriction is made by the vibrating vocal cords. What constitutes a constriction and what does not is arbitrary, however; for example, the vowel $i$ in Icelandic is formed very much like the Icelandic consonant $j$.

Consonants such as $b$, $r$, $s$, are formed by performing some constriction of the vocal tract. A stop is a consonant, formed by completely shutting off the stream of air through the vocal tract, for example, $b$, $t$ (Eiríkur Rögnvaldsson, 1989).

**Phonological processing** is a concept referring to the identification and use of the phonemes of a language to understand and produce oral and written language. As in other human information processing, phonological processing is often performed as covert behavior. Wagner and Torgesen (1987) differentiate between types of phonological processing. The first, **phonological awareness**, refers to the awareness of the sound structure of a language displayed, for example, by being able to isolate and even count the sounds in a word and combine syllables to form a word. **Phoneme awareness** indicates the skill to process and isolate phonemes in a word. Phonological awareness additionally includes analyzing and synthesizing larger units like syllables and morphemes: *analysis* indicates the partitioning of words into syllables or phonemes and *synthesis* the combining of syllables and phonemes to form a word.

Other phonological processing components relate to phonological recoding (Wagner & Torgesen, 1987). The concept of **phonological recoding in lexical access** means the ability to translate written symbols into a word. **Phonetic recoding in working**
memory refers to transforming a written symbol into a sound-based symbol that can be kept in mind while being processed.

In recent reading research, the first type of phonological processing, that is, phonological and phoneme awareness, is considered to be an important prerequisite skill for reading. It is worth remembering that most reading researchers now agree that the concept of phonological awareness is broader than the concept of phonemic awareness. Phonemic awareness refers to the awareness of single phonemes in words, while phonological awareness additionally encompasses the awareness of larger units within a word, for example syllabi and rhyming elements.

**Information-Processing Models of Reading**

As already mentioned, information-processing models highly influence the description of reading. Dual-route models have been influential in research on how the reader processes words (Humphreys & Evett, 1985). In a dual-route model, the assumption is made that two routes exist to process words: a lexical route and a nonlexical route. When using the nonlexical (sometimes called sublexical) route, the reader decodes the graphemes into phonemes, that is, transforms the words in the text into spoken\(^1\) words. The lexical route is the direct access to the meaning of the read word. When the reader reads a word, specific knowledge is activated as if prior read words were stored in a mental lexicon used for comparison to the currently read words.

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\(^1\) Even though the word *spoken* is used here to simplify the description, it does not mean that the read word is necessarily spoken aloud by the reader, only that it is phonetically recoded in working memory.
This means that a nonword, like \textit{nadeli}, can only be read in English or Icelandic by using the nonlexical route because ‘nadeli’ does not have a meaning. A word that does not follow the regular phoneme-grapheme rules of the language of the text could only be read correctly by using the lexical route. Examples of this would be the words \textit{yacht} and \textit{wind} in English and \textit{sigldi} (Engl.: sailed) and \textit{galli} (Engl.: overalls or defect) in Icelandic. The former word in the pair is pronounced differently from the traditional pronunciation of the letters, and the latter word can be pronounced in two different ways, having two different meanings, depending on the context.

Adherents of a strong version of the dual-route theory assume that the two routes, the lexical and the nonlexical, are totally independent. In a more flexible version of the theory, relative strengths and weaknesses of the two routes are assumed, requiring an independent evaluation of each route. Humphreys et al. (1985) described various studies, showing that the reading of nonwords is affected by associations with a known, meaningful word. It takes an English reader more time to decide that the nonword \textit{brane} is a nonword and not a real word than to decide on the nonword \textit{brame}, which does not sound like a real English word. Here a grapheme-phoneme conversion is not independent of the lexical access, but researchers do not have good methods for separating the nonlexical route completely from the lexical route, if separable at all. The dual-route theory also encounters problems when explaining disabled readers’ errors, as described later.

For a dual-route successor, Humphreys et al. (1985) recommended a multiple-level theory that enabled the reader to collect information from various steps of the
reading process. Researchers would then focus on a lexical-processing route with many levels of phonological activation, and figure out the multiple components involved. The levels would have to include components such as analysis and synthesis of phonemes, priming effects, which refers to the reader’s expectation for the following word, and other types of mapping between orthography and phonology, for example, how to assign stress when reading aloud. Additionally, the interaction of components both in normal reading, in impaired reading after brain damage, and in other reading difficulties would have to be outlined.

An example of a model where different information is simultaneously evaluated would be the Seidenberg-McClelland connection model. Two production facilities are proposed here, the orthographic and the phonological, where certain weights on each of the two, phonological coding and orthographic coding, are connected to decode each written word (Seidenberg, 1992).

The nonlexical route implies that reading might be different, depending on how the reader’s language is written, for example, whether a phonological or a morphemic system is used. But similar types of problems in reading, problems with one or both of the lexical and nonlexical routes, are found in both types of writing systems, perhaps because written words have meaning and information regarding the pronunciation, regardless of the type of writing systems (Paradis, 1987; Perfetti, Zhang, & Berant, 1992). Adults who do not read at all have difficulty performing phonemic awareness tasks. This characteristic has been found in adults who only read morphemic writing
systems, but here the definition of the concept of phonemic awareness might be tricky (Ehri et al., 2001; Morais, Bertelson, Cary, & Alegria, 1986; Shu et al., 2000).

According to Seidenberg (1992), a single-route model was described by Van Orden, Pennington, and Stone (1990), where phonological mediation was considered to be the route. This single route was indicated in studies where the key to people’s classification of words was phonological decoding, that is, words were classified according to how they sounded and not directly by their appearance. Other researchers (Jared & Seidenberg, cited in Seidenberg, 1992) have questioned this approach. They found that direct access, not phonological recoding, was used when reading highly frequent, irregular words. Whether the lexical and the nonlexical routes are separable or not, and whether they are a good description of the reading process, is a matter of debate. Research seems to indicate that efficient reading is both related to the reader’s language skills and the nature of the symbols to be decoded (Stanovich, 1992). Unskilled readers might use different strategies, but theories regarding reading disabilities will be mentioned later.

Is Reading Language?

Reading has frequently been considered a linguistic process, which is one form of using language (Høien & Lundberg, 1989; Lundberg, 1982; Vellutino, 1987). Phonological awareness is a linguistic phenomenon and has been found, as described below, to predict reading skills. This raises the question as to whether phonological awareness and reading are different steps on the same developmental scale, or if they work hand in hand. Language can be viewed as consisting of two components, receptive and expressive. An
example of a receptive language function would be to listen to and understand language, while talking is an expressive function. If reading were a linguistic process, it would be considered receptive as long as the reader reads silently. Reading aloud is both expressive and receptive because it implies that the text is communicated to others, as well as received by the reader. This description is superficial because expressive elements, such as the movements of lips and tongue, and the transforming of graphic symbols into phonemes, can be involved in silent, receptive reading. Writing can in a similar way be considered an expressive, linguistic process. A connection between talking, reading, and writing was in the Norwegian reading researcher Gjessing’s thoughts 25 years ago when he wrote, “Skriftspråket er talespråkets forlengede arm . . .” (Gjessing, 1977, p. 11), which translated to English means “Writing is the extended arm of speech . . . .”

To people who have quickly and effortlessly figured out how to read, reading as a language skill is natural; they do not remember having learned to read any more than they remember having learned to talk. Some children become skilled readers with minimal instruction, like people who become adequate speakers with minimal instruction. Lyon (1997) described their experience as an “effortless journey into the world of reading” (p. 1) embarked upon by about 50% of U.S. children who learn to read relatively easily. Others struggle for years, sometimes without even managing to attain basic and necessary reading skills.

Thus, it seems relevant here to quote the linguist Shuy (1986), who wrote, “To a linguist, it seems odd to assert that language analysis has a role to play in literacy. To us, literacy is language, at least as the intermediary medium from the human mind to the
printed page and back again” (p. 77). A slightly different point was made by Reagan (1997), who maintained that learning to read was very different from learning to speak. He was writing about the importance of schools’ respecting Black English and supporting children’s natural language. Reagan was not denying the linguistic components of reading but rather emphasizing that for some children, literacy does not necessarily provide a medium to connect their mind to the printed page because the two might use different languages, underscoring the connection between one’s natural language and reading.

Obviously, speaking is not reading; the former is mainly expressive while the latter is mainly receptive. Comparing the two processes, learning to read and learning to talk, seems to be an interesting topic of research, however. But so far, such studies have mainly dealt with the question as to whether delayed speech and delayed reading go together. Various studies have found an association between delayed language skills and reading difficulties. A more extensive description of this research is provided in a later section on the prediction of reading skills and reading difficulties. Reading skills and oral language expression have also been found to predict written expression (Berninger, 1994). Measuring children’s language skills when studying reading skills is therefore important.

Share, Jorm, Maclean, and Matthews (1984) proposed that the conversion of a printed word into a spoken word might act “as a self-teaching mechanism by which a child learns to identify words visually” (p. 1315). They also mentioned Geller’s argument (1983, as cited in Share et al., 1984) that children’s play with sound patterns like game
rhymes and tongue twisters, and that similar games contribute to the acquisition of phonological awareness. This play can be described as both a self-teaching mechanism and as an interpersonal
teaching of phonological awareness. Such activities form a large part of the phonological-awareness instruction program Markviss múlórvun used in this research.

Fifteen years ago, Vellutino (1987) pointed out that students with a reading disability did not have problems with visual or auditory processing per se. They only had problems when required to associate visual or auditory information and a phonologically coded stimulus, that is, a word, a syllable, or a phoneme—for example retrieving a word or a phoneme in response to the visual symbols, letters. This might look like a memory problem except that the students did not display memory deficits when retrieving other types of information. Vellutino thus added weight to the assumption that reading is a linguistic phenomenon and maintained that dyslexia was a linguistic deficiency. Vellutino used the word *dyslexia* for the concept of reading difficulties. In this study, the two concepts are used interchangeably. In brain research, however, no reading centers have been found, possibly indicating that the human brain is not, by nature, specifically designed for reading. Language centers, on the other hand, are decently mapped (e.g., Shaywitz et al., as cited in Wolf, 2002).

As mentioned earlier, reading development has been studied and modeled by researchers from various disciplines. Some of their findings will be introduced in the next section.

---

2 In cooperation with a peer.
Reading Development

In models of reading development, the connection between language and reading has been emphasized. The analogy of a staircase has also been used to describe reading development, where the prospective reader passes through various phases, one step at a time, on the way up the stairs towards fluent reading skills.

According to Frith (1985), a reading development model contains a logographic phase, followed by an alphabetic phase, and then an orthographic phase. Høien and Lundberg (1988) also proposed a model of reading acquisition that contains four steps: pseudoreading, logographic-visual reading, alphabetic-phonemic reading, and orthographic-morphemic reading. They conducted a number of single-case studies in four Nordic countries and concluded that the model seemed to be valid, regardless of language, teaching methods, or attributes of students. Both models depicted a very similar process. In the beginning, the prospective reader knew some words by sight, for example "Coca-Cola". Later he or she grasped the idea of a letter-sound correspondence and broke the code, learned to connect one letter to the next to decode the word, mastering the bottom-up procedure. Closer to the top of the ladder, the words were read as orthographic units without necessarily translating them into individual sounds or phonemes. The letter-sound correspondence was, however, always used as a safety net for detecting errors, indicating a top-down procedure.

There is a correspondence between the developmental phases and the lexical and nonlexical processes in reading. The alphabetic phase seems to be devoted to the strengthening of the nonlexical route by developing skills to decode a grapheme into a
phoneme. If this learning is disturbed, an individual unable to use the nonlexical procedure could not decode regular words or nonwords (Castles & Coltheart, 1993). If the orthographic phase is not completed, the reader might not master the lexical procedure and have problems reading words with irregular phoneme-grapheme correspondence. But, as mentioned earlier (p. 18), lexical effects on the decoding of nonwords have been documented. It is not known how we, readers, learn to do that, but such findings would have to be accounted for in a model of reading development.

The connection between language skills and reading skills is an issue that will be revisited later in this paper. The key concept, phonological awareness, will now be looked at in more detail.

**Phonological Awareness**

*The Concept of Phonological Awareness*

As mentioned earlier, phonological awareness has been found to be closely connected to reading acquisition (e.g., Adams, 1990; Ehri et al., 2001; Lundberg, 1994; Stanovich & Siegel, 1994). In this chapter, the discussion of the relationship between language, reading prediction, and reading skills will be limited to the relationship between phonological awareness and reading for the purposes of this study.

Wagner and Torgesen (1987) summarized the research on phonological processing as indicating the existence of a general phonological ability, independent of a general cognitive ability, emerging in most types of measures of all subcomponents of phonological processing. In a factor-analytic study, Wagner, Torgesen, and Rashotte
(1994) found phonological processing to include the following latent factors: phonological analysis and synthesis, phonological memory coding, and naming skills.

Høen, Lundberg, and Stanovich (as cited in Lundberg, 1994) studied factors involved in phonological awareness. When data from approximately 1500 preschool and first grade children were factor-analyzed, three basic factors were found: a phoneme factor, a syllable factor, and a rhyme factor. Earlier, Lundberg (1978) and Stanovich (1992) pointed out that phonological awareness could be depicted as a dimension ranging from shallow to deep where smaller phonological units, for example, phonemes, require deeper awareness than larger ones, such as words. Rhyming would only require being aware of a large unit, a word or a rhyme, and should therefore be easier than, for example, synthesizing the phonemes /s/, /u/, and /n/, to form the word sun. Rhyming would, according to this model of phonological awareness, be processed on a shallower plane than phoneme synthesis.

This hierarchy was at least partly confirmed in a study by Høen and Lundberg (1988), who found that the phoneme factor was the best predictor of reading skills and that the syllable factor (larger, shallower units) was the weakest predictor. The best predictor of reading skills within the phoneme factor was phoneme identification, explaining a 14% unique variance. Such results gave birth to a hypothesis where children who have obtained phonological awareness at the level of phoneme awareness are assumed to be able to learn to read faster than children who master rhyming, and to synthesize and analyze syllables. The finding that it is easier for young children to rhyme than to segment words into syllables has frequently been replicated (e.g., Adams, 1990;
Snider, 1997; in Iceland, e.g., Ásthildur, 1999). Children who are able to rhyme but are not aware of syllables would accordingly be further away from obtaining reading skills than children who master the syllable level.

In the developmental process of acquiring reading skills, a child becomes more and more skilled in analyzing words into subunits (Stanovich, 1991). Before acquiring this skill, the child seems to perceive words as whole chunks, but not as a series of syllabi or phonemes. For this child, the word *duck* represents a bird; it is not a single-syllable word constructed from phonemes. It is interesting here to speculate whether phonemic skills disappear temporarily along the developmental road. Infants seem to grasp individual phonemes because, before they utter their first word, they manage to sort their mental sound-databank into at least two parts: speech sounds that they seldom or never hear in their environment, and phonemes they have to recognize, train, and pay attention to. Why children process information on the phoneme level when younger than one year old but have difficulties doing so just before learning to read is an open and interesting question. The answer might be related to a fundamental difference between phonetic and phonemic skills, or the skilled infants may be performing some reflex-like activity that the older child has outgrown. However, the issue in this study is the development of phonological awareness when children are in the transition phase from preschool to elementary school, not in the cradle. But regardless of age, biological evidence for phonological awareness has been found and will be looked at in the following section.
**Phonological Awareness Biologically Supported**

A biological basis for phonological awareness has been documented, for example, by Grigorenko et al. (1997), who studied data on individuals from six dyslexic families. Only those who as children read below the 10th percentile were included. The researchers classified these individuals into five groups according to their difficulties. The groups contained individuals with: a) difficulties with phonological awareness, b) deficit phonological decoding skills, c) problems with rapid naming of colors and objects, d) problems with single-word reading, and e) discrepancy between IQ and global reading achievement. The discrepancy definition of reading difficulties, that is, the officially recommended criteria, will be covered later in more detail. To assess if the subjects fit into one of the first four groups, two tests to tap each skill were used. Evaluating the discrepancy for the fifth group was a little unusual because two verbal subtests were used for measuring the IQ.

Significant markers were found on chromosome 6 for the group lacking phonological-awareness skills. On chromosome 15 were significant markers for single-word reading difficulties, although they were not as clear as the relationship between chromosome 6 and phonological awareness. The researchers emphasized the importance of theoretically driven research for finding precise defining attributes of dyslexia to enable genetic mapping (Grigorenko et al., 1997). Other studies support a genetic component in dyslexia. In a group of Danish children of dyslexic parents, an increased risk of dyslexia by 4.3% was found, compared to the risk of dyslexia in children of
nondyslexic parents (Borstrøm & Elbro, 1996). Similar results were obtained by Gilger, Pennington, and DeFries (1991).

Structural differences between brains of dyslexic and nondyslexic students have been found, for example, an unexpected symmetry between the left and right hemispheres in the language area (planum temporale) of the brains of dyslexic people. It is an established finding that this area on the left hemisphere is associated with language processing and that structural asymmetry characterizes normal readers. The findings do not indicate larger language areas of good readers but an increased number of neurons in this brain region of dyslectic people. Infants have two times the number of brain neurons of pediatricians (Ratey, 2002). Pruning of brain nerve cells accompanies increased skills, so more is not necessarily better (Galaburda, 1991a).

The neurological functioning of the brain during reading has been studied by many researchers (e.g., Vellutino, 1987; Poldrack, 2002). One neurological damage might, for example, destroy the ability to visually process a text, while another kind of damage might affect phonological processing skills (Vellutino). Structural differences might also influence the brain function, for example, by decreasing the speed of information transfer and processing (Poldrack). Damages in disabled readers’ brains are seldom detected and, because the brain is flexible, the younger the reader is when the damage occurs, the less likely it is that the damage has any consequences (e.g., Ratey, 2002). Negative findings might, however, be caused by both the unavailability of exact measurements and the lack of knowledge about brain functions in reading.
Predicting Reading Skills and Reading Difficulties

Phonological awareness has for some years now been considered the most promising candidate for predicting later reading skills. Developing test batteries to predict reading skills or to find children who will have problems learning to read is not only interesting for teachers but also for politicians and government agencies who provide resources for the schools. The intention of constructing a test to screen for learning difficulties of elementary school students as early as possible was announced in 1998 by the Icelandic Office of Education (Menntamálaráðuneytið, 1998).

Mann (1993) investigated whether a phoneme segmentation test, that is, a test where the participating children indicated which one word out of four did not start with the same phoneme, predicted reading skills. Additionally, one year later she tested children’s early attempts to write. Two widely used tests of visual-motor ability (the VMI and The Draw-a-Man Test) were also studied as potential predictors. The phoneme segmentation test and the invented spelling test correlated with various, later obtained, measurements of reading in the range of $r = .54 - r = .68$, while the tests of visual-motor ability and reading correlated in the $r = .13 - r = .38$ range. Phonological awareness represented by the two former tests thus shared with reading 29% - 46% of their variance, while the tests of visual-motor ability shared 2% - 15% of the variance with reading.

Byrne and Fielding-Barnsley (1990) concluded that the recognition of phoneme identity was critical in acquiring the alphabetic principle. Obtaining the metacognitive knowledge about reading that words are composed of phonemes and that some of them may be identical across words, even though the words are otherwise totally different, is
what the definition of the concept alphabetic principle contains. Byrne and Fielding-Barnsley did a series of experiments where the importance of recognition of phoneme identity across words was compared with phoneme segmentation within words, thus separating phonemic awareness into subskills. The participants were four- to five-year-old children who were taught the two subskills. An example of an assignment indicating recognition of phoneme identity across words was the test in Mann’s (1993) research, where the word that did not share the initial phoneme with other words should be found. The phoneme segmentation task required the children to break single words into an onset and a rhyme, such as breaking *sun* into *s* and *un*. The instruction of phoneme identity turned out to be easier than teaching phoneme segmentation, and the identity skills generalized better to other assignments. When acquiring phoneme identity, it did not seem to make any difference to the children whether the instruction was focused on the initial phoneme, phonemes in the middle of the word, or the word’s last phoneme. It did not matter either whether the phoneme was embedded in a consonant cluster or connected with vowels to other parts of the word. When acquiring phoneme identity, stops were more difficult for the children than other types of sounds.

Six years later the children who had been trained in phoneme identity outperformed other children in reading irregular words and nonwords. These results were reported after an interesting follow-up study (Byrne, Fielding-Barnsley, & Ashley, 2000). Some of the trained children, however, had become poor readers, namely the children who were the slowest in achieving phoneme identity. A strong finding in follow-up studies of phonological training has been that children trained in phoneme awareness
before they get any reading instruction become more skilled in nonword reading. Children become more skilled in reading unfamiliar words, an advantage lasting at least into second grade (Byrne et al.). Reading unfamiliar words is clearly a more practical and applicable skill than reading nonwords. Reading nonwords and reading unfamiliar words are the same process, though, because decoding of phonemes is the most important skill in both tasks.

Rapid naming seems to be an additional factor affecting reading. Lacking rapid naming skills is frequently regarded as a symptom of slow access to the mental lexicon (e.g., Lyon, 1995). Blachman (1994) mentioned rapid naming of colors, letters, words, and other material. Her research indicated that lack of skills in both phonological awareness and rapid naming gave worse prognosis for reading than lacking phonological skills alone. By following students from third through eighth grade, Meyer, Wood, Hart, and Felton (1998) found that rapid naming abilities in third grade predicted later word reading skills for poor readers, that is, readers below the 10th percentile. The early poor readers “. . . in an unselected, normally distributed sample” (p. 113) were identified by assessing phonological skills. After such screening, however, rapid naming skills predicted who in the group of poor readers would improve. Color naming has been found to predict word recognition skills for real words but not word attack skills for nonwords, indicating a link between word recognition skills and lexical access, while lexical access and phonological decoding are probably unrelated. McGuinness, McGuinness, and Donohue (1995) tentatively concluded - adhering to the spirit of the above mentioned dual-route model of reading - that “. . . naming speed relates to a word-finding problem
and not to a deficit in accessing phonological codes in long-term memory” (p. 841). In spite of the apparent importance of future research into the nature of rapid naming skills, the focus of this study was on the predictability and manipulation of phonological awareness.

Both phonological awareness and rapid naming skills are linguistic skills, and reading as a linguistic phenomenon has already been mentioned. The question of whether language skills and reading go hand in hand has already been raised. Predicting reading skills for children with delayed language was the topic of Magnusson and Naucér’s (1987, 1991) research. They conducted a longitudinal research in Malmö, Sweden, where they followed children born in 1978 through the first four grades of school. They looked at whether good readers in first grade remained good readers in fourth grade, and whether such stability would also be true of delayed readers. All 76 children in the city who were diagnosed as having a specific language disorder participated. Thirty-nine of those children had already, before starting first grade, received speech and language therapy because of the diagnosed severity of their disorder. The 37 children who had not received therapy might therefore have had a milder language disorder. Normally speaking children were matched to individual students in the “severe” group on age, sex, and nonverbal cognitive level.

The definition of poor and good reading was based on results from a reading comprehension test. Poor readers were at the 25th percentile or lower in reading comprehension while good readers were at the 75th percentile or higher. Table 1 shows how the good and poor readers were recruited from the language groups in first grade.
Table 1

*Language Skills and Reading: Malmö, Sweden*

<table>
<thead>
<tr>
<th></th>
<th>Poor readers</th>
<th>Good readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe LDa</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Mild LD</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Normal language</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

*LD: Language disorders

As indicated in Table 1, language disorders did not predict reading skills in first grade. Approximately 35% of children with severe language disorders were good readers, while 35% of normally speaking children were poor readers. Less than 40% of the children remained in the same reading group in fourth as in first grade, 11 poor and 11 good readers. The poor readers in both first and fourth grade came from all three language groups, equally many from the normally speaking group and the mild group, but twice as many from the severe group.

The 4 out of the 28 good readers in first grade who became poor readers in fourth grade also represented all three language groups: two had normal language, one a mild, and one a severe language disorder.

In the same study, differences were found in preschool in the areas of language comprehension, syntax, naming ability, phonology, and linguistic awareness between good readers and poor readers in fourth grade. This difference was more marked for the readers who remained in their reading group.
Magnusson and Nauclér (1991) found that identification of phonemes and recognition of rhymes were the skills having the highest correlation with reading skills. Their findings thus support the importance of phonological awareness, an importance that is not simple nonetheless. Various empirical evidence indicates that phonological processing abilities should be considered stable characteristics of individuals, as opposed to some other forms of more transitory reading-related knowledge that varies with amount and type of instruction (Wagner et al., 1994). This evidence “reinforces the value of early screening of phonological processing abilities to identify children who are at risk for reading failure” (Wagner et al., p. 84).

When Blachman (1994) commented on Wagner et al.’s (1994) paper, she emphasized the consequences of the stability of children’s phonological processing. She drew an analogy from educational practices 30 years before when it was customary to try to fix deficits in visual organization and visual memory. But no empirical support was found for the assumption that such remediation would generalize to reading (Buckland & Balow, 1973, as cited in Dalby, Elbro, Jansen, & Krogh, 1992, p. 113). The stability of phonological-processing skills is an indication that such skills are not easy to alter or improve. Blachman therefore suggested that discovering methods to improve reading in spite of students’ deficient phonological skills might make more sense than trying to alter stable characteristics of the students. Nonetheless, it is important to know if that is possible. Improving children’s phonological skills is the main purpose of the training program Markviss má lörvun. In the United States, a National Reading Panel was constituted following a directive from the U.S. Congress in 1997. As a consequence,
various meta-analyses on reading were conducted, one of which focused on phonemic-awareness instruction and whether it helped children’s reading. It turned out that phonemic awareness could be taught, and that it also influenced reading and spelling skills (Ehri et al., 2001). Causality was determined by analyzing reading experiments only. Children in preschool and kindergarten gained more from phonemic awareness instruction than did the older children. Markviss málörvun contains not only phonemic skills but other phonological skills as well, frequently found to be weaker reading predictors.

In a meta-analysis of various studies on reading, Siegel (1992) found that phonological processing was the best predictor of later reading skills. In her research, phonological-processing skills were assessed with various measures. Some of the measures required reading skills, for instance, nonword reading. The predictive value of phonological processing seemed therefore to be contaminated with the predictive value of reading skills, a frequently encountered methodological problem (Troia, 1999; Wagner & Torgesen, 1987). Some of the children in Byrne et al.’s (1990) research had previous letter knowledge. Even though knowledge of letter sounds in the sample was minimal, just knowing the names of a letter may contain a phoneme-identity knowledge that is not detected when testing children’s knowledge of sounds of letters. It is not clear whether the children who already knew 10 to 20 letters when the instruction started were the same children who gained the most from the program.
Grapheme knowledge of prereaders is an important predictor of reading skills (Adams, 1990). It is not easy to determine if letter knowledge contains the earlier mentioned predictor, phoneme identification, but the two could be closely related.

When controlling for cognitive ability, phonological awareness in kindergarten predicted later reading skills. When controlling for reading skills in kindergarten, phonological awareness lost its predictive power because prior reading skills were the best predictor of later reading skills. Earlier behavior usually is a vital predictor of later behavior and cannot be dismissed in a predictive model (Wagner & Torgesen, 1987; Wagner et al., 1994). When Wagner et al. recomputed Lundberg, Olofsson, and Wall’s (1980) results in regard to holding constant prior reading skills, minimal or no correlation was found between phonological skills and subsequent reading, contrary to the original researchers’ conclusion.

Besides phonological awareness, rapid naming skills, letter knowledge, and reading, IQ and school-related factors have been found to predict reading skills. A correlation is frequently found between reading skills and IQ, usually in the r = .40 - r = .50 range (e.g., Clay, 1991; Þuríður Kristjánsdóttir, 1983). Problems with IQ as a predictor of reading skills will be mentioned later in connection with the discrepancy definitions of reading difficulties.

An interesting twist in the correlation between phonological awareness and reading was found by Share et al. (1984). In a longitudinal study of individual differences in reading acquisition, they found that not only did children’s phonemic awareness skills predict later reading but so did their peers’ phonemic awareness skills. The peers in this
case were classmates and schoolmates, although the effect seemed to be independent of
the frequency of the child’s interaction with their peers. This effect may therefore have
reflected the educational atmosphere of the school or the classroom, indicating that in
schools or classrooms where children were required to learn, they learned. The predictive
value of a classroom for the achievement of learning disabled students has been
demonstrated. Gender, behavior, and reading-skills influence which reading group a child
is placed in, and group placement is influential in predicting acquisition of reading skills
(Slavin, 1987). The relationship between schoolmates’ phonological awareness that Share
et al. found, though, was independent of any tracking of students into different
classrooms based on ability or academic achievement. It was also independent of whether
the student involved was a low-ability student or a high-ability student; all students
gained approximately equally from belonging to a high-skilled group.

**Tests for Predicting Reading Skills**

Constructing a good test to predict reading skills is therefore a challenge. In Iceland,
Elmar Þórðarson (1989) used grapheme-free symbol manipulation to test decoding skills
and the repetition of nonwords to test phonemic awareness. The tests were hypothesized
to detect children who might be at risk for reading difficulties. A weak correlation ($r =
.19$) was found between the symbol manipulation and later reading skills. This can be
explained by the fact that most good symbol manipulators became good readers. But the
tests did not provide a solid prediction for the poor readers, some of whom were skilled
symbol manipulators. Almost two thirds of the low-scoring symbol manipulators became
skilled readers. Repeating nonwords provided a somewhat better prediction; a correlation of \( r = .31 \) was found between nonword repetition and later reading skills.

Another example of a predictive test is McGuinness et al.’s (1995) test battery. By testing 95 first grade children, they found tests that together “can predict performance on word recognition and decoding (word attack)” (p. 841). These tests included those for phonological awareness (The Lindamood Auditory Conception Test [LAC]), rapid color naming, short-term memory for rhyming words, and a test of visual sequential memory. The prediction turned out to be gender specific and revealed an interaction between gender and both word recognition and decoding. Predicting separately for boys and girls improved the prediction, and phonological awareness seemed mainly connected to the boys’ reading skills. Age and rapid-naming skills contributed to the word identification variance for the girls.

As a possible explanation of the gender differences, the researchers mentioned a different number of participating boys and girls. How the proportions were skewed in the study was not obvious, nor was how it might have influenced the results. Possible gender specificity requires research results on the prediction of reading skills to be reported for each gender. It is also important to evaluate the distribution of scores for boys and girls separately because their distribution of achievement scores has tended to be different, narrower for the girls than for the boys (Feingold, 1995).

Test batteries designed to predict reading difficulties are often expensive and have to be administered individually to each test-taker. Compared with group-administered tests, individual administration requires considerably longer administration time. As an
example, a school with three first-grade classrooms with 20 children in each would use 90 minutes to administer a group-administered test compared to at least 1800 minutes for an individually administered test. To reduce these difficulties, Watkins, Van Meter, Hall, and Edwards (2000) developed a test battery. Their goal was to develop a valid and reliable instrument containing the most important predictors for later reading skills. A writing test (graphemes and words) was included, together with a phonemic-awareness scale. This scale contained 20 sound-categorization tasks where the children were required to find words containing similar or dissimilar phonemes. Tasks requiring an oral response, like syllable analyzing, synthesizing and analyzing phonemes, could not be used in a group-administered test. Rhyming was not used either, because it was considered too easy for first grade students, and rhyming was thought to be a weak predictor for later reading skills. Additionally, rhyming scores do not give high loadings on a phonological-awareness factor in factor analyses (Watkins et al., 2000; Yopp, 1988).

In this study, all tests were individually administered. If adequate predictors of reading skills were found, the economical advantages of using a group-administered test would justify later construction of a predictive group test in Iceland.

Which Comes First, Phonological Awareness or Reading?

Questions have been raised as to whether phonological skills are a prerequisite for learning to read, whether learning to read enhances such skills, or whether the causality goes both ways (Lundberg, 1994; McGuinness et al., 1995; Morais, 1991; Perfetti, Beck, Bell, & Hughes, 1987; Wagner & Torgesen, 1987). Obtained results regarding the direction of causality support a bi-directional influence. However, the causal direction
depends on which phonological skills are being studied. The developmental rate for various phonological-processing abilities, for example, phonological analysis and synthesis, has been found to vary. Some skills develop slowly and others develop more quickly (Wagner et al., 1994).

A distinction has been made between phonological sensitivity and phonological awareness, where phonological awareness requires more developed phonological skills and seems, at least partly, to be acquired through reading (Stanovich, 1986; Wagner et al., 1994). Synthesizing phonemes into a word is easier for most children than analyzing a word into subunits. This is indicated, for example, by the ability of young children to figure out what parents are saying when spelling out words. This is easier - and, of course, more interesting - for the children than spelling out the words themselves. Spelling out words is a skill that rapidly increases as children learn to read. Reading acquisition and the development of phonological-awareness skills go hand in hand during the developmental course of the prospective reader.

Which children are being studied is also important when determining causality because reading and phonemic awareness skills of four-, five-, and six-year-old children are more easily affected than similar skills of older, disabled readers (e.g., Ehri et al., 2001).

When studying the effects of phonological awareness on subsequent reading, measures of prior reading and subsequent phonological awareness must be included. Besides the importance of checking the direction of the causality, Wagner et al. (1994) emphasized the necessity of including an evaluation of the reader’s verbal ability in a
causal reading model. Correlation, because of shared characteristics of the variables involved, must be considered too, in addition to potential consequences of measurement errors.

Phonological Awareness and Markviss Málörvun

This section describes research on teaching phonological awareness by using the Markviss málörvun program. This research has mainly been conducted in Europe, primarily in the Nordic countries. Frost’s phonological-awareness instruction program, called Markviss málörvun in Iceland, was originally designed to teach phonological awareness and other metalinguistic skills without using graphemes (Lundberg, Frost, & Petersen, 1988). This program has provided an opportunity to evaluate whether phonological awareness can be trained and learned without prior grapheme knowledge or reading skills (Lundberg, 1994).

Frost’s program was originally designed for use in kindergarten (Danish: førskoleklasser), with approximately six-year-old Danish children, as a preparatory program for later reading instruction. Besides the Nordic countries, the program has been translated, adapted, used, and researched in Germany and the United States (Ehri et al., 2001). Frost used the program in the Bornholm project (Amtorp, Frost, & Troest, 1985; Frost, 1987, 1989; Petersen, 1989), a combined research and intervention project conducted in Denmark. A similar project, the Norwegian Jåtten project, was conducted in Norway (Austad & Bygnes, 1996).

The Jåtten project was an intervention project combined with longitudinal research. The purpose was to prevent and find reading-writing difficulties as early as
possible in preschool and first grade. Two cohorts of children in a part of the town of Stavanger participated. The preschool was a part of the children’s daycare institution, not the school. The children had started first grade in August of the year they had become seven years old. They were therefore approximately six years old when they started participating in the Jåtten project.

The teachers involved in the Jåtten project attended courses for two consecutive days each spring semester, plus monthly courses and meetings for three hours each. In the courses, the main emphasis was on Frost’s program with its stimulation of linguistic, especially phonological, awareness. The transition from preschool to school was emphasized during the coursework. The teachers received information about different stages in reading and writing acquisition, ways to stimulate reading, and different methods for teaching reading. They were encouraged to be eclectic in their choice of teaching methods, that is, to use elements from various methods. Meetings and newsletters were used to inform the parents of the participating children about the project, as well as about language stimulation and reading development. Besides indirect influence from these sources, the Jåtten-project students received Frost’s program in kindergarten, the first cohort during the spring semester of 1993, and the second cohort during the following fall and spring.

When describing the results from this project, it is important to remember that no control group was involved and that the children were compared to a group from a different community. Before the intervention, the two cohorts were evaluated with nonstandardized assessment material (Ringeriksmaterialet), designed to evaluate
linguistic awareness by 16 different subtests, for example, rhyming, tapping syllables, and detecting phonemes in words, to name a few. The pre-intervention status of the group was similar to the scores of same-aged children from a different place in Norway (the Ringerike group) (see Table 2). No significance tests were run on the data because the researchers were assessing their population. In first and second grade, standardized reading tests were administered.

The participating children did not receive uniform treatment because some of the teachers were unable to participate in the meetings. Some of the children therefore had teachers who only attended one or two courses per year. Results for these children were not reported separately and could have inflated possible differences.

Table 2

*The Jätten Project: Comparing Means of Subtest Scores*

<table>
<thead>
<tr>
<th></th>
<th>Cohort I&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Cohort II&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Others&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>8.10</td>
<td>8.71</td>
<td>7.90</td>
</tr>
<tr>
<td>Grade 1</td>
<td>10.23</td>
<td>10.28</td>
<td>9.98</td>
</tr>
<tr>
<td>Grade 2</td>
<td>14.58</td>
<td>14.30</td>
<td>13.46</td>
</tr>
</tbody>
</table>

<sup>a</sup><sub>N = 128 in K, N = 155 in Grade 1, N = 166 in Grade 2</sub>

<sup>b</sup><sub>N = 126 in K, N = 161 in Grade 1, N = 142 in Grade 2</sub>

<sup>c</sup><sub>pretest: Ringeriksprosjektet, n = 260 - 270; Grades 1 and 2: the Norwegian standardization sample for Kartleggingsprovene</sub>

The means of the test scores for the groups were similar, and even though the scores of the groups used for comparison were somewhat lower, the pattern was the same
for the pretest and the later tests. Therefore, comparing means did not reveal any advantage to the Jåtten program. However, an interesting difference in the distribution of scores emerged. More Jåtten children completed the reading assignments in first and second grade without errors, and fewer obtained a score indicating being at risk, compared with the standardization group. The latter finding was most prominent in second grade, where only around 10% of the children in the Jåtten-group were at risk for reading difficulties, compared with approximately 20% in the standardization sample. At the end of first grade, approximately 25% of the students were considered to be at risk and in third grade approximately 17%. The Jåtten results have raised many questions worth studying with other groups. For Icelandic educators, it is important to know whether implementing Markviss málörvun in preschool contributes to better reading and reduces the need for special education.

It is important to know if teachers can prevent reading difficulties by working with children at risk before their formal reading instruction starts. Some findings related to this question have already been introduced. Using a phonological-awareness program as a preventive measure will also be discussed in the section on preventing reading difficulties.

For the last decade, Markviss málörvun (Helga Friðfinnsdóttir et al., 1988) has been used in many schools in Iceland. During the first years of the program, teachers adhered to the original idea of not linking the phonemes to graphemes. While this symbol-free emphasis is decreasing in popularity, at least some teachers do this kind of linking explicitly, for example, by writing the letters that represent the relevant
phonemes, having discovered that some students do not spontaneously link phonemes and graphemes (Frost, 1989; Sigrún Löve, personal communication, August 7, 1998, & May 2, 2003). Besides, research has indicated increased efficacy of phonemic-awareness training if the phonemes are explicitly associated with letters of the alphabet (Bryant & Bradley, 1985; Byrne et al., 1990; Ehri et al., 2001; Lundberg, 1994).

Teaching Reading

Reading and writing are considered important skills. Not mastering these skills is a major handicap in today’s world where a person is surrounded by an abundance of print and other visual media, such as newspapers, manuals, and computers. Icelandic law (Lög um grunnskóla, 1995) mandates schooling for every child between the ages of 6 and 16 years. In the schools, children born the same year are usually grouped together. The integration of all children is the idea behind the law. Sometimes, however, children with special needs are instructed in small groups or individually within or outside of the classroom, and occasionally in special classrooms or schools. The last option does not exist for disabled readers though. The principle of using the least restrictive environment for special needs students is valued, but various practical reasons occasionally require a more restrictive environment than needed. There are no strict requirements like test scores or other measures that determine eligibility for remedial reading. Funding is limited, however, and school authorities prioritize the most needy children.

The fundamental difference between the current emphasis on phonological awareness and traditional reading instruction methods is the former’s preventive and preparatory focus, an early intervention emphasis, and the assumption that there is a
connection between language skills and reading. Traditional reading instructors deal
directly with reading, encourage and teach reading by reading. According to the
phonological-awareness approach, reading is taught after the awareness training has
begun. What follows is a discussion of how reading is taught.

**Reading Instruction**

There are several approaches to the teaching of reading. In their book on teaching
reading, Høien and Lundberg (1989) described the teaching methods used in Norway.
These methods are very similar to those used in Iceland and elsewhere in the Western
world. The previously mentioned opposite ends of the spectrum on reading instruction,
that is, the bottom-up and top-down approaches to reading, are frequently encountered. In
instruction and reading programs. Two of these represent extreme bottom-up and top-
down approaches. The bottom-up approach represents the view that the one and only
thing to do when learning to read is to master letter-sound relationships. The top-down
approach represents the view that any well-written storybook “will, by itself, teach
children to read” (p. 178). The third simple approach was to buy a package from a
publisher who guarantees that everything needed for learning to read is included. Clay
criticized proponents of such extreme views for maintaining that learning to read is
simple. These three approaches contradict the eclectic approach emphasized, for
example, in the Jåtten project (Austad et al., 1996) and by Smith (1978), who wrote about
reading instruction two decades ago. He mentioned that adhering to some dogmatic belief
in a single type of reading instruction is not infrequent while every instruction method works, at least for some children.

For years, decoding methods have dominated reading instruction. Such methods are close to the bottom-up end of the dual-route approach. Phonics is usually emphasized, where the graphemes and phonemes are the most important units to learn. Students try, with help from their teachers, to figure out how the letters sound when isolated from the context of the adjacent letters, and they must learn all the letters in the alphabet. Ísak Jónsson (1946; Þórey Kolbeins, 2002) was the main proponent of the phonics method in Iceland, which for more than seven decades has been the dominant reading-instruction method introduced to prospective teachers. Teaching letter names, on the other hand, was the method most used at home to teach reading, and most probably the method used by Magnína when she taught Ólafur Káráson to read. However, Icelandic teachers sometimes experienced conflict between the letter-names method used at home and the phonics method used when children started school.

The bottom-up approach has characterized Icelandic basal readers and reading programs such as Barnagaman and Við lesum (Rannveig Löve & Þórein Sigurðsson, 1971; Rannveig Löve & Þorsteinn Sigurðsson, 1974; Björgvin Jósteinsson, Helga Magnúsdóttir, & Þóra Kristinsdóttir, 1979). In these programs, teachers were supposed to teach grapheme-phoneme relationships thoroughly. The text contained mostly the letters that had been introduced to the children so far. A little more advanced reading than was enabled by the few already-learned letters was facilitated by teaching some frequently used words as whole words, in somewhat of a top-down way. Accordingly, children
should be able to recognize these words in a textbook, without having to rely on phonological decoding.

Closer to the top-down end of the spectrum are methods referred to as the Language Experience Approach (LEA), and still closer are the Whole-Word or Look-and-Say methods. Such methods emphasize reading comprehension and are based on the children’s acquisition of a considerable number of words they have learned by sight. When the system gets too difficult, too many words to remember, the children are supposed to figure out how to break the alphabetic code, top-down style, and thus be able to read new words. An example of a Whole-Word method would be to have clearly written name tags on items in the classroom, for example *wall, desk, blackboard, and drawer*. There are various ways to implement such methods and different routes to the subsequent analysis of the phoneme-grapheme code of the words. Occasionally, the children are expected to discover the grapheme-phoneme connection on their own. Some Icelandic childcare centers (Icel.: leikskólar, Engl.: playschools) have name tags on various items, following the whole word ideology, and many encourage young children to recognize their own name by placing clearly written name tags on their lockers and drawers.

The LTG method (Läsning på Talets Grund; Engl.: Reading based on speech) (Leimar, 1974) has influenced many teachers in the Nordic countries for the last two decades. LTG teachers write what the children say. After having transcribed the children’s speech into a text, teachers and students read the text and work with it in various ways, like recognizing words, finding repeated words, and searching for similar
The basic assumption of LTG is that reading is a language process and that teaching reading should be based on the child’s language (Høien & Lundberg, 1989). LTG is therefore a language experience approach. The emphasis in LEA on each child’s sentences and paragraphs rather than on the smaller phoneme or syllable units depicts its top-down status.

When choosing a method for first grade students, Icelandic teachers have frequently been eclectic and used bits and pieces from different methods. By using one method, reading teachers might certainly be teaching an important component of reading. However, it is not certain whether any single method includes all the necessary components of reading instruction. And, as mentioned before, many children quite naturally become skilled readers without receiving flawless instruction.

**Reading Readiness**

Reading readiness and the less-specific school readiness were popular concepts during the sixties and seventies, and tests were used to measure children’s readiness. However, Clay (1991) cited the fallacy of assuming that reading will be learned when the child is ready. Schools in different countries start to teach reading at different ages: in Britain and New Zealand when children are five years old; in Iceland and the United States at six years, and in Sweden and Russia at seven years. If children have a common critical reading readiness period, this range of ages for beginning reading instruction does not make sense, and some nations might start children too early to obtain optimal results from the teaching of reading. If that is not the case, then other nations may postpone their reading instruction unnecessarily. Waiting for reading skills to surface, or for reading
readiness to occur, might also deprive some children of services they need in order to prepare them to learn to read (Clay). Reading readiness is no longer used in Iceland as a criterion for the start of reading instruction. Some remnants of this practice prevail, however, because in some Icelandic schools, there is a tendency to postpone remedial reading-intervention until the reader is in second or third grade. This tendency is a sharp contrast to the current early-intervention zeitgeist.

**Research on Reading Instruction**

In the sixties, the U.S. Office of Education initiated research on reading instruction in first grade. The purpose was to figure out which kind of instruction was effective, whether the methods interacted with children’s reading readiness, and which other factors were related to children’s reading and spelling achievement (Bond & Dykstra, 1967, as cited in Adams, 1994). This research showed an advantage to methods that included (a) systematic phonics, (b) the linking of reading and meaning, and (c) writing exercises. But it was found that regardless of type of instruction, some students excelled and others failed in acquiring reading skills in first grade. Some schools outperformed others without a discernible reason, or as Adams concluded, “The implication is that to improve reading achievement, we must improve both programs and classroom delivery. Each seemed to contribute separately and significantly to children’s progress” (p. 43), and “[t]here are enormous differences in the outcomes of any program depending on the particular schools, teachers, children, and implementation vagaries involved. Yet . . . there seems to be something about that broad class of instruction known as phonics that is of general, substantive, and lasting value” (p. 49).
Clay (1991) implied that there was a gap between research on reading and reading instruction. She took as an example people’s views on reading programs where children succeeded, and commented,

It is easy to conclude that our usual sequences of instruction are the necessary sequences, but are they? If children succeed in a program that is a demonstration of a satisfactory sequence; it does not prove that it is a necessary sequence. Theorists and researchers have proceeded in the last decade with too little attention to the role of instruction, and the distinction between usual sequences and necessary sequences for learning. (p. 17)

The importance of the component of systematic phonics in reading instruction has thus been empirically established. This component is included in many reading teachers’ syllabi. Whether the syllabi are optimal or only satisfactory is a difficult question, but the more a teacher knows about what works and what does not work, the closer to the optimal results he or she gets. The most important difference between the concepts of reading readiness and phonological awareness is the specificity of the latter. Components of phonological awareness have been described. Knowing these components constantly provides an active and answerable question: How can this child’s phonological awareness be increased? No teacher waits for phonological awareness to surface. But more research is needed to establish whether every phonological-awareness task the teacher gives to the children is necessary and appropriately timed. It has been established that phonemic awareness tasks are important, especially if tangible or visible letters are used too (Ehri et al., 2001). Such tasks are sometimes close to tasks provided by a traditional phonics
teacher. Perhaps, as implied by Clay (1991) and Ehri et al. (2001), there is a gap between theory and application. Thus, bridging the gap could help the novice reader and the reading instructor.

In spite of flourishing methods and fresh research, some schoolchildren in each grade do not read as well as their classmates and might also need this bridge. These children have inspired the discussion in the following section.

**Reading Difficulties**

**The Concept**

Implicit in teaching students to read is the goal of preventing or at least remedying reading difficulties. The purpose of the study here was to test if the phonological-awareness training in Markviss málörvun serves the needs of prospective readers in Iceland. Therefore, students with reading difficulties form an important part of the picture. Who they are is not clear, though. All classification systems or cut-off points between reading-disabled individuals and nondisabled readers are arbitrary because reading skills are assumed to be on a continuum from lowest to highest. Cut-off points will therefore always be in the middle of a gray area containing the marginally reading-challenged (e.g., Fletcher et al., 2002).

Reading fluency is distributed within the population; some are fluent readers, others are not. The distribution of many human characteristics, for example height and weight, follows a certain pattern called the normal curve. The normal curve shows that most people are close to the mean; the further they get away from the mean, the fewer
individuals are similar to them in that specific trait. A yardstick for measuring the distance from the mean further characterizes this distribution. The units on the yardstick are the standard deviations (SD). Most people, or approximately two thirds, are considered to be within one SD from the mean on any particular normally distributed trait. This group is often referred to as average. Once people are more than one SD from the mean, either up or down, they start deviating, that is, belonging to a group that contains fewer individuals. If the trait of body weight were being measured and a person’s height was 1.80 m (~6 ft), then deviating in weight more than one SD from the mean would put this person into one of two possible groups. Either he or she would be in the group of the heaviest, 1.80 m tall people, or in the equally large\(^3\) group of the most lightweight at 1.80 m tall.

Reading skills are supposed to be distributed in a similar way, at least approximately. Some people are extremely skilled readers, most are average, and others struggle when confronted with print. The question as to whether dyslexic readers are fundamentally different from other readers has been an issue in dyslexia research. The focus of such research has been to find out if dyslexic individuals use different strategies from other readers, or whether the reading skills of the former just increase unusually slowly, indicating a developmental lag but qualitative reading development similar to normal reading acquisition (Lundberg & Høien, 1990). Testing the developmental-lag hypothesis (DLH) is methodologically difficult because comparing beginning readers and older dyslectic students provides many alternative explanations of similarities and

\(^3\) Approximately 16\% of all 1.80 m tall individuals.
differences in reading skills (Stanovich, 1988). In reading research, there is a decreasing emphasis on discriminating between developmental lag and qualitative differences, mainly because no established findings provide arguments for the existence of qualitatively different subgroups of children with reading difficulties (e.g., Fletcher et al., 2002; Lundberg & Høien). Researchers have not managed to find a group of children with poor reading skills caused by a developmental lag and another group of children with poor reading skills caused by some qualitative differences between them and other children. Finding subgroups of poor readers will be addressed in the following section on discrepancy definitions. The phonological-awareness emphasis in reading research decreases the importance of finding qualitatively different readers, because poor readers are hypothesized to have reduced phonological-awareness skills in common.

**Discrepancy Definitions: Pros and Cons**

There have been problems with the lowest-on-the-normal-curve definition of reading difficulties. Sometimes more individuals have been found at that end than the normal curve would predict. If theories on specific reading difficulties, or dyslexia, were true, an accrual of low reading skills near the low or leftmost end of the normal curve might be expected (e.g., Pind, 1997). Rutter and Yule (1975) reported such findings from their Isle of Wight and inner London longitudinal research. Tentatively they concluded that the accrual, or the hump, might consist of two groups, one having a specific reading retardation and the other having a general backwardness in reading.

The group with the specific reading difficulties was hypothesized to have a significant discrepancy between IQ and reading, while the general-backwardness group
was assumed to consist of slow learners, that is, generally low-functioning students. IQ would then be considered an indicator of reading potential. Usually a global measure of IQ is used, that is, both verbal and nonverbal skills are evaluated. Because reading might affect verbal skills, for example vocabulary, it is sometimes considered fairer to assess the nonverbal skills when looking for the discrepancy. Consequently, people with specific reading disabilities have sometimes been called underachievers in reading because of the discrepancy between reading skills and the hypothesized potential for reading.

The idea that some people should be able to learn to read, but cannot, has face validity, that is, it seems to make sense. Such individuals might, for example, be quite good in math, but reading would be a constant challenge for them. As mentioned earlier, there are established findings of a correlation between reading skills and IQ. This correlation, the face validity, and Rutter and Yule’s (1975) research seem to be the foundation for the discrepancy definitions of reading disabilities.

The hump at the bottom of the normal curve of reading skills has not always been replicated, and other researchers have found a soft continuity downwards on the curve (e.g., Fletcher et al., 1994). It is also a possibility that the hump in the curve has been a consequence of vague operational definitions and measures.

Differences between the reading of low-achieving readers with or without a discrepancy status have not been documented. Regardless of IQ, disabled readers score lower than normal readers on reading tasks (Fletcher et al., 1994; Siegel, 1991; Stevenson, 1988).
It is important to keep in mind that Rutter and Yule’s grouping of people with low reading skills was a hypothesis they started to test (Stanovich & Siegel, 1994). Before the discrepancy hypothesis was studied in depth, however, other researchers and clinicians assumed the existence of this grouping; thus, discrepancy scores have been widely used to determine eligibility for reading intervention (e.g., U.S. Office of Education, 1977).

Stevenson (1988) also found a hump on the reading curve. He nevertheless concluded that this was no argument for the existence of a specific reading disability and was of no importance in the debate about reading difficulties. Siegel (1991) brought forward strong arguments, some already mentioned, against the discrepancy definition of reading disabilities. She pointed out that intelligence tests do not measure reading potential, the measure is never exact, and IQ does not set limits to reading. There have been children with low IQs and reading skills well above what an intelligence test might predict. When assessing how much of the distribution of reading skills could be explained by IQ, Siegel entered phonological-processing skills into the equation. She found the phonological skills to almost erase the independent contribution of IQ, approximately reducing the variance explained by IQ from 20% to 2%.

For diagnosing reading disabilities, Siegel (1991) therefore recommended a test of reading achievement. A child who scored below a certain point would then be considered reading disabled. Some of them might have problems with other studies as well. Children with severe emotional problems, neurological deficits, inadequate educational opportunity, and insufficient knowledge of the language would not meet the classification criteria.
Defining children as reading disabled only when deviating from the average for their age has a potential weakness. Berninger and Abbott (1994), in their summary of different methods employed to diagnose learning disabilities, mentioned the risk of not serving children who have superior intelligence but who are unable to achieve above the mean in their class. The foundation for this argument is the discrepancy definition, which provides a school psychologist with a dilemma when recommending which students’ needs should be met. If a student with average reading skills and superior IQ and math skills is evaluated by a school psychologist, would the latter recommend specific reading instruction? Sternberg and Grigorenko (2002) proposed a solution to this problem, commenting, “. . . but so what? This is not an individual in whom one would want to invest any of society’s resources so as to bring his or her reading up to the level of his or her other abilities” (p. 74). They criticized the usage of cut-off points for determining eligibility for special reading interventions, especially if eligibility criteria are based on difference scores, here the difference between IQ and reading, because difference scores are more unreliable than the scores for the underlying variables. Besides, people do not agree on what intelligence is, and intelligence tests only measure a limited part of intelligence. Why that particular part should have more to do with reading skills than, for example unmeasured intelligence, remains to be seen. As long as children who lack reading skills do not get help because they fail to meet discrepancy criteria, the general view seems to be that spending expensive time on average readers seems a waste of money.
Genetic markers for a discrepancy-defined reading disabled group have not been found, as mentioned earlier (Grigorenko et al., 1997). This lack of findings cannot be considered an anti-discrepancy argument though because genetic researchers cannot yet answer an open-ended research question regarding whether a condition is genetically marked. In genetic research, the search has to be limited to a theoretically sensible part of human genes (e.g., Jón Sigmundsson, 2002). The lack of specific reading characteristics of discrepancy-defined groups also raises questions regarding the benefits of looking for such genetic markers.

**The Phonological-Core Model**

Other models of reading difficulties have been described. One such model is the phonological-core variable-difference model (Stanovich & Siegel, 1994). As in theories and models of reading, phonological processing has been important in many of these models. Such models provide an alternative to the discrepancy model. The phonological-core variable-difference model presupposes that all children with reading disability have low phonological-processing skills, that is, a weak phonological core. The variable-difference refers to the fact that other skills vary from being unusually high to extremely low, as in the population at large. These varied skills may affect reading acquisition in various ways. The variable-difference dimension can be clarified by an example. Imagine a slow reader, Adam, with reading skills commensurate with his other skills and another slow reader, Audrey, with a large discrepancy between her low reading skills and other skills, for example her performance IQ and math skills being high average. Adam and Audrey have similar phonological difficulties, that is, a defective phonological core, but
Audrey is more skillful in compensating for her reading difficulties. One example of a variable difference might be the variable *job*. Adam and Audrey get different jobs. She might opt for a job with more reading requirements than Adam would consider, challenging Audrey to improve her reading skill, a pressure Adam might not encounter.

In a study of phonological processing, Lundberg (1982) found reading disabled students in second grade to have more problems than other students with assignments requiring deliberate segmentation of phonemic units. This and other findings support the previously mentioned importance of phonemic skills. Exactly which skills are confined within the phonological core remain to be mapped, for example, whether the core is essentially a *phonemic core*, if such a core exists.

The phonological-core model creates a problem for the dual-route model of reading, that is, the model where reading is described by the separate lexical and non-lexical routes. The *paradoxical regularity effect* (Stanovich & Siegel, 1994) is unexplainable by the dual-route model. This effect has been displayed by children having deficient nonword processing and relative orthographic strengths. They seemed to have a relatively strong visual-orthographic route compared to their deficient phonological route. According to the dual-route theory, these children should tend to not read irregular words phonetically correct. But, Stanovich and Siegel reported that “several studies have failed to find this expected data pattern” (p. 45). A possible explanation, along the lines of the phonological-core - variable-difference model, is that students lacking the phonological core find alternative ways to recognize words. For some children, that would be the visual-orthographic route. Young disabled readers with less experience and fewer
encounters with words might simply guess. Different ways of tackling irregular words could therefore be expected.

**Failure to Respond to Treatment**

It is worth considering Bronfenbrenner’s point (as cited in Berninger, 1994) that causality is not necessarily explained by identifying etiology. The phonological-core-variable-difference model and the discrepancy model of reading difficulties are etiological in the sense that they describe the nature of the problem. According to Bronfenbrenner, one must show that one can change a process before one can claim that an understanding of the process has been obtained.

Influenced by Bronfenbrenner, some scientists maintain that the outcome of intervention or instruction is what is most important in dyslexia research, and therefore, that reading researchers should study why remedial reading sometimes works and sometimes does not. This failure-to-respond-to-treatment approach provides a new definition of reading disabilities (Berninger, 1994; Berninger & Abbott, 1994; Galaburda, 1991b; Vellutino, 1979).

Such a definition seems practical in the schools because it includes an evaluation of when and where to apply various intervention procedures. A failure-to-respond-to-treatment definition also might contribute to the discovery of basic information regarding why some students do not acquire reading skills despite optimal instruction. Other definitions of reading disabilities do not separate constitutional and experiential deficits. If a student shows discrepancy between IQ and reading, or displays low reading skills compared to other children, a set of equally valid explanations for the reading difficulties
might be found. It is possible that the student lacks the skills to learn to read, or may have experienced instructional methods that do not match his or her skills. The student might just as well have received too few reading lessons. Still more explanations might be found.

Researchers have found that elementary school teachers and special education teachers cannot automatically be assumed to possess qualifications to deal efficiently with reading instruction. Additionally, it is important to take into account variables intrinsic to the individual reader as well as extrinsic variables (Hooper et al., 1994; Berninger & Abbott, 1994).

An observation from the field might better exemplify the failure-to-respond-to-treatment definition. Sigrún Löve (personal communication, August 7, 1998), a special education teacher in Iceland, has used the phonological-awareness program Markviss málörvun as a reading intervention. In the beginning of second grade, she identifies the students who have not acquired any reading skills after the reading instruction in first grade. She then takes them as a group into a separate classroom, uses various games from the program, mainly phoneme analysis and synthesis, and links them to the teaching of the graphemes. An example of a synthesis game is her practice of giving the students a code to solve before they leave her class. She pronounces some isolated phonemes, and the students have to say the word before being allowed to exit. The number of pulled-out, second grade students varies from year to year but is roughly 4 - 14, out of a total of 50 - 60 (7% - 28%). The duration of the program is four classroom periods a week for the first three or four months of the school year. Before Sigrún starts the intervention, she
registers which letters are known by the students and divides the remaining ones into “packages” of four or five letters. After finishing each package, the students take a test to check if they have learned the letters.

After completion of the program, Sigrún noticed that very few remaining students had not started to read. It is likely that those remaining students needed to be considered reading disabled, according to the failure-to-respond diagnosis. Sigrún’s intervention is not commonly used in Icelandic schools, but in her school, it seems to be an important safety net and addresses most students’ need to learn to read before their reading problems inhibit their achievement in other subjects. Her intervention program lends itself to interesting intervention and prevention studies not yet conducted.

The efficacy of an intervention contributes to the number of reading disabled students and the cut-off point for reading difficulties. The persistence of reading difficulties over time might indicate that children who qualify as poor readers in both second and, for instance, fifth grade would be considered as having a reading disability (e.g., Shaywitz, Escobar, Shaywitz, Fletcher, & Makuch, 1992). This definition of reading disabilities is perhaps more practical than other definitions when evaluating the prevalence of reading disabilities. It might involve counting children in fifth grade who score low on reading tests, and looking at their second grade reading status. But delaying this observation for four years should not be an option for any school. Because there is a link between the prevalence of reading difficulties and the quality and timing of the instruction and interventions, it is important to know how effective the instruction and interventions are.
Some stability, but also variability, in reading difficulties has been found, as has already been mentioned. An additional research example of this type is Juel’s (1988) longitudinal study, where she followed children from first through fourth grade. The poor readers tended to fall into a vicious cycle of not being able to read, not liking to read, not getting enough practice, and not acquiring fluent word recognition. When Juel looked at the number of read words in the children’s basal-readers at the end of fourth grade, the poor readers had, on average, read fewer than half the words the skilled readers had read. Almost 90% of the poor readers in first grade were still poor readers in fourth grade, and most of them lacked both decoding skills and reading comprehension. These figures indicate more stability than was documented in the previously mentioned research of Magnusson and Nauclér (1991).

The stability of reading difficulties has been a challenge for teachers and researchers. The question as to whether or not reading difficulties can be prevented or ameliorated is therefore justifiable.

**Preventing Reading Difficulties**

The remedy for dyslexia according to Vellutino (1987) is reading instruction. Traditionally, teachers have tried to find ways to encourage reading-disabled students’ reading. These students have frequently been caught in the vicious cycle mentioned above, of not wanting to do what they are not good at, thus reducing the training. The issue of working with reading and phonological awareness when reading is difficult will now be discussed together with pro-active or preventive interventions that use phonological-awareness training.
By following children through kindergarten and first grade, Blachman (1994) compared a phonological-awareness intervention and a traditional reading program. Her intervention included the linking of phonemes to graphemes (sound-letter training), phonological analysis and synthesis, reading, and writing dictated words. At the end of first grade, the treatment group outperformed the control group on various measures of phonological skills, reading, and spelling. The children in the treatment group were less often recommended for retention or remedial reading. Similar results were found earlier by Lundberg, Frost, and Petersen (1988), who concluded that training in phonological awareness improved later reading skills.

In Bryant and Bradley’s (1985) experiment, six-year-old children were assigned to one of four groups and received 40 sessions of instruction spread over two years. One group was taught about rhyme and alliteration. An example of a rhyme task was to sort pictures that had all but the initial phonemes in common (e.g., bat, mat, hat, rat). In an alliteration task, they should find words that shared the initial phoneme (e.g., sun, sit). Another group sorted the pictures in the same way as the first group, but now plastic letters represented the phonemes. The third group, a placebo control group, sorted the same pictures for an equally long time into groups of animals, food, furniture, and so on, that is, according to the represented concept. A second control group, without any kind of intervention, was included too. When the groups’ reading was assessed two years later, the group that received the phonological instruction, supported by the use of plastic graphemes, contained the best readers. As mentioned earlier, these results indicated that
linking phonemes and graphemes was more important for later reading proficiency than training purely phonological skills.

The students in Magnusson and Naucler’s (1991) research, who were poor readers in first grade and remained poor readers in fourth grade, had received more remedial reading instruction than the students who improved their reading. Two contradictory conclusions could be drawn here: either that remedial reading did not do any good, or that only readers with the poorest reading skills and the worst prognoses received remedial reading. Therefore, it is important to evaluate how effective an intervention is.

When evaluating the outcome of an intervention, there seems to be a difference, depending on the type of instruction a reading disabled student gets, his or her reading skills, and the definition of the reading disability. Swanson and Hoskyn (1999) analyzed various intervention studies and classified them into the following four categories. Direct instruction (DI) contained fast-paced, well sequenced, highly focused lessons delivered in small groups where the students had ample opportunity to respond and get feedback, and where the teacher presented the new material. Strategy instruction (SI) contained elaborate explanations, reminders to use certain strategies, step-by-step prompts, teacher-student dialogues, and only necessary teacher assistance. Besides classifying studies as pure DIs or SIs, a combined DI + SI category, and a nonDI + nonSI category were used. The combined model, DI + SI, yielded the largest effect sizes, supporting the importance of teaching both the content and the application of new material. The concept effect size indicates that differences between groups are computed in standard scores, enabling comparison of obtained differences in various studies.
When Swanson and Hoskyn (1999) looked at the definition of reading disabilities, they found the largest effect sizes for the interventions where IQ and reading scores were between 84 and 91, and not significantly discrepant. It is not obvious, however, if the progress depended upon the definition of reading disability. Reading scores in the 84 - 91 range were within one $SD$ below the mean, and could thereby be described as low average scores. Therefore, they did not have to increase much to be considered average, rendering it easier for these students to increase their reading skills than for students with reading scores that deviated further from the average.

Ehri et al. (2001) concluded in their meta-analysis that phonemic skills increase reading skills. This applied not only to children with reading skills in the average range but also to children who were considered to be at risk for reading difficulties and children with reading problems. Phonemic-awareness skills increased reading skills of preschool children at risk more than they increased disabled readers’ reading skills. Because the disabled readers were older, the researchers suggested that they might have been closer to maximizing their phonemic-awareness skills, leaving less room for improvement. Therefore, the findings did not clearly support the notion that prevention is more effective than intervention or that early, rather than late, intervention is preferred. But obviously, preschool children have more latitude than older children for increasing their phonemic-awareness skills.

Good and Kaminski (1996) wondered if students lacking early literacy skills could be detected and treated by using an appropriate instructional intervention before reading difficulties emerged. By doing so, their difficulties could hopefully be prevented.
For this purpose, Good and Kaminski set up a problem-solving model. This was a quality management model, which contained the following steps: identification of the problem, problem validation, exploration, and evaluation of solutions. Phonetic awareness was the basic skill. In a kindergarten class, they identified a child with little phonetic awareness, that is, the child could not find the initial sounds in various words. This child was their case-study participant and received instruction in phonological-awareness skills. In first grade, the student was “in the upper 25% of his class” (p. 335) in reading. Good and Kaminski emphasized the link between research and practice. They maintained that, even though interventions have been found to be effective for groups of students, one never knows whether that applies to a particular student. Knowing that the method works for the individual student must be critical for a school psychologist. Good and Kaminski’s model includes progress monitoring so that if progress is lacking, the applied intervention is discontinued. They mentioned two sources of expectations for student performance when evaluating the need for intervention. These two sources are a local-normative context and performance standards, that is, what is needed to succeed in reading. The disadvantage is that the performance standards are, as Good and Kaminski called them, “guesstimates” (p. 330). This raises the question as to whether educators are getting closer to knowing what is needed, with the help of phonological or phonemic research. Problems with phonological research will be dealt with in the next section.
Research Problems

Problems When Evaluating Phonological Awareness

As already implied, reading researchers need to possess a versatile literacy in different research traditions, besides being aware of potential gaps and lack of communication between disciplines. Various methodological traps have to be avoided, but the effort seems to be worthwhile. At least in research on phonemic-awareness instruction, stronger research designs, when compared to weaker ones, have been found to “stand a better chance of obtaining sizeable effects” (Ehri et al., 2001).

When studying phonological-awareness interventions and reading, these variables can be hard to operationalize (Wagner & Torgesen, 1987). Not only is it difficult to determine what phonological awareness consists of, but the manipulation of the variable is not easy either. Is it, for example, possible to teach phonological awareness in a limited time to one group but not to the other? Ehri et al. (2001) found that the length of phonemic instruction for nondisabled readers did not affect reading and spelling results, indicating that large doses (e.g., 20 hours or more) of phonemic awareness training are not better than shorter instruction time. Readers with the poorest skills tend to get the longest intervention or instruction time. This contamination of poor reading skills and instruction time demands caution when reporting results for a combined group of skilled and poor readers.

Because phonological awareness is frequently considered to be, first, an important preparatory skill for reading; second, a skill that can be encouraged and taught to prevent reading difficulties, and third, an effective inspiration for reading instructors, it is highly
important to map the causal relationship between phonological awareness and reading. It was for this important reason that Ehri et al. (2001) evaluated only experimental studies in their analysis of phonemic awareness. An experimental study is the only research design that provides the possibility for drawing a causal conclusion because the researcher compares equivalent groups, where one group receives the intervention and the other does not. If the groups are not equivalent after the intervention—for example, if one group reads better, it should be safe to conclude that the intervention is the culprit, because the groups were equal in every other way.

Before looking at problems with the experimental research design, one should realize that the causal relationship between phonological awareness and reading has been concluded from nonexperimental research designs. Here, Wagner and Torgesen (1987) described two frequently used designs: longitudinal studies and cross-sectional studies of people with reading difficulties. In both designs, it is difficult to determine the direction of causality; the results are indicated by correlation of the variables. Even though strong correlation is found and, as in longitudinal research, one variable emerges before another does, the variables are not necessarily in a cause-and-effect relationship, and thus may be correlated because of their association with a third variable. A potential candidate here could be IQ.

Problems with the experimental design have been encountered too. In his critical review of experimental methodology in phonological-awareness intervention, Troia (1999) reviewed almost 40 studies conducted between 1974 and 1996. He found various methodological flaws that limited the applicability of obtained results. Those flaws are
similar to the methodological problems encountered when studying other types of intervention (e.g., Bickman, 1996). Evaluating and comparing interventions, for example the results of a therapy, has been a methodological challenge throughout the twentieth century (e.g., Kazdin, 1992; Stiles, Shapiro, & Elliot, 1986).

One of the flaws Troia (1999) mentioned was in not ensuring the equality of the compared groups. Random assignment of participants to groups is theoretically the best way to obtain maximum equivalence of two or more groups. In schools and other institutions where phonological awareness can be taught, groups are often already intact and inseparable when the researchers appear. Then their only option is to use a quasi-experimental design that differs from an experimental design by not randomly allocating participants to groups. Instead intact groups such as preschool classes are compared. If the groups are not equivalent in the beginning, differences caused by the intervention and differences caused by previously existing inequalities cannot be easily separated. Previous reading skills might, for example, be an influential variable. Controlling for such skills might be a necessary precaution when studying how phonological skills and reading are associated. Randomly assigning children to groups should give the best control. However, when small groups are examined, individual differences can skew the balance. Matching children on reading will provide groups with equal distribution of reading skills, but by such manipulation, other important variables might become biased.

Another important part of an experimental design is the random allocation of intervention to groups, where all groups have an equal chance of receiving the intervention. This can be done with intact groups. Sometimes the researcher consciously
chooses one group as an intervention group, increasing the number of potential
explanations of later differences. If the compared groups additionally come from different
schools, confounding of intervention with schools takes place, still increasing the number
of alternative explanations. The lack of random allocation of participants and treatments
might either artificially increase the difference between compared groups or render it
invisible, as in cases where the pre-intervention differences favor the comparison group.

The frequently encountered random allocation problem in experimental studies is
not the design’s only weakness. Not controlling for the Hawthorne effect was a frequent
flaw found in more than half of the studies that Troia (1999) reviewed. The Hawthorne
effect refers to differences elicited by the novelty of any intervention. If a comparison
group does not receive placebo treatment, preferably using the same material as the
experimental group, the novelty rather than the nature of the experimental group’s
program or training material might explain a post-intervention difference between the
groups. Reducing a possible Hawthorne effect has for years been considered important, at
least in psychological and medical research. In that regard, Ehri et al. (2001) reported an
interesting finding. When comparing studies in which placebo-control groups were used,
with studies in which the comparison groups received no special treatment, the effect
sizes for the placebo design were often smaller or not significant. This applied to studies
where phonemic-awareness skills were hypothesized to predict reading and later
development of phonemic-awareness skills. The results of these studies replicated earlier
results obtained by Bus and van IJzendoorn (1999). These findings challenge researchers
to study whether the Hawthorne effect is an irrational belief or a reality.
A third flaw encountered by Troia (1999) was the lack of fidelity checks. Checking the fidelity of the intervention refers to examining whether the treatment is correctly implemented, that is, whether the treatment protocol or script is conscientiously adhered to. If the treatment is not correctly implemented, the results might easily reflect something different from what should have been studied according to the original hypothesis. Surprisingly, Ehri et al. (2001) found effect sizes to be smaller in studies where fidelity checks were used than in studies with no fidelity checks. Other variables might, however, have influenced the results, underplaying any conclusions regarding the importance of fidelity checks.

The measurements of the variables provided the fourth flaw. This issue was at least threefold. First, poor measurement sensitivity was common, mainly related to obtained floor and ceiling effects of the measures (McGuinness et al., 1995; Troia, 1999). Floor effect means that only a few participants complete more than very few, if any, items on a test. The concept of ceiling effect refers to situations where almost everyone completes everything. Both extremes of the difficulty level of a test reduce the sensitivity of the test and disable a fine-grained analysis of individual differences. Second, not reporting internal reliability of other measures of the dependent variables was common, making it “impossible to determine if measurement error has yielded spurious findings“ (Troia, p. 45). The third issue was that effect sizes were seldom reported, making a quick comparison between studies difficult.

Measuring pure phonological skills can be tricky. The sound categorization task, where the participants are supposed to pick a word that does not share phonemes with
other dictated words, might tap working memory skills in addition to phonological awareness. The words have to be kept in working memory while searching for the odd one (Wagner & Torgesen, 1987). On the other hand, this combined working-memory capacity and analyzing of phonemes could be closer than pure phonological awareness to the actual skills used when reading.

In efficacy research projects, the interventions tested not only have to be correctly implemented, correctly evaluated, and correctly compared, but they also have to be effective. It does not make sense to figure out which of two toothpaste types, A or B, tastes better, if A and B have no flavor!

Evaluating advantages and disadvantages of every action is important before designing an instructional research. Escaping every possible flaw is frequently an unrealistic goal, however.

**Validity and Power**

There might be a real difference between the groups, which the study does not detect, or a Type II error. Regarding this, Bickman (1996) delineated four types of validity that are involved when real differences are not found: statistical validity, internal validity, construct validity, and external validity. **Statistical validity** refers to the research not having enough power to detect the difference. When defining power, Judd and McClelland (1989) used the analogy of a game with Nature. It is Nature that decides how things are, for example whether a certain intervention works or not. The researcher’s role in the game is to figure out, on the basis of obtained data, what Nature has decided. If the intervention works but the researcher cannot reach a conclusion, the research methods are
not powerful enough, and a Type II error occurs. Determining which influential variables to consider, improving the quality of measures, and increasing the number of participants are examples of how the researcher might increase the power of a study.

A threat to internal validity might be the inability, as mentioned above, to initially have two or more equivalent groups. Thus, results for the hypothesis being tested would not be obtained. Regarding construct validity, various threats need to be considered. Construct validity refers to what “the conceptual basis (construct) underlying the effect” is (Kazdin, 1992, p. 15). When finding that an intervention works, obtaining construct validity involves considering which aspect or aspects of the intervention caused the obtained effect. Therefore, instead of comparing whole packages of interventions, for example language-experience versus phonetics, better construct validity might be obtained by dividing one type of intervention into subcomponents and studying which of the subcomponents work and which subcomponents might be skipped. In Magnusson and Nauclér’s (1991) longitudinal research mentioned earlier, the teaching methods—either the phonics or language experience approach—did not predict which children became poor readers and which became good readers. This is one research example where the lack of findings might have been caused by a lack of studying subcomponents. The researchers are not to be blamed, however, for this lack of findings on methods use because evaluating reading instruction methods was not their purpose. The conclusion mentioned above, that every instruction method works for some children (e.g., Smith, 1978), seems to be the result of the methodological weakness of comparing whole packages instead of subcomponents. This conclusion has also been used as a rationale for
accepting eclectic reading instruction, which might make sense until research has established what works and what does not. It is also important to ascertain that the instruments measure the construct of interest.

*External validity* refers to the practical question of whether the researcher can generalize obtained results to people who were not subjects in the research. Random sampling from a large, heterogeneous population may be necessary to obtain external validity. It is important to look out for differences between the participants and other people, detect differences, and evaluate whether the similarities justify the conclusion that the specific intervention, which has influenced the experimental group, would work for people in general.

**Research Problems with Student Profiles**

Five years ago, the researchers Sternberg and Grigorenko (1997) discussed the concept of cognitive styles. This concept refers to individual differences in information processing, that is, when different readers use different methods or styles for reading the same material. As in other reading research, the understanding, prediction, and improvement of educational achievement are the main reasons for studying cognitive styles. Earlier, student profiles, that is, intra-individual strengths and weaknesses, were similarly considered and abandoned because research did not support the underlying hypotheses. In the more recent cognitive-styles research, basic methodological criteria have not always been met, according to Sternberg and Grigorenko. Sometimes, theoretical specifications were not clear, underlying structures not always demonstrated, and convergent and discriminant correlation coefficients not always found. Besides, it was often problematic
to develop further research questions and practical application from the research. For example, when assessing students’ cognitive styles from the students’ and the teachers’ points of view, students were found to match their teachers’ styles. If the students matched their teacher’s style, the teachers assessed the students in a more positive way.

Earlier research on cognitive styles in the schools produced seemingly contradictory results. When computing the correlation between academic achievement and cognitive styles, the range of coefficients across school settings extended from a medium negative correlation to a medium or high positive correlation. The explanation for this discrepancy was the fact that what is “valued in one environment may actually be devalued in another” (Sternberg & Grigorenko, p. 709). They proposed a fresh model for approaching the cognitive-styles research, namely, the mental self-government approach, where everybody was assumed to possess every style to some degree, while some styles were more preferred than others, being affected by the assignments or situations people were dealing with.

The earlier mentioned dual-route theory lends itself to testing a learning-styles hypothesis, where some students might be nonlexical readers and others lexical. Support for this hypothesis would probably be difficult to find because most readers use both routes, both styles. Such findings are in harmony with the mental self-government approach, however.

Additionally, Sternberg and Grigorenko (1997) drew an analogy between the cognitive style research in psychology and the changing fashion of wearing wide ties.
Sometimes, it has been in to wear a wide tie, but fashions come and go. Similarly, in psychology, studying cognitive styles has been out of fashion for a while.

To form subgroups of beginning readers, for example preschool students, based on cognitive styles, might therefore be irrelevant; at least more, well-documented knowledge in this regard is needed. On the other hand, grouping nonreaders and beginning readers according to their phonological-awareness abilities, and teaching them accordingly, has a research base. In light of earlier research on the hierarchical order of phonological abilities, a cohort of preschool children can be classified into ability groups. Having a certain level of phonological sensitivity but no conscious phoneme awareness would be present in a group of children with the lowest phonological-awareness skills. These children might be able to rhyme short words and possibly clap the rhythm of some words, that is, analyze two or three syllables, but not able to synthesize phonemes. The second group might be able to rhyme, clap most words by syllables, understand the idea of synthesizing phonemes, and even synthesize short words, when hearing their phonemes. The group with the highest phonological-awareness abilities would be able to synthesize many words from phonemes, besides competently using the other phonological-awareness skills. This third group most likely would contain the readers in the cohort.

*Other Variables Affecting Reading Skills*

Many variables influence whether a reading intervention is effective. These variables are often nonacademic and marginally related to reading. Some variables are common-sense notions and have been studied, while others have been accidentally discovered. It is
important to study which variables contribute to academic failures and successes. Anderson and Keith (1997) proposed and studied a model of academic success for high school students at risk. The model included the following components or effector variables on academic achievement: the socioeconomic status of the family, parental involvement, ethnicity, student ability, motivation, gender, academic coursework, and quality of schooling. All these variables except parental involvement were found to be important predictors for academic achievement of the students. Of these components, student ability was the strongest predictor and influenced the quality of their schooling, motivation, and academic coursework. Regarding academic work, the more courses the at-risk high school student completed, the better was their academic achievement.

An interaction might also occur between variables, for example, between biological endowment and various social and environmental factors (Shaywitz et al., 1995). Many families that contain biologically skilled readers provide a clear example here, because they tend to live where there are better preschools and schools, and support their children’s reading activities.

Teachers are also influential and provide one example of the quality of schooling. Teachers in high achieving classrooms in the Bornholmprojekt seemed to give their students clearer messages, such as setting clearer limits for their behavior and giving clearer homework instructions (Petersen, 1989). In this project, experienced teachers showed more flexibility regarding the subject, knew more about their students’ background, were more relaxed towards a high distribution of reading skills in their classrooms, and felt more competent when cooperating with parents.
Gender is a potential effector variable too, which is sometimes reflected in teacher bias towards students with low reading skills. A disproportionate referral of boys and girls to remedial reading services has been found; when looking at students with similar reading skills, more boys than girls receive reading intervention (Guðrún Bjarnadóttir, 1994; Shaywitz, Shaywitz, Fletcher, & Escobar, 1990). Gender, however, is not the only kind of referral discrimination. It has been found that younger students in a classroom, Caucasian students, and students with above average height and weight have been referred to a psychological evaluation of eligibility for a learning disabilities program more often than other students (Wisniewski, Andrews, & Mulick, 1995). Definitions of reading disability do not, typically, contain nonacademic variables. However, such variables might occur as exclusionary criteria, thus preventing a child from being diagnosed with reading difficulties.

While socio-economic status (SES) can also influence reading skills, SES is a sensitive subject in Iceland. Therefore, in this research, ways to evaluate SES were originally considered, but abandoned. Obtaining a comparable evaluation for Iceland and the U.S. based on SES would be very difficult as well, if not impossible. Iceland is a Scandinavian-like welfare state where everybody should get various medical and social services when needed. This means that being poor in the U.S. does not mean the same as being poor in Iceland. Until very recently, the belief prevailed that everybody is socially equal in Iceland. A recent report on changes in the socio-economic pattern of inhabitants in Reykjavík revealed differences between people in some parts of the town (Ragna B. Garðarsdóttir, Jóhanna Andrésdóttir, & Friðrik H. Jónsson, 2002). The report was a
sensation because it contradicted the accepted assumption about equality. In areas around the University of Iceland (the city center included) there were more people with university degrees and fewer children per family than elsewhere in Reykjavík. Most children per family were in the most recently constructed areas, where the per capita income was highest. The part of town containing the preschools participating in this study had an intermediate socio-economic status.

In Reykjavík, more than 90% of 3 - 5 year old children attend daycare centers and preschools (Ársskýrsla [Annual report], 2001), even though the attendance is not obligatory. This situation enables generalization of the results obtained in Reykjavík’s childcare centers to children in Reykjavík. No obvious differences between the two preschools were detected, and the teachers and the administrators did not know any differences that might influence the results.

**Research Questions**

In light of this introduction, evidence regarding the following questions was sought:

1. Did five-year-old Icelandic children who had 19 weeks of phonological-awareness training (Markviss málörvun) have different phonological-awareness and reading scores from children who did not get the training?

2. Did children receiving the phonological-awareness training (MM) later receive remedial reading less frequently than children without MM training?

3. Did children receiving the phonological-awareness training, according to their entry level of performance, profit more than those receiving traditional phonological-awareness training, that is, without regard for entry level?
4. What is the contribution of phonological awareness, letter knowledge, and language skills as measured in the fall (prior to the phonological-awareness training) to letter knowledge and reading in the following spring (last spring in preschool) and to first grade measures?

**Ethical Considerations**

The main sources consulted on ethical issues in regard to this study were the *APA Ethical Guidelines* (American Psychological Association, 1992) and the book *Ethics in Psychology* (Keith-Spiegel & Koocher, 1985). Preventing ethical dilemmas in this study seemed relatively easy. No apparent risks were involved for the participants. Research supports phonological-awareness instruction, and both the experimental and control groups’ syllabi contained phonological-awareness instruction. Negative, evaluative labeling had to be considered where children were grouped by their phonological-awareness skills. If all groups enjoyed the activity and 95% of the children’s preschool time was in heterogeneous groups, resilient labels would not be considered an issue here. The groups were named A, B, and C, without any reference to the hierarchy of skills. The researcher also considered that communicating the students’ results between teachers in preschool and first grade might also label and thus restrict possibilities for some children. But the importance of knowing about their students’ skills made it easier for the teachers to provide individualized instruction and immediately support those in need of help. This benefit was considered to be more important than the issue of labeling. Not realizing the potential risks of labeling also contradicts teachers’ ethical guidelines (Síðareglur kennara [Ethical guidelines of teachers], 2002).
Signed parental consent was obtained for the children participating, and, at the same time, information on the project was given to parents in writing. Having essential knowledge regarding the study before they signed the consent forms was important for the parents, and they were also given access to the testing situation. It was considered important to respect the children’s inability to realize all the potential issues involved, and the power differential between them and the researcher.

A more subtle ethical issue related to the study was the question as to whether human beings should be allowed to erase individual differences and, thereby, artificially produce a more conformist society. This is a fundamental ethical dilemma touching various issues. One of them is the relatively recent possibility of pregnant women having a selective abortion (see e.g., Asch, 1999). In this case, an early-diagnosed disability in the fetus creates a question for the mother as to whether or not she should continue the pregnancy and give birth to the child. This is not only a philosophical and ethical question, but also a practical, economical, and emotional consideration. The issue in regard to reading diagnosis and instruction boils down to: Is the dyslectic experience of some unacknowledged worth? The fact that illiteracy is considered a handicap in most societies and can be helped solves the ethical issue for the individual researcher, but leaves an unanswered question: Is variability valuable for the sake of variability?
CHAPTER TWO
Method

This study was part of a collaborative project conducted by the researcher with teachers in two daycare centers (Icel.: leikskólar) and in Grade 1 of an elementary school (Icel.: grunnskóli) in one suburb of Reykjavík, Iceland. This chapter provides a description of the assessment instruments that were used in the study, following the general information on the institutions and children who participated. The last section contains information regarding how the study was conducted. A short overview of the methods is given here because the description of the procedure is complicated and hopefully an overview will help the reader relate the participants and the assessment tools to the procedure. Additionally, a schematic of the procedure is given in Figure 2.

Three cohorts of children were followed from their last year in a daycare center (preschool) through Grade 2. The main purpose was to study phonological-awareness instruction (MM) and the children’s development of reading skills, as indicated in the previously stated research questions. Cohort 1 was a comparison group, without MM instruction. Cohort 2 received the MM instruction; half of the group received the instruction adapted to three different levels of phonological skills (experimental group). The other half received traditional MM instruction (control group). Cohort 3 received the same adapted MM instruction as the experimental group in cohort 2. When finishing their preschool year, all three cohorts were assessed with tests of phonological awareness, reading skills, language skills, and visual recognition. Follow-up information on reading skills in grades 1 and 2 were obtained for all cohorts.
### Participants

Preschool children in two daycare centers constituted an availability sample (mean age when completing preschool = 72 months). The daycare centers contained four classrooms, two for younger children (2 - 3 years old) and two for older children (4 - 5 years old). Collaborative meetings in the schools are not shown here.
years old). Each classroom included both boys and girls. In the description below, the terms preschool and daycare center are used interchangeably, because only the five-year-olds in the daycare centers participated. The elementary school was part of a larger school attended by students from grades 1 to 10. In each grade, there were three classrooms of children, with approximately 18 - 25 students in each. In Iceland, children enter first grade in late August of the year they become six years old. Most students in the elementary school have been transferred from the two daycare centers because of their geographical proximity.

The daycare children participating in this project were recruited during the school year (fall and spring) before they transferred to first grade. The fall semester in daycare was the fall of the year the children became five years old, and the spring semester was the spring of the year they became six years old. The word recruited here means that parents of the children signed a consent form, described below, allowing their children to participate. Three cohorts of children participated. They were born in 1992 - 1994, and entered first grade in 1998 - 2000. Cohort 1 was recruited in the spring, a month or two before leaving the daycare center. Cohorts 2 and 3 were recruited during the fall, that is, before entering their last winter in the daycare center, the preschool winter.

The number of children in each cohort varied and can be seen in Table 3. When first assessed, the children in cohort 1 numbered 37, with 56 in cohort 2, and 67 in cohort 3. In cohort 2, the gender ratio was skewed, with 11 boys versus 18 girls in the experimental group, and 8 girls versus 19 boys in the control group. This was an unavoidable coincidence, complicating gender-specific comparisons between the
experimental and control groups. Since this was a longitudinal study, some attrition was unavoidable; a total of 35 children out of the 160 that started, or 22%, had left the schools at the end of first grade, because they had moved away with their families and changed schools. How this affected the cohorts can also be seen in Table 3.

Consent was obtained from the parents for their children’s participation in the research project, and permission for the researcher to gather information regarding the children’s progress in elementary school. The parents signed a consent form (Appendix A) delivered to them in the daycare center, along with a letter explaining the purpose of the research (Appendix B). The letter explained the main goals of the study, among those being the preparation of reading skills, the content and purpose of the assessments, and the optional access for parents. It also contained assurance of confidentiality and the anonymity of the participants. Every child in each cohort participated in the instruction. Data were not collected on children who did not have parental consent. This applied to two children, or approximately 1.3%.

There was, and still is, room for a total of 143 children in the two daycare centers. The number of children in each cohort fluctuates because the spaces are not earmarked for certain age groups. This situation explained the difference between the numbers of preschool children in the three cohorts. Additionally, cohort 1 was tested at the end of their preschool year. During the last year in preschool some attrition occurs in each cohort as can be seen for cohorts 2 and 3 in Table 3. No other reasons were found for the relatively few children in cohort 1.
Table 3

The Number of Boys and Girls in Each Cohort

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<th>Post-intervention assessmentb (n = 147)</th>
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<td>Cohort 1</td>
<td>Cohort 2</td>
<td>Cohort 3</td>
<td>Cohort 1</td>
<td>Cohort 2</td>
<td>Cohort 3</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>Boys</td>
<td>ns</td>
<td>Girls</td>
<td>Boys</td>
<td>ns</td>
</tr>
<tr>
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<td>29</td>
<td>18</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
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<td>27</td>
<td>17</td>
<td>19</td>
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</tr>
<tr>
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<td>56</td>
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<td></td>
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<tr>
<td></td>
<td>Cohort 1</td>
<td>Cohort 2</td>
<td>Cohort 3</td>
<td>Cohort 1</td>
<td>Cohort 2</td>
<td>Cohort 3</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>Boys</td>
<td>ns</td>
<td>Girls</td>
<td>Boys</td>
<td>ns</td>
</tr>
<tr>
<td>Leikskóli1</td>
<td>10</td>
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<td>19</td>
<td>14</td>
<td>9</td>
<td>23</td>
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<tr>
<td>Leikskóli 2</td>
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<td>4</td>
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<td>17</td>
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<tr>
<td>Total</td>
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<td>17</td>
<td>32</td>
<td>18</td>
<td>22</td>
<td>40</td>
</tr>
</tbody>
</table>

*aLeikskóli: Engl.: daycare center, preschool. In Cohort 2: Leikskóli 1 = experimental group; Leikskóli 2 = control group.
bThe concept post-intervention assessment is used for the end-of-preschool assessment in all three cohorts, even though cohort 1 did not receive an intervention.
Instruments

Children in cohort 1, the untreated comparison group, were first assessed with the assessment instruments used in the study. This assessment resulted in minor changes in the final test battery for the study. One phonological-awareness test, supposed to map the children’s skills in assessing length of words, was eliminated from the testing procedure. In this test, the children were supposed to find which word in a pair was longer. Three pairs of words were used, the longer word in two pairs representing a small object and the shorter word a larger object. The words were: fill - kónguló (Engl.: elephant - spider), diskur - skál (Engl.: dish - bowl), and blóm - poppkorn (Engl.: flower - popcorn). The children had problems understanding what they were supposed to do, and the few word-pairs did not provide adequate control for guessing. Additionally, a third test of language skills, Understanding Sentences (Icel.: Túlkun setninga), a Told-2P subtest (Ingibjörg Simonardóttir, Einar Guðmundsson, Sigurgrímur Skúlason, & Sigríður Pétursdóttir, 1995), was used only for cohort 1. It did not add information to what the two other tests of language development provided, and would have, unnecessarily, increased the length of the test session. The timeframes in which the assessments were administered can be seen in Figure 2.

Assessment Tools

The assessment tools were classified according to the following three categories:

a) tools for evaluating the children’s skills before the intervention (preassessment)
b) tools used immediately after the intervention (post-intervention assessment\footnote{4})

c) tools used in the follow-up studies (follow-up assessment).

**Preassessment**

A total of seven tests were used for the preassessment. Three tests were used to evaluate phonological awareness. Two reading tests were used for assessing the reading of words and grapheme knowledge, one test for visually matching written letters and nonwords, and one test for assessing language development. A description of the seven tests follows.

Rhyming skills were evaluated by a list of words, one to four syllables long. The list contained 13 words (Appendix C). Internal consistency was indicated by an alpha coefficient of .87. The correlation matrices and other statistical output in the computation are displayed in Appendix G. The raw scores for rhyming indicated the number of words correctly reacted to, providing an ascending continuous scale with higher scores indicating better skills. An answer was scored as correct if the child rhymed correctly, regardless of how meaningful the rhyme was. The three measures of phonological skills were uniformly scaled and, therefore, the raw scores for the rhyming skills were recoded into standard scores with $M = 100$ and $SD = 15$.

Syllable-analyzing skills were also evaluated using a list of words, one to five syllables long (Appendix D). This instrument required tapping or clapping of syllables. The length of the syllable-analyzing lists varied; 16 words were used on the pretest and 15 words on the post-intervention test. The bias of more words producing a higher score was avoided by using each child’s percentage of correct answers as a raw score.

\footnote{4 The concept *post-intervention assessment* is used for the end-of-preschool assessment in all three cohorts.}
Analyzing every word correctly provided a raw score of 100, while analyzing four words provided a score of 25 on the pretest and 26.7 on the post-intervention test. Such a procedure can cause a small systematic bias in favor of the shorter list. In this research, the error would never extend the ratio of 1:16, which was considered small enough to justify choosing this procedure instead of randomly deleting one word from the pretest list. The coefficient alpha of this measure was .83 (Appendix G). As on the rhyming test, the raw scores for syllable analyzing were rescaled into standard scores.

Phonological synthesis was evaluated by the phonological synthesis test (Hljóðtenging) on the Icelandic version of the Aston Index (Bjarnfríður Jónsdóttir et al., 1996). By this test, the children’s skills in synthesizing phonemes, spoken by the examiner, were evaluated. The phonemes formed a total of 15 real words, ranked by difficulty, and 5 nonwords. A raw score of 1 was given when the child provided a correct word immediately. If the examiner had to sound out the phonemes twice, the child obtained a score of ½ for a correct answer. Reliability indices of this subtest were not reported in the test manual. In England, predictive validity has been found by comparing 5½-year-old children’s scores with their reading and spelling scores two years later. The obtained correlation with reading was \( r = .63 \) and with spelling \( r = .58 \) (Bjarnfríður Jónsdóttir et al.). This third test of phonological skills was recoded as the other two on a standard scale with \( M = 100 \) and \( SD = 15 \).

Grapheme recognition was evaluated by showing the children all the lower-case and capital letters used in written Icelandic, and the diphthongs \( au, ei, \) and \( ey \). The letter recognition sheet from the Aston Index (Bjarnfríður Jónsdóttir et al., 1996) was used.
This subtest contained, on a white sheet of paper, 26-point sized letters, separated by half an inch, clearly printed in nonalphabetical order, grouped in capital and lowercase letters. This measure was designed for evaluating the children’s grapheme knowledge, but no reliability indices were reported in the manual. The face validity appeared good because recognition of graphemes was assessed by having children recognize clearly printed graphemes in a random order. Random ordering was preferred, rather than alphabetical ordering, because the children might have known the alphabetical order by frequently singing the alphabet song. Alphabetically ordered graphemes might therefore have tested memory skills and not grapheme recognition. It was assumed that a fair testing of grapheme recognition was obtained by having the participating children read the clearly printed letters. Seeing a whole sheet of unfamiliar symbols and being required to read them might, however, be a stressful situation for a preschool child. Therefore, the following instructions\(^5\) were used to decrease the pressure: “Do you see all those letters? I would like to know if you can look at them and check if you know any of them or have seen them before. To be able to find them, we have to look at every letter, so you just follow me and say yes if you know them. OK?” The examiner pointed to each grapheme. When the children knew many letters they tended to take over and read. If they just knew one or two, they said yes, frequently with excitement, when seeing those. Then the examiner asked: “Do you know the name of this one?” If the child did not answer, then: “Where have you seen it? Do you know somebody whose letter this is?” The child

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\(^5\) The instructions were given in Icelandic. (Here they are translated into English in the remainder of the paragraph.)
received a score for the grapheme if he or she uttered the letter-name or the phoneme. No scores were given for answers like: “This is mine!”

Reading skills were evaluated if the child knew the graphemes of the first words on the reading test. The reading test for six-year-old children on the Aston Index was used. Reading individual words was required by the test, as constructed by the original author (Newton, as cited in Bjarnfríður Jónsdóttir et al., 1996) to detect typical errors of reading-disabled children, for example omissions, reversals of words, similarly formed graphemes, and graphemes symbolizing similarly sounding phonemes. During the construction of the Aston Index, pretests were conducted on the reading tests, and they were standardized for children in first through sixth grade. Psychometric data on the pretests were not reported in the manual. The obtained mean for the first graders in the standardization sample was 30.6 words with a standard deviation of 29.9, indicating that many children had not started to read. In second grade, the distribution was still great ($SD = 30.5$), but more children had started to read ($M = 63.7$). The individual differences, that is, the spread of the reading scores on this test, did not markedly decrease until in fourth grade ($M = 88.1; SD = 14.4$). Even though the Icelandic standardization sample’s youngest group was in first grade, this reading test was used here for children one year younger, mainly because of clearly printed words of varying length, in an ascending order from short to long words. No reading tests explicitly designed for preschool children were available, and no other standardized reading tests for beginning readers existed in Iceland.
Visual matching of graphemes was tested with the Visual Recognition Test on the Aston Index. On this subtest, printed, lower-case letters formed a total of 10 items. The test required a visual matching of graphemes, real words, and word-like grapheme combinations. The examinee should find a match between a grapheme or a combination of graphemes and a target, hidden among five or six alternatives, for example finding the target d in a group of h, p, d, f, b, and finding the word band in the group danp, pand, banp, band, and bnad. Reliability and validity were not reported in the manual, but getting 7 out of 10 correct was considered by the test authors to be an indication of good visual-recognition skills.

Language skills were evaluated by the subtest Endurtekning setninga (Repetition of Sentences) on the Icelandic version of the test battery Told-2P (Ingibjörg Simonardóttir et al., 1995). As indicated in the manual, the mean reliability coefficient alphas for the Icelandic standardization sample were .87 for 4½-year-old and .91 for 5-year-old children. Told-2P contains seven subtests for assessing different aspects of language development. The scores for each subtest are on a scale from 1 to 20 with $M = 10$ and $SD = 3$. In the standardization sample, the Endurtekning-setninga subtest had the second highest correlation, $r = .68$, with the total Told-2P score, the Language development index.

**Post-intervention Assessment**

As indicated earlier, this was the first assessment for cohort 1, and the second assessment for cohorts 2 and 3. The seven previously described tests were used again, but two changes were made. First, different words were used for rhyming and syllable analyzing
(Appendixes C & D) to prevent practice effects resulting from, for example, playing with words memorized during the pretest.

Second, to obtain a better measure of language skills, an additional test was used. This was the Told-2P subtest, *Botnun setninga* (Sentence Closure), that is, the test with the highest correlation with the Language development index ($r = .73$). The coefficient alpha for this test, according to the manual, was .84 and .88 for 4½- and 5-year-old children, respectively (Ingibjörg et al., 1995).

**Follow-up Assessment**

The follow-up assessment was based on the elementary teachers’ evaluation of the children’s reading skills upon leaving grades 1 and 2. Traditionally, first and second grade teachers in their respective elementary school, grade their students by using a written evaluation to describe the children’s reading, for example, “knows most of the letters and reads short words.” These descriptions form an easily recoded ordinal scale with four levels (1 - 4). Children obtaining the lowest grade receive special reading intervention. No integrity indices exist for this evaluation. The teacher is the only evaluator, under the influence of various biases and bits of knowledge obtained during his or her time with the student, and uses various assessment methods to reach a conclusion. This evaluation is an important element in an application for reading support for any student with reading difficulties. In spite of the lack of reliability and validity indices for the reading scores in grades 1 and 2, the scores were used, because they provided the school’s cut-off point for remedial reading and were the official reading scores, that is, the scores communicated to the parents. The lack of valid and reliable reading tests in
Iceland was, obviously, a problem here. The long-term hypotheses that were studied contained, therefore, various reliability and validity issues regarding the method of testing the relationship between phonological-awareness skills and teacher-graded reading skills.

**The Protocol**

The handbook *Markviss málörvun* (Helga Friðfinnsdóttir et al., 1988), MM, was the protocol for the preschool teachers during the children’s last winter in their daycare centers. This was the Icelandic teachers’ handbook, translated from Danish and adapted for use in Icelandic schools. In the following section, a brief description of the content is given, following the description of the research procedure. As mentioned earlier, the MM program has been used in the U.S. An English-speaking reader might, for additional information, refer to the translation provided in Adams et al. (1998). Since the English (U.S.) translation contains some cultural adjustments, it is not identical in every detail to the Icelandic MM. The assignments are coded by type and level of difficulty. A description of the code is provided in the following section. In the U.S. program, the numbers in the category-code are from 3 through 8, but in the Icelandic MM, they are from 1 through 6.

**Procedure**

In many daycare centers in Iceland, five-year-old children are prepared during their last year in the center for the transition to first grade. For them, the last year in daycare is therefore a preschool year. Thus, phonological-awareness instruction in the form of
Markviss málörvun (MM) was added to the existing preparation schedule. Before the research project started, the preschool teachers had been considering the use of easy MM assignments. This study provided them with a ready-made plan for using MM, although it contained more than easy MM assignments.

As mentioned earlier, an overview of the procedure, described here, is depicted in Figure 2. Children in the first cohort, cohort 1, were tested with the assessment instruments in May - June of the year they transferred from the daycare center to first grade. The two daycare-center preschools were compared to obtain an assessment of the preschools’ homogeneity. As indicated in Chapter 3, no significant differences were found on any of the variables ($\alpha = .05$). Cohort 1 was a comparison group, receiving no MM instruction. Children in cohort 1 were compared with children receiving MM instruction, that is, cohorts 2 and 3.

Children in cohorts 2 and 3 were pretested upon entering their preschool year. On the basis of their phonological skills, they were divided into three groups. The most phonologically aware children formed group C and the least phonologically aware children formed group A. The medium-skilled children formed group B. Thus, group A contained children who had some rhyming skills but very little if any syllable-analyzing skills. Group B consisted of children who could rhyme and clap many words into syllables, but they were unable to synthesize isolated phonemes. Group C contained the most phonologically skilled children. In group C, some children had grasped the alphabetic principle and were starting to read.
As indicated above, children in cohorts 2 and 3 received MM instruction. An experiment was designed for cohort 2, where one preschool followed an experimental syllabus and the other preschool received traditional MM instruction. The experimental group received the MM instruction adapted to three different levels of phonological skills. For cohort 2, a coin was flipped to decide which preschool would follow the experimental syllabus and which the traditional syllabus. Therefore, random allocation of treatment to groups was used, but not random allocation of individuals to treatment groups, which was impossible because the participating children had already been placed in their daycare centers. The phonological-awareness project did not influence the parents’ choice of schools; for these children as elsewhere in Reykjavík, a daycare center was chosen when most of the children were one or two years old. No differences between the two daycare centers in the number or nature of applications were discernible.

Cohort 3 received the same adapted MM instruction as the experimental group in cohort 2. Data for cohort 3 were combined with data for the experimental group in cohort 2, resulting in an unequal number of children in the two groups, the experimental and the control group.

Two A groups, two B groups, and two C groups were formed in each preschool, a morning group and an afternoon group, because some children attended their daycare center for half days only. Each group contained 4 - 6 children.

The groups met in a separate room three times a week during fall and spring (October - April), a total of 19 weeks. Each session took 20 minutes, as recommended by the handbook’s authors (Helga Friðfinnsdóttir et al., 1988), during which the assigned
part of the MM program was conducted by a preschool teacher. Regardless of skills, all children got equally long instruction time.

Each group had the same MM teacher for all sessions. If the teachers’ instructional skills were different, the results might be biased, but incorporating any other arrangement into the preschools’ daily schemes was difficult. Such bias might have been prevented by having the teachers rotate, but the children were expected to feel more secure with one teacher. To prevent confounding of instruction with groups, each preschool teacher conducted only one type of instruction, an A, B, C, or traditional instruction. In the experimental center, four preschool teachers conducted the instruction, and three in the control center. Each teacher in the control center conducted one type of group, that is an A group, a B group, or a C group, both before and after lunch. The same applied for two teachers in the experimental center; one teacher had the two A groups, and another teacher both of the B groups. For practical reasons, the morning C group had one teacher, and the afternoon C group another. All the teachers were female; no male teachers worked in the two daycare centers at the time.

The preschool with the experimental group had a separate MM syllabus for each of the A, B, and C groups, while children in the other preschool, the control group, received traditional MM instruction. (The syllabi for each group can be seen in Appendixes D and E.) In the experimental group, group A received the most basic MM assignments, for example, rhyming and working with syllables and words. Group B received intermediate assignments. Group C received assignments requiring more developed phonological skills, with an emphasis on working with phonemes. The code in
the syllabus, displayed in Appendix D, is a code from the MM handbook (Helga Friðfinnsdóttir et al., 1988). Each assignment or game is coded, and the numbers from 1 through 6 indicate category or type of assignments. The difficulty level within each category is represented by the letters of the alphabet, where the assignment marked A is the easiest one in the category. The categories are:

1. Listening (e.g., instructions, own name, sounds)
2. Rhyming
3. Sentences and words (e.g., isolating single words, length of words, making one word by combining two)
4. Working with syllables
5. Initial phonemes
6. Phonemes

All the groups in the control preschool followed a traditional MM syllabus (Appendix E). One untraditional element characterized the control group, however. The children received instruction in more homogeneous groups than traditionally in Icelandic preschools and schools, that is, homogeneous with regard to phonological-awareness skills. This was unavoidable because it was the only way to make sure that the treatments of the experimental and control group were equal, apart from the difficulty levels of the assignments. In a traditional MM syllabus, the same assignments are given to all children in one classroom. The assignments chosen here (Appendix E) are one example of a traditional MM syllabus, following the guidelines provided by the authors.
After the intervention, the children were evaluated in the same way as the children in cohort 1, that is, with the post-intervention instruments described in the previous section. Depending on the experience from the groups in cohort 2, the preschool teachers decided which of the two syllabi, the traditional or the experimental, cohort 3 should follow. They opted for the experimental syllabus, not only because of documented results, but also because the experimental preschool teachers recommended the procedure.

Even though the experimental and control groups got different assignments, the material was new and interesting for the children, providing a placebo treatment for the control group. All groups played with rhyming, syllable splitting, and various word-games.

A flaw mentioned by Troia (1999) had to be considered here. A confounding of intervention with schools or a possible difference between the experimental group and the control group, in spite of random allocation of treatments, might have occurred. Even though the preschools were equal when cohort 1 was evaluated, cohort 2 might have differed by schools. Therefore, for cohort 2, the pretests for the two preschools were compared. Grapheme knowledge differed significantly by schools; the experimental group scored higher before obtaining the intervention. Children in the experimental group knew, on the average, 22 graphemes, while children in the control group knew 11 ($t_{(54)} = -2.820, p = .007$). Language skills were also significantly different, favoring the experimental group ($p < .05$). This partly different entry level of the two preschools required caution when interpreting obtained differences.
Fidelity checks of treatments were not conducted because of practical issues in the schools. Unobtrusive checking was impossible. The clear and easy treatment protocols were supposed to increase treatment fidelity. The preschool teachers had not used phonological-awareness assignments before and therefore had a limited repertoire of alternative assignments. Besides, having a clear plan to follow was a tempting option for the teachers, as they indicated in a collaborative meeting in August 1998, just before the MM instruction started. The preschool teachers confirmed the utility of the protocol both in personal communication and in two post-intervention meetings (personal communication, May 25, 1999, & August 22, 2000), where they described the protocol as practical and timesaving because it was easy to follow, step by step. Their comments were interpreted as an indication of treatment fidelity. As pointed out by Ehri et al. (2001), documented negative correlation between effect sizes and fidelity checks needs to be further examined, but it was not considered here.

Helga Friðfinnsdóttir, one of the authors of Markviss málörvun, led a MM workshop for the teachers before the children in cohort 2 started their preschool year. All teachers in both preschools attended the workshop, the teachers of cohort 3 included. The MM assignments were introduced, along with the traditional syllabus. To avoid the usage of any MM assignments in cohort 1, the workshop was conducted in the fall of 1998, that is, after cohort 1 left the preschool. A day or two devoted to workshops and courses in the beginning of a school year is a regular event each year.

The researcher performed the preschool testing of every child. Other options were not available. The examiner was, therefore, not blind with regard to the hypotheses being
tested. The ease of and objectivity in scoring the tests were considered to minimize biased scoring. A tight schedule where children from different preschools were tested on consecutive days was supposed to minimize potential bias caused by a different atmosphere or rapport, and different interaction with the children.

Before this research project was conducted, Tölvnufnd (now known as Persónuvernd; Engl: The Icelandic Data Protection Commission) granted its approval May 4, 1998 (Appendix H). Tölvnufnd was an Icelandic government committee, formed to ensure that research was conducted in accordance with Icelandic regulations and guidelines. In Iceland, Tölvnufnd’s approval was analogous to the IRB approval received from The Pennsylvania State University, July, 2003, to conduct the study.
CHAPTER THREE

Results

Before the research questions in this study were addressed, the equality of the children from the two preschools was evaluated. This pre-intervention comparison will be described first. An account of some methodological considerations follows, before introducing data regarding the research questions. The sections on the obtained results provide a comparison of the children with and without MM instruction, followed by an evaluation of the need for remedial reading. Then the adapted and traditional forms of MM are compared. The chapter ends with the prediction of reading skills in first grade.

When the children in cohort 1 were compared during the spring, before entering first grade, no significant differences were found between the two preschools. This applied to the children’s ages, phonological skills, visual recognition skills, language skills, and skills in grapheme recognition and reading. The means and distribution indices of the scores for the two preschools are in Table 4. A $t$ test for independent samples with equal variances was run for each comparison; the probability indices are also in Table 4.

To obtain a single index of each child’s phonological-awareness skills, the scores for each of the three variables—rhyming, syllable analyzing, and phoneme synthesis—were averaged. The mean was used as the child’s phonological-awareness score. Similarly, when two tests of linguistic skills were used, the scaled scores were averaged to obtain a single language score. The distribution of phonological-awareness skills for cohorts 2 and 3 before the MM intervention started is shown in Figure 3.
Where answers regarding the research questions were sought, the level of significance in all evaluations of significant differences was set at $\alpha = .05$. This applied to other evaluations too, if not otherwise stated.

In addition to the research questions stated in Chapter One, gender received special attention because gender differences in phonological-awareness skills and reading have been vaguely documented. Both earlier findings and the pattern of these data indicated the importance of considering such interaction. Therefore, description of the gender groups is provided in Chapter 4, mainly as a basis for future research.

Table 4

*Comparing Preschools, Cohort 1, End of Preschool. Children without MM* Instruction

<table>
<thead>
<tr>
<th></th>
<th>Leikskóli 1(^b) ($n = 21$)</th>
<th>Leikskóli 2(^c) ($n = 16$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Grapheme knowledge</td>
<td>28.29</td>
<td>21.35</td>
<td>35.25</td>
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<tr>
<td>Phonological awareness(^d)</td>
<td>97.30</td>
<td>6.57</td>
<td>99.88</td>
</tr>
<tr>
<td>Reading</td>
<td>6.48</td>
<td>21.19</td>
<td>9.13</td>
</tr>
<tr>
<td>Language skills(^e)</td>
<td>10.36</td>
<td>2.85</td>
<td>9.17</td>
</tr>
<tr>
<td>Visual recognition</td>
<td>5.43</td>
<td>2.36</td>
<td>6.00</td>
</tr>
<tr>
<td>Age in months</td>
<td>70.86</td>
<td>3.24</td>
<td>71.06</td>
</tr>
</tbody>
</table>

\(^a\)MM: Markviss málörvun. The phonological-awareness instruction was provided to the other cohorts in the form of Markviss málörvun (MM).

\(^b\)Leikskóli 1: The daycare center that later contained the experimental group.

\(^c\)Leikskóli 2: The daycare center that later contained the control group.

\(^d\)On the phonological-awareness measure, both preschools: $n = 16$. Phonological awareness: (rhyming + clapping + synthesizing phonemes) / 3.

\(^e\)Language, end of preschool: the average of two scaled scores (Repetition of sentences, Sentence closure).
The first research question was stated as the following hypothesis: Five-year-old children who receive phonological-awareness training (MM instruction) have higher phonological-awareness and reading scores than children who do not receive the training. To make this comparison, a multivariate GLM analysis was run. Phonological-awareness training (MM) was the only factor, that is, children in cohort 1 (no MM) were compared with later cohorts (with MM). Phonological awareness, measured after the children received the MM instruction, was one of the two dependent variables. The measures of the other dependent variable, Reading, were obtained twice, that is, at the end of preschool following the MM instruction and a year later. This situation would have
provided three dependent measures, but the measure of reading skills at the end of preschool turned out to be a measure of questionable quality because few children could read at the time (see Figure 4). The skewness and kurtosis of the distribution were 3.5 and 13.1, respectively. Seventy six percent of the children in cohort 1 and 58 - 59% in cohorts 2 and 3, respectively, could not read a word at the end of preschool. If reading three words or less was set as a limit for inclusion in the could-not-read group, the number of children who could not read when leaving preschool rose to 87%, 83%, and 78%, respectively, for the three cohorts. This reading skills measure, reading at the end of preschool, was therefore not included in the statistical analyses of the data.

Measures of skills in the fall, at the beginning of the children’s preschool year, were not available for children in cohort 1, the no-MM group. There might have been differences between the groups at that time, but the situation did not allow consideration of such differences.

Both the Hotelling’s Trace and Wilks’ Lambda multivariate tests revealed significant differences ($F = 9.1; p = .000$) between the MM and no-MM groups. The tests of between-subjects effect revealed significant differences between the two groups on the measure of phonological-awareness skills but not on the measure of first grade reading skills ($F_{phonaw} = 17.9, p = .000; F_{1Gread} = 2.7, p = .101$).
Figure 4. The distribution of reading scores at the end of preschool. All cohorts.

A display of the phonological-awareness, reading, grapheme-knowledge, and language scores (Ms and SDs) for the groups with and without MM instruction is provided in Table 5.
Table 5

*Phonological Awareness and Reading Skills of Children with and without MM Instruction*

<table>
<thead>
<tr>
<th></th>
<th>MM instruction</th>
<th>No MM instruction</th>
<th>( p^a )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>((n = 93 - 110))</td>
<td>((n = 28 - 31))</td>
<td>( (2\text{-tailed}) )</td>
</tr>
<tr>
<td><strong>Phonological awareness</strong></td>
<td>103.0</td>
<td>4.20</td>
<td>98.4</td>
</tr>
<tr>
<td><strong>Reading in Grade 1</strong></td>
<td>2.8</td>
<td>0.84</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Grapheme knowledge</strong></td>
<td>34.5</td>
<td>19.02</td>
<td>31.6</td>
</tr>
<tr>
<td><strong>Language skills</strong></td>
<td>10.3</td>
<td>2.11</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Girls ( (n_1^b = 39 - 54, n_2^b = 12 - 14)^c )</th>
<th>Boys ( (n_1^b = 48 - 56, n_2^b = 16 - 17)^c )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonological awareness</strong></td>
<td>103.3</td>
<td>4.37</td>
</tr>
<tr>
<td><strong>Reading in Grade 1</strong></td>
<td>2.9</td>
<td>0.66</td>
</tr>
<tr>
<td><strong>Grapheme knowledge</strong></td>
<td>36.5</td>
<td>19.19</td>
</tr>
<tr>
<td><strong>Language skills</strong></td>
<td>10.4</td>
<td>1.73</td>
</tr>
</tbody>
</table>

\(a^a\)To give an idea of the overall differences, the \( p \) provided is from a \( t \) test for independent samples.

\(b^b\)\( n_1 \): \( n \) in the MM-instruction group; \( n_2 \): \( n \) in the No-MM-instruction group.
The Relationship of Phonological-Awareness Instruction and Remedial Reading

The purpose of the second research question was to find out if children receiving MM instruction were better prepared for reading instruction than children not receiving such training. This would be indicated by the latter group’s more frequent referrals to remedial reading. The reading score of 1 in first grade was used as a cut-off score for the referral. Using the score instead of counting children who actually got remedial reading was decided because the children receiving remedial reading in Iceland are not necessarily poor readers. The over-referral of some children to remedial reading, probably caused by the lack of other resources, confuses the actual need for remedial reading. The tendency to provide some good readers, especially boys, with remedial reading has been demonstrated elsewhere (Guðrún Bjarnadóttir, 1993). Using just the cut-off score was a measure taken to avoid this referral bias. This hypothesis, similar to the previous one, required the comparison of cohort 1 and later cohorts. Table 6 contains a 2 x 2 table for this comparison.

Table 6


<table>
<thead>
<tr>
<th>MM-instruction or not</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM</td>
<td>No MM</td>
</tr>
<tr>
<td>Remedial reading</td>
<td>7</td>
</tr>
<tr>
<td>No remedial reading</td>
<td>86</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
</tr>
</tbody>
</table>
Statistically significant general support for the hypothesis was not found (Chi-Square: Fisher’s Exact Test, 2-sided sig.: .088; 1-sided sig.: .069). Out of the 93 children provided with MM instruction, 7.5% qualified for remedial reading. This applied to 19.4% of the children without MM instruction. The group of 13 children who qualified for remedial reading consisted of 12 boys and 1 girl.

**Determining If Different Skills Require Different Instruction**

Children’s interpersonal differences were assumed to be important when planning the MM instruction. Here, compared with traditional MM instruction, more individualized instruction, that is, a different curriculum for three levels of skills, was supposed to influence the acquisition of phonological skills and reading. This hypothesis required comparing two groups: children receiving instruction according to their entry level of performance and children receiving traditional MM instruction.

Mean scores and standard deviations of various measures from the children who received adapted MM instruction and those who received the traditional form can be seen in Table 7. Besides the phonological awareness and reading skills, grapheme knowledge and language skills following intervention are displayed as well.

When the multivariate GLM analysis was run to predict phonological awareness and reading skills from the form of instruction, significant differences were found. The multivariate tests (Hotelling’s Trace & Wilks’ Lambda) indicated a significant difference between the traditional and the adapted MM instruction ($F = 3.5; p = .033$). When phonological-awareness skills and reading skills were separated, the test of between-subjects effect revealed significant differences for reading but not for phonological-
awareness skills. The $F$ values were as follows: $F_{\text{phonaw}} = .3$, $p = .559$; $F_{\text{Gread}} = 6.1$, $p = .016$.

In cohort 2, the first cohort grouped by entry level of performance, significant differences between the two instruction forms were seen (see Table 8). The children taught according to their entry level of performance did significantly better on most measures than children taught with the traditional approach. This not only applied to phonological awareness but also to grapheme knowledge, reading in first grade, and linguistic skills. These results raised the suspicion that the two groups might have been different from the start.

Yet, when the scores obtained before the MM instruction began were compared for the two groups in cohort 2, small differences were observed. The results are shown in Table 9. Significant differences were not found, with the exception of grapheme knowledge. The children in the group that later received the adapted MM, recognized, on the average, 10 more letters than the children who were heading towards the traditional instruction ($t_{(53)} = 2.66$, $p = .010$, two-tailed).
### Table 7

**Phonological Awareness, Language and Reading Skills of Children with Adapted or Traditional MM Instruction**

<table>
<thead>
<tr>
<th></th>
<th>Adapted MM $(n = 76 - 86)$</th>
<th>Traditional MM $(n = 17 - 25)$</th>
<th>$p^a$ (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonological awareness</strong></td>
<td>103.2 4.30</td>
<td>102.1 3.83</td>
<td>.264</td>
</tr>
<tr>
<td><strong>Reading in Grade 1</strong></td>
<td>2.9 0.77</td>
<td>2.4 1.00</td>
<td>.014</td>
</tr>
<tr>
<td><strong>Grapheme knowledge</strong></td>
<td>37.4 19.03</td>
<td>25.9 16.86</td>
<td>.008</td>
</tr>
<tr>
<td><strong>Language skills</strong></td>
<td>10.6 1.97</td>
<td>9.3 2.23</td>
<td>.006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Girls $(n_{1} = 40 - 48, n_{2} = 4 - 7)^c$</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonological awareness</strong></td>
<td>103.5 4.18</td>
<td>101.8 5.64</td>
<td>.338</td>
</tr>
<tr>
<td><strong>Reading in Grade 1</strong></td>
<td>2.9 0.68</td>
<td>2.8 .50</td>
<td>.722</td>
</tr>
<tr>
<td><strong>Grapheme knowledge</strong></td>
<td>38.1 19.19</td>
<td>28.7 19.42</td>
<td>.232</td>
</tr>
<tr>
<td><strong>Language skills</strong></td>
<td>10.4 1.69</td>
<td>10.1 2.01</td>
<td>.689</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Boys $(n_{1} = 36 - 38, n_{2} = 13 - 18)^c$</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonological awareness</strong></td>
<td>102.8 4.46</td>
<td>102.2 3.06</td>
<td>.647</td>
</tr>
<tr>
<td><strong>Reading in Grade 1</strong></td>
<td>2.9 .88</td>
<td>2.2 1.09</td>
<td>.026</td>
</tr>
<tr>
<td><strong>Grapheme knowledge</strong></td>
<td>36.4 19.03</td>
<td>24.8 16.23</td>
<td>.031</td>
</tr>
<tr>
<td><strong>Language skills</strong></td>
<td>10.8 2.29</td>
<td>8.9 2.27</td>
<td>.008</td>
</tr>
</tbody>
</table>

---

*a*The $p$ provided is from a $t$ test for independent samples.

*b*Grapheme knowledge and language skills measured at the end of preschool.

*c*$n_1$: $n$ in the adapted MM-instruction group; $n_2$: $n$ in the traditional MM group.
### Table 8

**Cohort 2. Comparing Children with Traditional and Adapted MM Instruction**

<table>
<thead>
<tr>
<th></th>
<th>Adapted MM ($n = 26$)</th>
<th>Traditional MM ($n = 25$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Phonological awareness$^b$</td>
<td>104.5</td>
<td>4.03</td>
<td>102.1</td>
</tr>
<tr>
<td>Grapheme knowledge</td>
<td>43.9</td>
<td>17.43</td>
<td>25.9</td>
</tr>
<tr>
<td>Reading in first grade</td>
<td>3.1</td>
<td>.76</td>
<td>2.4</td>
</tr>
<tr>
<td>Language$^c$</td>
<td>11.3</td>
<td>2.21</td>
<td>9.3</td>
</tr>
</tbody>
</table>

$^a$MM: Markviss málörvun. The method used to teach phonological awareness.

$^b$Phonological awareness: (rhyming + clapping + synthesizing phonemes) / 3

$^c$Language, end of preschool: (repetition of sentences and sentence closure) / 2.

$^*p < .05; ^{**}p < .01$, on a $t$ test for independent samples.

### Table 9

**Comparison of the Experimental and Control Group in Cohort 2 before Intervention**

<table>
<thead>
<tr>
<th></th>
<th>Experimental group ($n = 27$)</th>
<th>Control group ($n = 27$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Phonological awareness$^a$</td>
<td>96.8</td>
<td>6.54</td>
<td>94.6</td>
</tr>
<tr>
<td>Grapheme knowledge</td>
<td>21.8</td>
<td>15.05</td>
<td>11.4</td>
</tr>
<tr>
<td>Language, pretest$^b$</td>
<td>9.6</td>
<td>2.62</td>
<td>8.3</td>
</tr>
</tbody>
</table>

$^a$Phonological awareness: (rhyming + clapping syllables + synthesizing phonemes) / 3.

$^b$Language, pretest: Repetition of sentences, scaled scores ($M = 10$ & $SD = 3$).

$^*p < .05; ^{**}p < .01$, on a $t$ test for independent samples.
Predicting Phonological Awareness and First Grade Reading

The last research question related to the contribution of various variables to later skills. The above results indicated that MM instruction increased phonological-awareness skills, but a demonstration of its utility for later reading was not obtained without controversy. In light of this, the originally stated question was revised and answers were sought to two open questions on the prediction of skills. The first was: What are the best predictors of reading skills in first grade? The second: What are the best predictors of phonological-awareness skills at the end of preschool?

Three multiple regression models were created, one for the prediction of reading skills in first grade and two with phonological-awareness skills near the end of preschool as a dependent variable, one for predicting phonological-awareness skills and the other to find out how well different measures, simultaneously obtained, provided a fit to phonological-awareness skills. This will be further explained near the end of this section. To predict reading skills in first grade, a stepwise multiple regression was run for the following independent variables: age, gender, grapheme knowledge, instruction, language skills, phonological awareness, previous reading skills (end of preschool), and visual recognition. Instruction represented two variables: one with the values MM and no-MM, and the other with the values of adapted MM and traditional MM. The former was included in the analysis of the total group where cohort 1 formed the no-MM group. The latter only applied to cohorts 2 and 3, because cohort 1 had no MM. Regardless of whether the regression was run for the total group with the variable MM instruction (yes or no) included, or just for cohorts 2 and 3, where the adapted-traditional MM instruction
was included, the best model to predict first grade reading skills (Read1G) contained the following three variables: grapheme knowledge (GK), language skills (LS), and age (A) (Model: Read1G\textsubscript{i} = -3.36 + 0.02GK\textsubscript{i} + 0.17LS\textsubscript{i} + 0.05A\textsubscript{i} + 0.64). With all cohorts included, this model, or the three variables together, explained 53.7% of the variance in first grade reading skills, which tested significant ($F_{(3)} = 44.03; p = .000$). Each variable contributed significantly to reading in first grade ($p \leq .016$).

Similar stepwise regression analysis was run to find the model that best predicted phonological-awareness skills. Potential predictors were the variables used on the pretest: grapheme knowledge, language skills, phonological awareness, and visual recognition, besides age, gender, and instruction, adapted or traditional. Pretests were only available for cohorts 2 and 3, the MM cohorts. The best prediction was provided by a model consisting of the two variables: prior phonological awareness and grapheme knowledge. The variables explained 35.7% of the variance in phonological awareness at the end of preschool ($F_{(4)} = 29.14; p = .000$) and both variables contributed significantly ($p \leq .001$).

To find a model providing the best fit for phonological awareness in the total group, simultaneously measured variables were analyzed in similar ways. Included independent variables were: age, gender, grapheme knowledge, instruction (MM or no MM), language skills, and visual recognition. With these variables entered into a stepwise regression analysis, the best predictors of phonological-awareness skills (PAw) were: grapheme knowledge (GK), instruction (MM), language skills (LS), and age (A). A model consisting of the four variables (PAw\textsubscript{i} = 74.53 + 0.10GK\textsubscript{i} + -3.60MM\textsubscript{i} + 0.62LS\textsubscript{i} +...
.30A_i + 3.84) explained 47.2% of the distribution of the children’s phonological-awareness skills when finishing preschool ($F(4) = 29.0; p = .000$).

Bivariate correlations between reading skills, phonological-awareness skills, and various other measures are listed in Table 10.

### Table 10

**Bivariate Correlation between Reading, Phonological Awareness, and Other Measures. All Cohorts**

<table>
<thead>
<tr>
<th></th>
<th>Reading skills</th>
<th>Phonological Awareness&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 1</td>
<td>Preassessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End of preschool</td>
</tr>
<tr>
<td><strong>Preassessment:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phonolog. awareness&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.565**</td>
<td>.533**</td>
</tr>
<tr>
<td>Grapheme knowledge</td>
<td>.555**</td>
<td>.472**</td>
</tr>
<tr>
<td>Visual recognition</td>
<td>.328**</td>
<td>.242*</td>
</tr>
<tr>
<td>Language&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.325**</td>
<td>.287**</td>
</tr>
<tr>
<td><strong>Post-intervent.assessm.:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phonolog. awareness&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.542**</td>
<td>1.000</td>
</tr>
<tr>
<td>Grapheme knowledge</td>
<td>.646**</td>
<td>.548**</td>
</tr>
<tr>
<td>Visual recognition</td>
<td>.344**</td>
<td>.382**</td>
</tr>
<tr>
<td>Language&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.531**</td>
<td>.394**</td>
</tr>
<tr>
<td>Reading, Grade 1</td>
<td>1.000</td>
<td>.542**</td>
</tr>
<tr>
<td>Gender (1 = ♀; 2 = ♂)</td>
<td>-.178*</td>
<td>-.106</td>
</tr>
<tr>
<td>MM Instruction or not</td>
<td>-.118</td>
<td>-.352**</td>
</tr>
<tr>
<td>Adapted or tradit. MM</td>
<td>-.253*</td>
<td>-.108</td>
</tr>
<tr>
<td>Age in months</td>
<td>.189*</td>
<td>.263**</td>
</tr>
</tbody>
</table>

<sup>a</sup>Phonological-awareness skills: (rhyming + clapping + synthesizing phonemes) / 3

<sup>b</sup>Language, pretest: Repetition of sentences, scaled scores ($M = 10, SD = 3$).

<sup>c</sup>Language, end of preschool: (Repetition of sentences + Sentence closure) / 2.

* $p < .05$; ** $p < .01$
CHAPTER FOUR

Discussion

Did this research project demonstrate that teaching phonological awareness pays off? Yes and no. The first issue to consider is the generalizability of the results. As indicated earlier, the sample is not a random sample from all Icelandic preschool children, and the children were not randomly allocated to groups. This limits the validity of the research. However, no obvious characteristics are specific for this group of children; they look like typical Icelandic children, at least like typical five-year-old Reykjavikings! Therefore, the choice was made to treat the data as generalizable, that is, inferential statistics were computed and a level of significance set.

The question at the beginning of this section is very important. Phonological awareness as a predictor of reading skills, and as a device for decreasing reading difficulties, is considered of enough importance to be included in the curriculum of many schools. Researchers have found that phonological-awareness skills predict reading skills. The correlation between the two, $r = .54 - r = .57$, in this research indicates that reading and phonological awareness share approximately 30% of their variances. This is within the range of frequently encountered figures in the research literature.

The positive answer to the question as to whether phonological-awareness instruction is valuable was demonstrated here by the fact that significant differences were obtained between groups who learned MM and groups who did not. The differences were obtained by using an experimental design that should allow causal conclusions. Here, as frequently happens in educational research, the experiment transformed into a quasi-
experiment because the groups were intact some years before. Unexpected preexisting
differences between groups and lack of control for extraneous variables were the main
difficulties in deriving conclusions.

One main conclusion is that phonological-awareness instruction in the form of
Markviss málörvun is useful for teaching phonological-awareness skills in preschool, that
is, the children’s phonological-awareness skills of rhyming, syllable analyzing, and
phoneme synthesizing were increased. This relates to the debate nine years ago between
Wagner et al. (1994) and Blachman (1994) on the stability of phonological awareness.
The results obtained here indicate that even though phonological awareness increases
with age, it can be influenced by instruction, a similar conclusion to that of Ehri et al.
(2001), who found from their meta-analysis that phonemic awareness was alterable. The
phonological awareness here was only partly phonemic but mainly devoted to larger
phonological units, because the children were young \(M = 64\) months when they started
in the MM program. Both phonemic and phonological awareness, as measured here, are
alterable.

The negative answer to the question on the value of phonological-awareness
instruction is related to its connection with reading skills. Are the phonological-
awareness skills learned in MM generalizable to reading? Well, measured one year
earlier, they predicted reading skills at the end of first grade, but there were other, more
powerful predictors. Grapheme knowledge, language skills, and age were the best
predictors for reading in first grade. This seems to be contradictory to the picture given
by the correlation between first-grade reading and potential predictors (see Table 10). Not
unexpectedly, the relationship between grapheme knowledge and first-grade reading produced the largest Pearson’s coefficient, \( r = .65 \). Other variables, among them phonological awareness, correlated with first-grade reading. Just by looking at the correlation coefficients, variables with the strongest correlation with reading might be chosen as the best predictors. Age would not be one of them \( (r = .19) \). The multidimensional look obtained by multiple regression provided the possibility for sorting out the best predictors, by considering their correlation or overlap with other variables. The results of this endeavor to predict first-grade reading did not favor the phonological-awareness measures.

Nonetheless, the measured variables shared variances with phonological awareness and reading, and with each other in various ways. By looking at the correlations listed in Table 10, variables that did not correlate with phonological awareness and reading are hard to find.

Is it possible to construct a tempting, but possibly unfair, analogy between fixing deficits in visual organization, hoping they would generalize to reading, and fixing deficits in phonological awareness, hoping they would generalize to reading? As mentioned earlier, no empirical support was found 30 years ago for the hope expressed in the first part of the analogy (Buckland et al., 1973, as cited in Dalby et al., 1992, p. 113). The hypothesized decrease in remedial reading as a consequence of teaching phonological awareness was nonsignificant in this study. That the MM children and the no-MM children seemed unlikely to be different was disappointing, and the results seemingly supported the latter half of the proposed analogy. But a practical school
psychologist might say here: “Isn’t it important to reduce the number of children in remedial reading from 19.4% to 7.5%?” Another, statistically knowledgeable school psychologist would likely answer, being 95% sure, “But the reduction is probably just a coincidence in this particular group!” So, let us look briefly at this scenario from a pragmatic point of view. There is no reason to assume that a reduction in remedial reading would be obtained by avoiding phonological-awareness instruction. Available research, as mentioned earlier, tends to support the instruction. Therefore, one-tailed significance testing stands to reason, and produced here $p = .07$, fulfilling a level of significance set at $\alpha = .10$. Even though a $\alpha = .05$ level of significance is customary and an arbitrary cut off point, it is not necessarily the final truth. Some even maintain that most null hypotheses are probably false anyway. Questioning how likely results are to match such hypotheses might, therefore, not always make sense. An overview of the debate on null-hypothesis testing was given by Krueger (2001) who wrote, “The lack of significance does not establish the truth of the null hypothesis . . .” (p. 18). Translated to the current data: the lack of significant differences (as documented in Chapter 3) in remedial-reading qualifications does not make it true that there is no difference between groups with and without MM instruction. With a slackened level of significance, there seems to be an advantage in having learned MM in preschool. The analogy between the myth of visual organization and phonological awareness is unfair in light of the obtained results in this study. The indication that the MM instruction, compared with no MM, provided fewer poor readers was interesting but not unequivocal because other potential explanations were not ruled out. Different prior skills of the children might explain this
result, as would possible biases in the teachers’ grading. Here, more research is needed because no measures were taken to sort out other potential influences. The interrelationship mentioned above—of phonological awareness, language, and other reading-related skills—justifies caution. The data also suggest that the instruction might not affect all children similarly. In addition to children qualifying for remedial reading services, boys and girls might provide different subgroups in further considerations of the advantages of phonological-awareness instruction. In this study, the subgroups were too small to provide solid evidence of the differential effects of phonological-awareness instruction.

Solid inferential statistics for girls and boys separately was not obtainable because of the skewed gender ratio in some of the groups. The boys in first grade seemed to gain more in reading from the MM instruction than the girls. For description, the between-subjects effects from running Manova were as follows: \( F_{\text{boys}} = 5.1; p = .028; F_{\text{girls}} = .2; p = .647 \). In Table 11, the means and standard deviations of the first-grade reading scores for boys and girls are displayed.
Table 11

Reading Skills of Girls and Boys with and without MM Instruction

<table>
<thead>
<tr>
<th></th>
<th>Reading skills in first grade</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Girls ($n = 51$)$^a$</td>
<td>Boys ($n = 64$)$^b$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>MM$^c$ instruction</td>
<td>2.9</td>
<td>.69</td>
<td>2.7</td>
</tr>
<tr>
<td>No MM instruction</td>
<td>3.0</td>
<td>.95</td>
<td>2.1</td>
</tr>
</tbody>
</table>

$^a$Girls: MM instruction: $n = 39$; no MM instruction: $n = 12$

$^b$Boys: MM instruction: $n = 48$; no MM instruction: $n = 16$

$^c$MM: Markviss málörvun. The method used to teach phonological awareness.

Grapheme knowledge is a classic predictor of reading skills, classic because information on the relationship between the two is frequently met in old and newer publications on reading research. To improve reading skills, a traditional letter-sound training alone does not seem to work as well as phonological-awareness training, especially combined with letter-sound training (e.g., Ehri et al., 2001). Why then is grapheme knowledge such a powerful predictor?

In an article three years ago, Schneider, Roth, and Ennemoser (2000) traced the history of research on linking phoneme awareness and grapheme knowledge in reading instruction back to Bradley and Bryant in 1985 (cited in Schneider et al.). As indicated earlier, linking phonemes and graphemes, or letter-sound training, is a much older tradition in reading instruction (e.g., Ísak Jónsson, 1946). In Schneider et al.’s research, children at risk for reading difficulties were randomly allocated to one out of three instruction forms: phonological awareness, letter-sound training, or a combination of the two. As expected, from the combination came the best readers. The groups learning
phonological awareness outperformed others on it, which is not surprising, considering the results of this study. Children can be taught phonological awareness.

To figure out why the combined instruction works better than letter-sound training only or phonological-awareness training only, might require asking other questions, both about phonological awareness and about other qualities. Certainly, phonological awareness is easier and broader than the narrow phonemic awareness (e.g., Schneider et al., 2000). There are various indications of an earlier mentioned hierarchy of phonological-awareness skills, where phonemic skills are not easy for most five-year-old children. Could it be that a typical letter-sound training at that age involves much too advanced phonemic awareness requirements? Could a combination of two training programs—for example, phonological-awareness training and letter-sound training—contain more varied activities and, thus, simply be more fun and more motivating for the children? Sigrún Löve’s tendency, mentioned earlier, to blend grapheme training with the MM program makes sense when considering the results on the combined training. Such an MM program would probably promote more readers to higher grades than an elementary school without the program. Here, further research is needed.

But what is phonological awareness and is it worth learning? It can be trained, as the reader has seen here. It, however, did not stand out as a specific phenomenon that could predict reading skills. Other skills and qualities were more important predictors, because phonological-awareness skills shared much of its variance with other skills. When the main predictor of reading skills, grapheme knowledge, was omitted from a stepwise multiple regression analysis, phonological awareness was contained in a
predictive model. Together with language and age, phonological-awareness skills explained 45.8% of the variance in first-grade reading skills, while a model where grapheme knowledge was inserted, instead of phonological-awareness skills, explained 56.2% of the reading variance. A model with phonological awareness only, gave a shared variance of 29.4% with reading in first grade, while a model with grapheme knowledge only, gave a 43% shared variance. From the data gathered and analyzed here, no final conclusion could be drawn about the reality of the concept of phonological awareness. Nevertheless, the findings support the need for more questioning regarding the concept. Hence, more research on its reality and practicality is needed.

The results from the quasi-experiment on adapted MM instruction were ambiguous. The adapted MM instruction, which should be better adapted to individual needs than the traditional instruction, did not provide significantly better results on phonological-awareness skills. However, differences in reading skills in first grade between the two groups emerged. Changes in the MM curriculum thus require more research. A strong rationale for rejecting the traditional form was not found.

The ceiling effect might be important when looking at the results here. Some researchers have found that initially proficient children gain most from phonological-awareness instruction. Others have found evidence to the contrary. In Ehri et al.’s (2001) meta-analysis, various methodological issues related to different findings were revealed. The lack of difference between the two MM forms might be explained by the most proficient children not having enough room for improvement. By subtracting the phonological-awareness pretest scores from the phonological-awareness post-intervention
scores, a measure for improvement was obtained. When the children in the A group \((n = 35)\), the least phonologically aware, were compared with the children in the C group \((n = 35)\), the most phonologically proficient children, the A group improved their phonological skills significantly more than the C group. The mean improvement score for the children in A was 9.6 but 2.9 for the children in C. This might indicate that group C was closer to the maximum of their phonological-awareness score, the ceiling, than group A, but a measure with greater improvement potential is needed to determine this. When group C was excluded and a stepwise regression analysis run to find the best model for the prediction of first-grade reading skills (adapted-traditional MM instruction included), the best predictors were grapheme knowledge (similar to the total group) and phonological awareness. This model explained approximately 34% of the variance in first-grade reading for the A and B group children. When the instruction, that is, adapted or traditional, was added as the third variable to a predictive model, the model’s shared variance with first-grade reading became 35.5%. The instruction form, therefore, made little difference even though the most proficient group was excluded. The \(t\) values for the two predictors were significant \((t = 2.5, p = .014 - .015)\), but nonsignificant \((t = -1.4, p = .17)\) for the instruction form. These results decrease the plausibility of a ceiling effect being the explanation for not finding significant differences between the adapted and traditional MM.

In light of the above, individual differences and instructional practices might in various ways be important in choosing a preparatory method for reading skills. The preschool teachers preferred the adapted instruction form. According to these teachers,
the children loved the 20-minute instruction period. The preschool children’s attitudes towards the different forms were not evaluated, but anecdotal evidence of their expressed worries about risking absence on the MM days draws attention to the potential motivation of this instruction method. This study and other research even more clearly underscore the necessity of studying differences between instruction programs in light of student motivation. In a recent article, Izard (2002) outlines the lack of empirical evidence regarding the role of emotions when preventive interventions are evaluated. She provides an extensive overview of the relevant literature on this topic, demonstrating that empirical evidence indicates that emotions are motivational. One of her conclusions is that a need “for emotion-centered preventive interventions” is being created because the nurturing of emotions “may often prove inadequate” (p. 31). The preventive intervention researcher here is among the culprits who have disregarded the role of emotions. For her, having to emphasize the importance of considering motivational aspects in phonological-awareness instruction research seems therefore well deserved. As indicated earlier, the MM assignments are game-like activities. Thus, MM might be at least partly useful for teaching phonological awareness because its amusing games appeal to children. The games were contained in both the traditional and the adapted approach, which might explain the equality of the two instruction forms for teaching phonological awareness.

An interesting finding was that age predicted reading skills and phonological awareness for the total group. This means that children born in the first months of the year have a head start, compared with children born, for example, in October - December. The entrance cutoff for first grade is the end of the year. A delayed school entry is no
longer used in Iceland but still applies in some countries. In the U.S., this practice is sometimes called “redshirting.” Graue and DiPerna (2000) looked at school records from over 8,000 third graders and found that 7% of them had been redshirted. Redshirting is related to the previously mentioned concept of school readiness, but research has not demonstrated advantages for the redshirted over the nonredshirted students, who are of equal age (Cameron & Wilson, 1990; Graue et al.; Shepard, 1997). The power of age in the multiple regression model was its independence, but not really, because age was such a good predictor. The shared variance with reading and phonological awareness was well below 10%.

Gender did not predict phonological-awareness skills nor reading skills. Therefore, the gender ratio, 1 girl to 12 boys, in the group that qualified for remedial reading services was surprising. In an earlier study of reading scores and remedial reading referrals of approximately 3600 children in 3d - 6th grade in Reykjavik, the gender ratio among the lowest scoring children varied somewhat for the four grades, sometimes in favor of the boys and sometimes the girls, but the ratio never exceeded 1:3 (Guðrún Bjarnadóttir, 1993). The ratio here, 1:12, looks like a rare coincidence. If not—and later research reveals that this is a typical gender ratio in first grade in Reykjavik—questions regarding the grading of first graders, teacher bias, and fundamental differences between first grade children and older ones must be asked. But for now, coincidence can suffice as an explanation.

Another gender-related thought emerged when the data were inspected. Although lacking statistical significance for support, boys seemed to gain more than the girls from
being phonologically aware. As mentioned earlier, the few children in the non-MM group and especially in the traditional-MM group, justify replications of the comparisons with larger groups. When a best-fit model for reading in first grade was sought separately for girls and boys, by using stepwise multiple regression, grapheme knowledge was, as for the whole group, the best predictor ($p = .000$). Grapheme knowledge was, however, the only good predictor for the girls, indicating a 46.2% shared variance. For the boys, language and phonological-awareness skills in addition to grapheme knowledge were suggested as appropriately fitting into a predictive model, which explained 64.8% of the variance in first-grade reading. With the variables in this study, it seems more difficult to predict girls’ reading skills than those of boys. This is a very interesting conclusion, deserving a closer look. This state of affairs might obviously be specific for this group of children and, therefore, pure coincidence, but if not, good predictors for both boys and girls must be found if predicting reading skills is to help reduce reading problems.

Early intervention to prevent reading difficulties and enhance children’s reading ability is the underlying reason for implementing MM instruction and other phonological-awareness instruction programs. A consensus on an early intervention emphasis on the prevention of reading difficulties requires a solid research base, however. As long as the empirical evidence provides more questions than answers, interesting paths lie ahead in research and intervention. Whether the final itinerary includes phonological awareness, grapheme knowledge, nurturing of children’s emotions, a variety of instruction, children’s birth dates for school entrance, or other elements, remains to be seen. But, at least, phonological-awareness instruction is a path that merits still further exploration.
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APPENDIX A

Consent Form

Ég undirrituð/-aður, foreldri ______________________________________, gef hér nafn barns

_____________________________________________________________________

nafn foreldris/orráðamanns
APPENDIX B

Information Letter

Reykjavík, 19. sept. 1999

Kæru foreldrar/forráðamenn.


Mikilvægt er fyrir okkur sem að þessu verkefni stöndum að fá leyfi ykkar til að leggja ýmis hljóðgreiningarverkefni o.fl. fyrir börnin í upphafi vetrarstarfsins, til þess að meta stöðu hvers og eins. Gert er ráð fyrir að sú prófun farí fram á næstu vikum. Þið verðið láutí vita fyrirfram hvenær röðin kemur að ykkar barni svo þið getið verið viðstödd ef þið óskið þess og hafið tók á.

Skráning niðurstaðna verður með þeim hætti að kyn og aldur barns verður skráð á prófblöðin. Jafnframt er þar skráð leyninúmer barnsins, en sú tala er hvergi tengd nafni barnsins nema á blaði því sem inniheldur greiningarlykillin. Undirrituð, sem er verkefnisstjóri með þessu verkefni, hefur ein aðgang að greiningarlykli, en ykkur er velkomíð að sjá niðurstöður ykkar barns. Greiningarlykillinn verður varðveittur í þau tvö til þrjú ár sem verkefní stendur yfir, en þá verður honum eytt ásamt öllum frumgögnnum prófanna.

Ykkur er að sjálfsögðu í sjálfstæðu sett hvort ykkar barn tekur þátt í þessu starfi. Við metum það mikils ef barn ykkar tekur þátt, og það gefur réttari mynd af því hvenig þessi núja skipan mála reynist. Því er þess farið á leit við ykkur að gefa samþykki með undirskrift á neðri hluta þessa bréfs.

Ef þið hafið spurningar varðandi samstarfsverkefni eða ofannefnda próf, eruð þið hvött til að hafa samband við undirritaða í síma xxx xxxx. Skilaboð má lesa inn á símsvara með símanúmeri xxx xxxx. Tölvupóstfang er xxx@xxx.is ef ykkur finnst sú leið þægilegri.

Med bestu kveðju og fyrirfram þakklæti.

Guðrún Bjarnadóttir, verkefnisstjóri
### APPENDIX C

**Rhyming-Skills Evaluation**

**Fall (pretest):**
- ljós
- fótur
- kaka
- skjár
- líma
- borðið
- flís
- bakari
- vettlingurinn
- togaðu
- diskarnir
- eyjarnar
- prentari

**Spring (posttest):**
- mýs
- gjóta
- raka
- snjór
- lána
- ferðin
- fló
- rakari
- þyrsklingurinn
- sogaði
- töskurnar
- græjurnar
- skammtari
APPENDIX D
Syllable-Analyzing Evaluation

**Fall (pretest):**
sími
dós
leikskóli
kona
strákurinn
ber
appelsína
Heiðarborgarbarn (Rauðaborgarbarn)
röluvöllur
garðurinn
hitamælirinn
hús
bollastell
hanakambur
hesthús
matardiskarnir

**Spring (posttest):**
spóla
lím
Viðarás
eyra
stelpurnar
gos
apaköttur
kappakstursbillinn
krökódilar
hjólabrettagaur
bók
kafari
saunastofa
myndband
búðarmaðurinn
APPENDIX E
Protocol for the Experimental Group. Adapted MM.

Hópur A (Group A):
12.-16. okt.

mán. 1A (Hlustað á hljóð)
   2A (En hvað það var skrítð, klappa 3-4 hendingar)
   2D (ís-flis/hæna; már-lag/hár; dós–lim/rós; Kalli-Palli/Siggi; úr-
       bör/klukka; fára-ganga/bara)
miðv. 2A (Segðu það börnum, klappa 3-4 hend.)
   2D (úr-búr/klukka; sól-tungl/gól; Bína–Stína/Bogga; foss-koss/vatn;
       bátur-kátur/skip; kútur-bútur/belgur)
   1B (t.d. fletta, slá takt m. fætinn, anda, krypla saman pappir)
föst. 1A (Hlustað á hljóð)
   3A (Hugtakið setning lagt inn)
   2A (klippa, rífa, fletta, smella tönum, anda, tvö hljóð í röð)
19.-23. okt.

mán. 2A (næsta ljóð)
   1C (Jakob, hvar eft þú?)
   2B (Kindur järma)
   2D (rím, e-ð sem áður er komið)
miðv. 1B (5-6 hljóð)
   3A (Hugtakið setning)
   2E (Dýrarím)
   2F (1-6)
föst. 1A (Hlustað á hljóð)
   1C (Jakob, hvar eft þú?)
   2B (næsta)
   2F (4-9)
26.-30. okt.

mán. 1F (a)
   2B (næsta)
   2D (orð i bókinni)
miðv. 2A (næsta með klappi)
   3A (Setning)
   1A (Hlustað á hljóð)
   2G (Hvað er í “pokanum”? Þ.e. efri hluti bls., ekki álvarupoki)
föst. 2B (næsta)
   2G (Hvað er í “pokanum”?)
   3A (öll börnin segja setningu)
02.-06. nóv.

mán. 1A (Hlustað á hljóð)
   1E (Hver segir hvað?)
   Ríma við dýranófn og dýrahljóð í 1E
   2H (Hvað eru þau að geða?)
miðv. 1C (Jakob, hvar eft þú?)
1H (Hvíslleikur)
2B (næsta þula)
2G (Hvað er í “pokanum”?)
föst. 2A (með klappi)
2H (Hvað eru þau að gera?)
3A (öll börnin segja setningu)

9.-13. nóv.
mán. 1E (Hver segir hvað?)
3B (Hugtakið orð, liður 1. Kenn.býr til setn., börnin hafa kubba og gera eins)
1H (Hvíslleikur. Lógð áhersla á að nú er verið að láta ORÐ ganga)
miðv. 1G (Rugl, saga í bók)
3B (Sbr. síðustu viku)
2A (næsta ljóð með klappi)
föst. 2E (Dýrarím)
2D (ís-flís/hæna; már-lag/hár; dós–lim/rós; Kalli-Palli/Siggi; úr-búr/klukka; fara-ganga/bara)
1K (Hver er með boltann?)

16.-20. nóv.
mán. 3B (Hugtakið orð, liður 1.)
2F (Getur þú rímað?)
2A (Stutt rímað ljóð með klappi)
miðv. 1K (Hve oft?)
3C (Æfingar með orð og setningar)
1H (Hvisla orði)
föst. 2G (Hvað er í “pokanum”?)
3C (Æfingar með orð og setningar)
1L (Nafnaleikur)

23.-27. nóv.
mán. 1K (Hve oft?)
3C (Æfingar með orð og setningar)
1I (Minnisleikur)
miðv. 4A (Klappa nöfn – bara fornañíð)
4B (Að taka hluti úr kassanum)
3C (Æfingar með orð og setningar)
föst. 1L (Nafnaleikur)
4B (Að taka hluti úr kassanum)
3C (Æfingar með orð og setningar, ath. vel að små þyngja, sbr. athugasemd í bók)
1A (Hlustað á hljóð)

11.-15. jan.
mán. 2A (Næsta ljóð, muna að klappa hrynjandi öðruvisi (t.d.ekki m.lófunum) en samstöfur)
3C (Æfingar með orð og setningar, kubbar)
3D (Æfing með stutt/löng orð. Hafa orðin á spjöldum. Má nota klapp til að meta lengdina á orðunum)
miðv. 2B (þula að eign vali)
Rifja stuttlega upp rim
2H (Hvað eru þau að gera? Ath. hér þarf að ljósrita)
3D (Æfing með stutt/löng orð, sbr. mán.)

föst. 3E (Leikur að setningum og orðum, dæmi nr. 1)
3C (Æfingar með orð og setningar, kubbar)
3C áfram en teikna nú kubba á bláð, einn f. hvert orð, fyrir 2-3 setningar
  t.d.: ég heiti Jóna (ᚦᚦᚦᚦ) (hver notar eigið nafn) – ég er að læra um orð
  (ᚦᚦᚦᚦ) – ég á heima í Seláshverfi (ᚦᚦᚦᚦ). Benda á hvern kubb og
  “lesa” hann.
2C (Flækjumamma, ef tími vinnst til)

18.-22. jan.
  mán. 3C (Eins og síðast, prófa að teikna kubban (ef börnin ráða ekki við það,
        þá taka alvörukubba áfram). “Lesa” kubban í rétttri röð. Dæmi um
        hugsanlegar setningar: Ég heiti “Páll Jónsson”. Ég á bláar buxur heima.
        Ég á heima á/i “götunafn”.
  miðv. 3F (Ljúktu við setninguna - taka líka Tilbrigði)
        2A (Sú vinselasta af þeim gömlu ef tími vinnst til)
  föst. 3C (Æfingar með orð og setningar, dæmi nr. 2)
        3D (Æfing með stutt/löng orð)
        4D (Hlusta fyrst, présa svo)
        4F (Óskaleikurinn)

25.-29. jan.
  mán. 4E (Tröllævintýrið)
        4G
        3F (Ljúktu v. setninguna, fyrri hluti, þ.e. áhersla á að finna hve mörg orð)
  miðv. 3E (Leikur að setn. og orðum, dæmi nr. 2)
        3D (Æfing með stutt/löng orð)
        4D (Hlusta fyrst, skoða svo; ef tími vinnst til þá raða orðum eftir lengd)
  föst. 3G (Orðapúsl)
        4E (Tröllævintýrið)
        4F (Óskaleikurinn)
        2B (næsta/nýtt, ef tími vinnst til)

01.-05. feb.
  mán. 5A (Nafnaþraut)
        3G (Orðapúsl)
        4G (Samstöfubolti)
  miðv. 5B (Að finna hlut, fyrsti hluti, stutt kynning)
        3D (Æfingar með stutt/löng orð.)
        4G (Samstöfubolti)
        4C (Þrautakóngur, ef tími vinnst til)
  föst. 5A (Nafnaþraut)
        5B (Að finna hlut, fyrsti hluti, fleiri orð en síðast)
        3H (Ljúktu við orðið)
        4F (Óskaleikurinn)

08.-12. feb.
  mán. 5A (Nafnaþraut)
5B (Að finna hlut)
4D (Hlusta fyrst, skoða svo; hér þarf myndir)
4C (Þrautakóngur, ef tími gefst)

miðv. 4B (Að taka einn hlut úr kassanum)
5B (Að finna hlut, stutt upprifjun)
5C (Ég hugsa um, - fyrst kennari, svo leyfa 1-2 börnum að prófa)
2B (Velja e-ð vinsælt)

fóst. 3D (Æfing með stutt/lóng orð)
5B (Að finna hlut - stutt upprifjun og Tilbrigði)
4F (Óskaleikurinn)

15.-19. feb.
mán. 3G (Orðapúsl)
4B (Að taka einn hlut úr kassanum)
4C (Þrautakóngur)
miðv. Öskudagur
fóst. 5B (Að finna hlut, tilbrigði, - enn er bara unnið með forhljóðið)
2J (Setningarím)
3F (Ljúktu við setninguna, Tilbrigði, samtal með kubbum)
2C (Flækjumamma)

22.-26. feb.
mán. 5C (Ég hugsa um, rifja stutt upp og svo: Tilbrigði)
3C (Æfingar með orð og setningar, kubbar)
4G (Samstöfubolti)
miðv. 3D (Æfingar með stutt/lóng orð)
5C (Ég hugsa um: Tilbrigði))
3F (Ljúktu við setninguna, Tilbrigði, samtal með kubbum)
fóst. 5D (Hljóð tekið burtu, útskyrt sbr. inngang, taka svo 1. dálkinn)
5C (Ég hugsa um: Tilbrigði))
4C (Þrautakóngur)

01.-05. mars
mán. 5D (Hljóð tekið burtu, rifja upp og taka 2. dálkinn)
4E (Trölllaevintyríð)
4G (Samstöfubolti)
miðv. 5D (Hljóð tekið burtu, 3. dálkur og þrjú fyrstu orð í 4. dálki)
5C (Ég hugsa um: Tilbrigði)
3F (Tilbrigði, samtal með kubbum)
2B (frjálst val)

föst. 5D (Hljóð tekið burtu, 4. dálkur allur)
5D (börnin prófa að taka sjálf fyrsta hljóðið framan af eigin nafni)
5B (Að finna hlut, en nú finna börnin sjálf í huganum orð sem byrja eins)
5F (Köngulóarvefurinn, stutt)

08.-12. mars
mán. 5D (Hljóð tekið burtu, 5. dálkur)
5C (Ég hugsa um)
5F (Köngulóarvefurinn)
3I (Að bala afturátak I, ef tími vinnst til)
miðv. 5C (Ég hugsa um)
5B (Að finna hlut, börnin finna sjálf orð sem byrja eins)
15.-19. mars ( = vika 2 í B)
mán. 4F (Óskaleikurinn)
5A (Nafnaþraut)
5B (Að finna hlut, kenn. segir 3 orð, 2 með sama forhljóði og eitt öðruvisi, börnin finni hvað byrjar eins)
miðv. 4F (Óskaleikurinn)
4G (Samstöfuboltsi)
5C (Ég hugsa um, smáauka Tilbrigðaþáttinn (þ.e. börnin búa til gátur)
föst. 5D (Hljóð tekið burt, inngangur og 1.dálkur fyrri síða)
4G (Samstöfuboltsi)
4E (Trölllaevintýrið)

22.-26. mars
mán. 5A (Nafnaþraut)
5B (Að finna hluti, nota hluti í herberginu)
2L (Frjálst rím)
miðv. 2B (næsta þula)
5C (Ég hugsa um…)
5D (Hljóð tekið burt, 2.dálkur, fyrri bsl.)
föst. 2L (Frjálst rím)
5D (Hljóð tekið burtu, 3.dálkur)
3D (Stutt/löng orð)

29. m.-09. apr. Páskahlé (dymbilvika og næsta vika á eftir)
12.-16. apr.
mán. 3D (Stutt/löng orð)
5D (Hljóð tekið burtu, 4.dálkur)
2B (næsta þula)
miðv. 2L (Frjálst rím)
2K (Ljóðabók)
föst. 3F (- tilbrigði, samtal með kubbum)
2K (Klára Ljóðabók frá miðvikud.)
2H (Hvað eru þau að gera?)

Hópur B (Group B):
12.-16. okt.
mán. 1A
2B (Kindur jarma)
3E
3A
miðv. 1B (t.d. fletta, slá takt m. fættnum, anda, kryppla saman pappír)
2B (næsta þula)
3A
3B
föst. 1B (ný hljóð, 5-6)
2A (1. ljóð með klappi í 3-4 hendingar)
19.-23. okt.
mán. 2A (næsta ljóð með klappi)
 2D (Orðin í bókinni)
 1C (Jakob, hvar ert þú?)
miðv. 2B (næsta þula)
 3B
 3C (Æfingar með orð og setn.)
föst. 2A (næsta ljóð með klappi)
 2E
 3C (Æfingar með orð og setn.)
klappa orðin úr 3C, kubbaordín

26.-30. okt.
mán. 2B (næsta þula)
 3C
 4A (bara fornafnið)
miðv. 2B (næsta þula)
 2F
 4A
 4B
föst. 2G
 3C (Æfing með orð og setn., nota kubba)
 4C

02.-06. nóv.
mán. 2A (næsta m. klappi)
 3D (má nota klapp til að finna lengdina í byrjun)
miðv. 3E
 3F
 4B (Að taka hlut úr kassanum)
föst. 3F
 4C (Þrautaköngur)

9.-13. nóv.
mán. 2A (næsta með klappi)
 3C (Æfing með orð og setn., nota kubba)
 3D (Æfing með stutt/löng orð. Hafa orðin á spjöldum, má nota klapp)
miðv. 2B (e-r skemmtileg þula af þeim sem ádur hafa verið teknar)
Rifja stuttlega upp rim.
 2H (Hvað eru þau að gera?)
 3D (Æfing með stutt/löng orð. Hafa orðin á spjöldum, má nota klapp)
föst. 3E (nota aðra þulu en á miðv. í s.l. viku)
 3C (Æfing með orð og setn., nota kubba)
 3C áfram en teikna nú kubba á blað, einn f. hvert orð, fyrir 2-3 setningar
t.d.: ég heiti Jóna (Þróðr) (hver notar eigið nafn) – ég er að læra um orð
(Þróðr) – ég á heima í Seláshverfi (Þórguð). Benda á hvern kubb og
“lesa” hann.

16.-20. nóv.
mán. 3C (Eins og síðast, prófa að teikna kubbana (ef börnin ráða ekki við það,
þá taka alvörukubba áfram). “Lesa” kubbana í réttri röð. Dæmi um
hugsanlegar setningar: Ég heiti “Páll Jónsson”. Ég á bláar buxur heima.
Ég á heima á/i “götnafrn”.
3F (Seinni hlutinn - tilbrigði)
2A (Sú vinselast af þeim gömlu ef tími vinnst til)
miðv. 3F (Ljúktu við setningar)
2A (Ljóð að eigin vali, með klappi)
4B (Að taka hlut úr kassanum.)
föst. 4C (Þrautakóngur)
4D (Hlusta fyrst, skoða svo)
4F (Óskaleikurinn)

23.-27. nóv.
 mán. 4E (Tröllævintýrið)
4G
3F (Fyrri hlut, ljúktu v. setninguna)
miðv. 3E (nýtt ljóð)
3D (Æfing með stutt/löng orð)
4D (Hlusta fyrst, skoða svo; ef tími vinnst til þá raða orðum eftir lengd)
föst. 3G (Orðapúsl)
4E (Tröllævintýrið)
2B (næsta/nýtt)

11.-15. jan.
 mán. 5A (Nafnaðraut)
5B (Að finna hlut, inngangur að Tilbrigði)
4D (Hlusta fyrst, skoða svo; hér þarf myndir)
4C (Þrautakóngur, ef tími gefst)
miðv. 4B (Að taka einn hlut úr kassanum)
5B (Að finna hlut, stutt upprifjun)
5C (Ég hugsa um, - fyrst kennari, svo leyfa 1-2 börnum að prófa)
2B (Velja e-ð vinsælt)
föst. 3D (Æfing með stutt/löng orð)
5B (Að finna hlut - stutt upprifjun og Tilbrigði)
4F (Óskaleikurinn)

18.-22. jan.
 mán. 4F (Óskaleikurinn)
5A (Nafnaðraut)
5B (Að finna hlut, kenn. segir 3 orð, 2 með sama forhljóði og eitt öðruvisi,
börnin finni hvað byrjar eins)
miðv. 4F (Óskaleikurinn)
4G (Samstöfuðbolts)
5C (Ég hugsa um, smáauka Tilbrigðaþáttinn (þ.e. börnin búa til gátur)
föst. 5D (Hljóð tekio burt, inngangur og 1.dálkur fyrri sída)
4G (Samstöfuðbolts)
4E (Tröllævintýrið)

25.-29. jan.
 mán. 5A (Nafnaðraut)
5B (Að finna hluti, nota hluti í herberginu)
2L (Frjálst rím)
miðv. 2B (næsta þula)
5C (Ég hugsa um…)
5D (Hljóð tekið burt, 2. dálkur, fyrrri bls.)
fäst. 2L (Frjálst rím)
5D (Hljóð tekið burtu, 3. dálkur)
3D (Stutt/löng orð)

01.-05. feb.
mán. 3D (Stutt/löng orð)
5D (Hljóð tekið burtu, 4. dálkur)
2B (næsta þula)
miðv. 2L (Frjálst rím)
2K (Ljóðabók)
fäst. 3F (- tilbrigði, samtal með kubbum)
2K (Klara Ljóðabók frá miðvikud.)
2H (Hvað eru þau að gera? Ath. hér þarf að ljósrita)

08.-12. feb.
mán. 5D (Hljóð tekið burtu, 5. dálkur)
5E (Hljóði bætt framan við, inngangur og fyrstu 5-6 orðin)
5F (Kóngulóarvefurinn)
miðv. 5F (Kóngulóarvefurinn)
3C (Æfingar með orð og setningar)
5E (Hljóði bætt framan við, næstu 5-6 orðin)
fäst. 5E (Hljóði bætt framan við, klára ordalistann)
5I (Hvaða hljóð er fremst? Kafli nr. 1)
5G (Fléttan)

15.-19. feb.
mán. 5B (Að finna hlut, upprifjun, hlutur í umhverfi, stutt)
5C (Ég hugsa um...)
5D (Hljóð tekið burtu, upprifjun, blanda úr öllum listum)
5E (Hljóði bætt framan við, blanda úr öllu)
miðv. Óskudagur
fäst. 5B (Að finna hlut, enn er bara unnið með forhljóðið)
5I (Hvaða hljóð er fremst? Kafli nr. 2, og rifja upp e-ð úr nr. 1)
5H (Hlutur í poka, ath. hér þarf að finna hluti)
5G (Fléttan)

22.-26. feb.
mán. 5I (Hvaða hljóð er fremst? Kafli nr. 3, og rifja upp e-ð úr nr. 2)
6A (Tveggja hljóða orð, börnin nota kubba fyrir hljóðin en kennari sýnir líka bókstafina álausum spjöldum og lærur pá renna saman í orð um leið og hún segir hljóðin. Ath. að hér er best að hafa skýra prentstafi á línum spjöldum. Lesa vel innangal)
5B (Að finna hlut, nú er sýndur á spjaldi stafurinn sem er sameiginlegur)
miðv. 5C (Ég hugsa um, -leiðsk. kenn. sýnir stafinn um leið og hún segir hljóðið)
6A (Tveggja hljóða orð, eins og á mán., sömu orð tekinn í annarri röð) Hvert barn finnur spjald með sinum staf, þ.e. 1. staf í nafni sinu. Þau réttu sinn staf þöru barni sem finnur hljóð stafsins með því að finna fyrsta hljóði í nafninu. Reynt að láta hvert barn finna sem flest fyrstu hljóði.
fäst. 5C (Ég hugsa um, leiðsk. kenn. sýnir stafinn um leið og hún segir hljóðið) Leikur með stafi (Stafakassar væru góðir hér, en hvaða lausa stafism er (t.d. stafakubba, en það þarf margar má nota). Börnin leggja þau orð sem þau vilja, með eða án hjálpar annarra barna og fullorðinnan, og nöfn stafanna má nota að vild. Hugsanlega mætti ljúka tímanum með því að leggja örstutta sögu í sameiningu.)
01.-05. mars

mán. 5A (Nafnaþraut, sýna spjald með stafnum einum á)
6A (Veggja hljóða orð, ný orð: lá, út, má, sé, en e-r af “gömlu” orðunum
höfð með, stafirnar sýndir, börnin finni sjálf orð til skiptis)
5G (Flétañ, nýtt orð í hverri umferð)
miðv. 5A (Nafnaþraut, leyfa barni, sem ræður viðpað, að sýna stafaspjöldin)
6A (Börnin finni til skiptis 2ja hljóða orð, kenn. sýnir stafatáknin)
Leikur með stafi, sbr. síðasta fóstud.
öst. 5L a (Hvaða hljóð er síðast?)
6B (3ja hljóða orð)
5L b (Má ég fá?)

08.-12. mars

mán. 5A (Nafnaþraut, leyfa nýju barni að sýna stafaspjöldin)
5L b (Má ég fá?)
6B (3ja hljóða orð)
miðv. 5A (Nafnaþraut, leyfa nýju barni að sýna stafaspjöldin)
6B (3ja hljóða orð, 4ra hljóða ef börnin eru örugg á 2ja og 3ja hlj. orðum)
Leikur með stafi, sbr. síðasta miðvikud.
öst. 5B (Að finna hlut)
5L b (Má ég fá?)
5F (Köngulóarfurefurrinn)

15.-19. mars

mán. 6B/6C (3ja/4ra hljóða orð)
6D, nr. 1 (Hvaða orð er lengst/flest hljóð? Nota kubb fyrir hvert hljóð)
5L b (Má ég fá?)
miðv. 5A (Nafnaþraut, leyfa nýju barni að sýna stafaspjöldin)
6D, nr. 1 (Hvaða orð er lengst/flest hljóð? Nota kubb fyrir hvert hljóð)
6D, nr. 2 (Um hvaða mynd er ég að hugsa. Ath. að finna myndir)
fóst. Finna stórletraða bók sem börnin þekkja þekkja vel (t.d. Depill eða e-ð þ.h.).
Leiksk.kenn. les bókina þannig að öll börnin geti sér leiðir og bendir á
stafina um leið og hún les þá. Nokkur stutt orð úr bókinni lögð með
kubbum (sbr. 6D1) og börnin telja hvort kubbfjöldinn verður jafn
stafafjöldanum.
6D, nr. 5 (Leynimynd. Hér þarf að finna myndir)
5L b (Má ég fá?, ef tími vinnst til)

22.-26. mars

mán. 6D, nr. 5 (Leynimynd. Bæði aðrar og sömu myndir og s.l. fóst.)
6D, nr. 3 (Að gefa gjöf. Ath. að þessi er dálítið erfið og ekki vist hún
gangi nema með hjálp. Hér þarf að finna myndir, en mætti hugsanlega
nota sömu og hafa verið í nr. 5)
5G (Flétan)
miðv. 6B/6C (3ja/4ra hljóða orð)
5L a (Hvaða hljóð er síðast?)
Leikur með stafi, sbr. 1. vk. mars.
fóst. 6D, nr. 2 (Um hvaða mynd er ég að hugsa. Nýjar myndir)
6D, nr. 3 (Að gefa gjöf, en hugsanlega með hjálp, sbr. s.l. manud.)
Finna stórletraða bók sem börnin þekkja (sbr. s.l. fóstud.). Óll börnin
sjái leiðir og fylgi því. Nokkur ný orð lögð með kubbum og borinn saman
stafa- og kubbfjöldi
5L b (Má ég fá?, ef tími vinnst til)

29. m.-09. apr.  Páskahlé (dymbilvika og næsta vika á eftir)
12.-16. apr.
mán. 6D, nr. 5 (Leynimynd, nokkrar nýjar myndir)
6D, nr. 4 (Hlutir í kassa. Hér þarf að finna nefnda hluti. Leiksk.kenn. þarf að meta hvernig hefur gengið áður í t.d. 6D1,2 og 3. Ef e-ð vantar á þar, má byrja hér á að hafa hlutina sýnilega á borðinu og kenn. hljóðar orðið og börnin benda á rétta hlutinn. Eða börnin geta æft sig í sameiningu að hljóða nöfn hlutanna á borðinu. Síðan setja hlutina í kassann og gera eins og lýst er í handbókinni, eða að barnið bara þukli hlutinn (ósýnil.) og hljóði orðið svo)
4G (Samstöfu bolti)
miðv. 4A (Að klappa nöfn. Hvert og eitt barn klappar nafn sitt og fður/móðurnafn, t.d. Árni Jónsdóttir. Hin börnin gisaka á hvað klappad hafi verið.)
6D, nr. 3 (Að gefa gjöf, sbr. síð. tvær vikur)
Leikur með stafi, sbr. fóst. 22. jan.
fóst. Finna stórletraða bök sem börnin þekka (sbr. fóst. 19. febr.). Öll börnin sjái letrið og fylgi því. Nokkur ný orð lögð með kubbur og börnin saman stafa- og kubbafjöldi
Leikur með stafi, sbr. fóst. 22. jan.
5G (Fléttan, ef timi vinnst til)

Hópur C (Group C):
12.-16. okt.
mán. 1A
2A (m. klappi 3-4 hendingar)
4B
5A
miðv. 1B
2B
4A (Bara fornöfnin)
5A
fóst. 5B
3C
2A (m. klappi 3-4 hendingar)

19.-23. okt.
mán. 4B
5C
5A
miðv. 5B
4D
4E
fóst. 4E
2A (m. klappi)
4F

26.-30. okt.
mán. 5B
5C (fyrst kennari, svo leyfa 1-2 börnum að prófa)
4D
miðv. 4B
5C (auka hlut barnanna smám saman)
2B
föst. 2A (m. klappi)
5B (seinni hl. - tilbrigði)
4F
02.-06. nóv.
mán. 4F
5B (kenn. segir 3 orð, 2 með sama forhljóði og eitt öðruvísi, börnin finni hvað byrjar eins)
miðv. 4F
4G
5C
föst. 5D (Hljóð tekið burt, 1.dálkur fyrri síða)
4G
2B (næsta þula)
9.-13. nóv.
mán. 5A (Nafnapraut)
5B (Að finna hluti, nota hluti í herberginu)
2L (Frjálst rím)
miðv. 2B (næsta þula)
5C (Ég hugsa umm…)
9.-13. nóv.
mán. 5A (Nafnapraut)
5B (Að finna hluti, nota hluti í herberginu)
2L (Frjálst rím)
miðv. 2B (næsta þula)
5C (Ég hugsa umm…)
16.-20. nóv.
mán. 3D (Stutt/lóng orð)
5D (Hljóð tekið burtu, 1.dálkur seinni bls.)
2B (næsta þula)
miðv. 2L (Frjálst rím)
2K (Ljóðabók)
föst. 3F (- tilbrigði, samtal með kubbum)
2K ef þórf er á, klára frá miðvikud.
2H (Hvað eru þau að gera? Ath. hér þarf að ljósrita)
23.-27. nóv.
mán. 5E (Hljóði bætt framan við)
4E (Tröllævintýrið)
5F (Kóngulóarvefurinn)
miðv. 5F (Kóngulóarvefurinn)
3C (Æfingar með orð og setningar)
(Ef tími vinnst til: 2B (e-r vinsæl))
föst. 2A (næsta ljóð með klappi)
3C (Æfingar með orð og setningar)
5G (Fléttan)
11.-15. jan.
mán. 5B (Að finna hlut, upprifjun, hlutir í umhverfi, stutt)
5C (Ég hugsa um...
miðv. 5E (Hljóði bætt framan við, klára listann)
5G (Flétan)
5C (Ég hugsa um, Tilbrigði)
5H (Hlutir í poka, ath. hér þarf að finna hlutir)

föst. 5I (Hvaða hljóð er fremst? Kafli 1 og 2)
5B (Að finna hlut)
4E (Tröllaevintýrið)
5F (Köngulóarvefurinn, ef tími gefst)

18.-22. jan.
mán. 5I (Hvaða hljóð er fremst? Kafli 3 og skjóta inn nokkrum orðum úr kaf. 2)
6A (Tveggja hljóða orð, börnin nota kubba fyrir hljóðin en kennari sýnir líka bókstafina álæðum spjöldum og lætur þá renna saman í orð um leið og hún segir hljóðin. Ath. að hér er best að hafa skýra prentstafi á litlum spjöldum. Lesa vel inngang!)
5B (Að finna hlut, nú er sýndur á spjaldi stafrinn sem er sameiginlegur)

miðv. 5C (Ég hugsa um, leiksk.kenn. sýnir stafinn um leið og hún segir hljóðið)
6A (Tveggja hljóða orð, eins og á mán., sömu orð tekin en í annarri röð)
Hvert barn finnur spjald með sínum stafr, þ.e. 1. stafr í nafni sinu. Þau röfta sinn stafr öðru barni sem finnur hljóð stafsins með því að finna fjölda hljóð í nafninu. Reynt að læta hvert barn finna sem flest fyrstu hljóð.

föst. 5C (Ég hugsa um, leiksk.kenn. sýnir stafinn um leið og hún segir hljóðið)
Leikur með stafi (Stafakassar væru góðir hér, en hvaða lausa stafisum er (t.d. stafrænda, en það þarf margar) má nota). Börnin leggja þau stafr sem þau vilja, með eða án hjálpar annarra barna og fullorðina, og nöfn stafanna má nota að vild. Hugsanlega mætti ljúka tímanum með því að leggja örstutta sögu í sameiningu.

25.-29. jan.
mán. 5A (Nafnaþraut, sýna spjald með stafnum einum á)
6A (Tveggja hljóða orð, ný orð: lá, út, má, sé, en e- af “gömlu” orðum höfð með, stafirnir syndir, börnin finnir sjálfr orð til skiptis)
5G (Flétan, nýtt orð í hverri umferð)

miðv. 5A (Nafnaþraut, leyfa barni, sem ræður viðbaðið, að sýna stafaspjöldin)
6A (Börnin finnir til skiptis 2ja hljóða orð, kenn. sýnir stafatáknin)
Leikur með stafí, sbr. síðasta föstud.

föst. 5L a (Hvaða hljóð er síðast?)
6B (3ja hljóða orð)
5L b (Má ég fá?)

01.-05. feb.
mán. 5A (Nafnaþraut, leyfa nýju barni að sýna stafaspjöldin)
5L b (Má ég fá?)
6B (3ja hljóða orð)

miðv. 5A (Nafnaþraut, leyfa nýju barni að sýna stafaspjöldin)
6B (3ja hljóða orð, 4ra hljóða ef börnin eru örrugg á 2ja og 3ja hlj. orðum)
Leikur með stafí, sbr. síðasta miðvikud.

föst. 5B (Að finna hlut)
5L b (Má ég fá?)
5F (Köngulóarfurinn)

08.-12. feb.

mán. 6B/6C (3ja/4ra hljóða orð)
6D, nr. 1 (Hvaða orð er lengst/flest hljóð? Nota kubb fyrir hvert hljóð)
5L b (Má ég fá?)

miðv. 5A (Nafnafraut, leyfa nýju barni að sýna stafaspjöldin)
6D, nr. 1 (Hvaða orð er lengst/flest hljóð? Nota kubb fyrir hvert hljóð)
6D, nr. 2 (Um hvaða mynd er ég að hugsa. Ath. að finna myndir)

föst. Finna stórletraða bók sem börnin þekkja vel (t.d. Depill eða e-ð þ.h.).
Leiksk.kenn. les bókina þannig að öll börnin geti séð leið og benda á stafina um leið og hún les þá. Nokkur stutt orð úr bókinni lögð með kubbum (sbr. 6D1) og börnin telja hvort kubbafjöldinn verður jafn stafafjöldanum.
6D, nr. 5 (Leynimynd. Hér þarf að finna myndir)
5L b (Má ég fá?, ef tími vinnst til)

15.-19. feb.

mán. 6D, nr. 5 (Leynimynd. Bæði aðrar og sömu myndir og s.l. föst.)
6D, nr. 3 (Að gefa gjöf. Ath. að þessi er dálítið erfið og ekki víst hún gangi nema með hjálp. Hér þarf að finna myndir, en mætti hugsanlega nota sömu og hafa verið í nr. 5)
5G (Flétтан)

miðv. Öskudagur

föst. 6D, nr. 2 (Um hvaða mynd er ég að hugsa. Nýjar myndir)
6D, nr. 3 (Að gefa gjöf, en bara ef það hefur gengið s.l. mán)
Finna stórletraða bók sem börnin þekkja (sbr. s.l. föstud.). Öll börnin sjáí leiðið og fylgi því. Nokkur ný orð lögð með kubbum og borinn saman stafa- og kubbafjöldi
5L b (Má ég fá?, ef tími vinnst til)

22.-26. feb.

mán. 6D, nr. 5 (Leynimynd, nokkrar nýjar myndir)
6D, nr. 4 (Hlutir í kassa. Hér þarf að finna nefnda hluti. Leiksk.kenn. þarf að meta hvernig hefur gengið áður í t.d. 6D1,2 og 3. Ef e-ð vanrar á þar, má byrja hér á að hafa hlutina sýnilega á bordinu og kenn. hljóðar orðið og börnin benda á réttu hlutinn. Eða börnin geta æft sig í sameiningu að hljóða nöfn hlutanna á bordinu. Siðan setja hlutina í kassann og gera eins og lýst er í handbókinni, eða að barnið bara þukli hlutinn (ósýnil.) og hljóðið orðið svo)
4G (Samstöfbolti)

6D, nr. 3 (Að gefa gjöf, sbr. síð. tvær vikur)
Leikur með stafi, sbr. föstud. 22. jan.

föst. Finna stórletraða bók sem börnin þekkja (sbr. fóstud.19. feb.). Öll börnin sjáí leiðið og fylgi því. Nokkur ný orð lögð með kubbum og borinn saman stafa- og kubbafjöldi
Leikur með stafi, sbr. fóstud. 22. jan.
5G (Flétтан, ef tími vinnst til)
01.-05. mars
mán. 6D, nr. 3 (Að gefa göf)
6D, nr. 1 (Hvæða orð er lengst, nýjar myndir eða orðapör sem e-r segir)
5L b (Má ég fá?)
miðv. 5B (Að finna hlut; Erfiðara, þ.e. finna eins orð skv. síðasta hljóði)
Fjáls teikning. Meðan barnið er að teikna skrifar leiksk.kenn. skýrt hjá
myndinni 2-3 setn. sem barnið segir um myndina og les orðin um leið
fyrir barnið. Þau “lesa” sínar setn. hvert fyrir annað.
Myndunum safnað saman.
föst. Fjáls teikn. frá því síðast, myndirnar hafa nú verið ljósritaðar í hefti
handa hverju barni. Allar sögurnar lesnar saman.
6D, nr. 1 (Hvæða orð er lengst, nýjar myndir eða orðapör sem e-r segir)
5B (Að finna hlut, orð sem enda eins)

08.-12. mars
mán. 6D, nr. 1 (Hvæða orð er lengst, örfá orðapör sem e-r segir)
6D, nr. 3 (Að gefa göf)
5La (Hvæða hljóð er síðast? Reyna líka: Næst fyrst, næst síðast)
5K (Að bala afturátak II)
miðv. Lesin saga með stóru letri (sbr. föst. 19. febr. o.víðar)
6D, nr. 4 (Hlutir í kassa)
6E (Giskað á orð, ath. hér þarf myndir)
föst. 6F (Tröllavéntýrið 2)
6G (Finndu stystra/lengsta orðið)
6H (Nagrannar, notið 3-4 þrígga hljóða orð)
5F (Kóngulóarvæfurinn) (Endurmat á stóðu hópsins, of
hratt/hægt, fundur haldinn 11.3)
15.-19. mars (Áætlun þessarar viku unnin á fundi 11.3.)
mán. 5A (Nafnaþraut)
4F (Óskaleikurinn. Börnin ráða hvort þau óska í samstöfum eða hljóðum.)
5B (Að finna hlut, innangangur og tilbrigði)
miðv. (5A)
Stafír, sbr. 22. jan.
föst. 5A (Nafnaþraut)
4F (Óskaleikurinn. Börnin ráða hvort þau óska í samstöfum eða hljóðum.)
5C (Ég hugsa um. Börnin búi til gátuna sjálf.)
5D (Hljóð tekið burtu)

22.-26. mars
mán. 5A (Nafnaþraut)
5D (Hljóð tekið burtu, önnur orð en s.l. föst.)
5L, b. (Má ég fá?)
6F (Tröllavéntýrið 2. Stutt (u.p.b.2 börn). Leikskólakenn. er Tröllið, en
nú mætti reyna hvort börnin geta “tekið við göfinni” með því að
endurtaka fyrst hljóðun leikskólakennarans og segja svo orðið Þau
börn sem eiga í erfiðleikum hér fá “styttri” gjaferir.)
miðv. 5A (Nafnaþraut)
5D (Hljóð tekið burtu, önnur og førri orð en s.l. föst.)
5E. (Hljóði ðað framan við.)
6F (Tröllavéntýrið 2. Eins og á mánud. en nú hin börnin í höpnum, og
hugsanlega 2. umferð ef tímí vinnst til.)

föst. 5L, b. (Má ég fá?)
  5E (Hljóði bætt framan við. Önnur orð en s.l. miðv.)
  4A (Að klappa nófn, tilbrigði. Hafa hér spjöld með fullu nafni barnanna
       (byrja má á að laða alla klappa saman, ef e-r börn fást illa til að klappa
       ein.) Hafa líka spjöld með ýmsum orðum, mislóngum (t.d. sími, mús,
       krókódll, ís, kóngulóarvefur, kaka, djús, bátur, Rauðaborg, snjóhúss,
       símanúmer, reiðhjólaljálmur). Leiksk.kenn. eða barn/börn segja orðið
       um leið og spjaldið birtist, og svo eru samstöfur klappaðar (ka-ka.).)

29. m.-09. apr.    Páskahlé (dymbilviða og næsta við á eftir)
12.-16. apr.

  mán.  5A (Nafnaþraut, örstutt, má sleppa)
         Stafír, sbr. 22. jan.
  miðv.  4A (Að klappa nófn, tilbrigði. Nófn og örfá spjaldanna frá fóstud.f.páska)
         5E. (Hljóði bætt framan við.)
         4F (Óskaleikurinn. Börnin ráða hvort þau óska í samstöfum eða hljóðum.)
  föst. Siðastí dagur.
         4A (Prófa öll orðaspjöldin (ekki nófnin) frá föst. f. páska, og bæta
            nokkrum við (t.d. blása, rok, skafrenningur, snjókoma, páskaegg,
            ungi)
         6E (Giskað á orð. Börnunum leyft að giska á eftir að barnið með myndina
            hefur sagt tvö hljóð. Barnið með myndina og það barn sem giskar rétt á
            reyna síðan að klára að hljóða orðið í sameiningu. Hin hafa hljóð á
            meðan en mega síðan hjálpa ef þessi tvö gefast upp.)
         5L, b (Má ég fá?) og/eða e-r skemmtilegur leikur sem börnin vilja rifja
            upp.
APPENDIX F

Protocol for the Comparison Group. Traditional MM.

Hópar A, B og C (Groups A, B, C):

12.-16. okt.

mán. 1A
2B (Úen dúen din)
2A (Kötturinn með hótinn)

miðv. 1A
2B (Úen dúen din)
1D (Vekjaraklukka falin)

föst. 1B (Við myndum hljóð og hlustum)
2B (Úen dúen og Úllen düllen doff)
2A (Kötturinn með hótinn)

19.-23. okt.

mán. 1B (Við myndum hljóð og hlustum)
2B (Úen dúen og Úllen düllen doff)
1C (Jakob, hver eft þú?)

miðv. 1A og 1B
1E
2A (Kötturinn með hótinn)

föst. 1B
2F (að hvísla nafnið sitt)
2B (Eniga meniga)
2B (Einn og tveir)

26.-30. okt.

mán. 2B (Eniga meniga)
2L (Frjálst rím)
1J (Hlustaðu eftir nafninu þínu)

miðv. 2L (Frjálst rím)
1I (Minnisleikur)
2B (Einn og tveir)

föst. 2E (Dýrarím)
1L (Nafnaleikur)
1C (Jakob, hver eft þú?)

02.-06. nóv.

mán. 2F (Getur þú rímað?)
1D (Vekjaraklukka falin)
2B (Einn og tveir)

miðv. 2H (Hvað eru þau að gera?)
1L (Nafnaleikur)
2B (Hann Kalli átti káta mús)

föst. 2J (Myndarím)
1K (Hver er með boltann?)
2B (Sagan hennar Systu)

9.-13. nóv.

mán. 2L (Frjálst rím)
2B (Ení mení)
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1H (Hvísleikur)
miðv. 1A (Hlustað á hljóð)
2B (Hann Kalli átti káta mús)
1L (Nafnaleikur)
föst. 1A (Dýrarím)
1K (Hver er með boltann?)
2B (Hann Kalli átti káta mús)

16.-20. nóv.
mán. 3A (Hugtakið setning lagt inn)
2G (Hváð er í “pokanum”? Þ.e. efri hluti bls., ekki alvörupoki)
1I (Minnisleikur. Ath.: Gæti þurft smá undirbúning)
miðv. 3A (Setningarar)
1E (Ath.: Hér þarf e.t.v. að finna dýr eða dýramyndir.)
2A (Ljóð að eigin vali, með klappi)
föst. 3A (Setningarar)
21 (Rím eða myndarím)
2B (næsta á eftir þeirri sem var í 1. viku nóv.)

23.-27. nóv.
mán. 3A (Setningar)
2J (Setningararím)
2A (Ljóð að eigin vali, með klappi)
1H (Hvísleikur)
miðv. 1L (1&2)
3B (Hugtakið orð lagt inn. 1.)
2B (næsta)
föst. 3B (Orð, 1)
1A (Hlustað á hljóð)
2B (e-r af þeim sem búnar eru, t.d. sú vinsælasta)
11 (Minnisleikur, sbr. mánuð.16. nóv.)

11.-15. jan.
mán. 3G (Orðapúsl)
3C (Æfingar með orð og setningar, kubbar)
3E (Leikur að setningum og orðum, t.d. nr. 1)
miðv. 2B (þula að eigin vali)
3C (Æfingar með orð og setn., velja annað “umræðuefni” en s.l. mánuð.)
2L (Frjálst rím)
föst. 21 (Myndarím)
3E (Leikur að setningum og orðum, t.d. nr. 2)
3G (Orðapúsl)
2C (Flækjumamma)

18.-22. jan.
mán. 1B (Við myndum hljóð og hlustum)
3F (Ljúktu við setninguna)
3D (Æfingar með stutt/löng orð. Gott ráð til að finna lengd: klappa orðin)
2L (Frjálst rím)
miðv. 3D (Æfingar með stutt/löng orð.)
3C (Æfingar með orð og setn., velja nýtt “umræðuefni”)
2A (ljóð að eigin vali)
föst. 2J (Setningarím)
   2K (Ljóðabók)

25.-29. jan.
mán. 2K (Ljóðabók frá því síðast kláruð og “lesin”)
   3D (Æfingar með stutt/löng orð.)
miðv. 3E (Leikur að setningum og orðum, frjálst val)
   3F (Ljúktu við setninguna, Tilbrigði)
   4B (Að taka einn hlut úr kassanum)
föst. 3H (ríðja stutt upp 3G og síðan 3H: Ljúktu við orðið)
   4B (Að taka einn hlut úr kassanum)
   4D (Hlusta fyrst, skoða svo; hér þarf myndir)
   4C (Þrautakóngur, ef tímí gefst)

01.-05. feb.
mán. 5A (Nafnaþraut)
   3F (Ljúktu við setninguna)
   4E (Tröllævintýrið)
miðv. 5B (Að finna hlut, fyrsti hluti)
   3D (Æfingar með stutt/löng orð.)
   4G (Samstöfúbolti)
föst. 5A (Nafnaþraut)
   5B (Að finna hlut, fyrsti hluti, fleiri orð en síðast)
   3H (Ljúktu við orðið)
   4F (Óskaleikurinn)

08.-12. feb.
mán. 5B (Að finna hlut, stutt uppríðjan og síðan Tilbrigði)
   4B (Að taka einn hlut úr kassanum)
   5C (Ég hugsa um)
miðv. 5A (Nafnaþraut)
   3G (Orðapúsl)
   3D (Æfingar með stutt/löng orð.)
föst. 5B (Að finna hlut, Tilbrigði.)
   4E (Tröllævintýrið)
   5C (Ég hugsa um)
   4F (Óskaleikurinn)

15.-19. feb.
mán. 3G (Orðapúsl)
   4B (Að taka einn hlut úr kassanum)
   4C (Þrautakóngur)
miðv. Óskudagur
föst. 5B (Að finna hlut, tilbrigði, - enn er bara unnið með forhljóðið)
   2J (Setningarím)
   3F (Ljúktu við setninguna, Tilbrigði, samtal með kubbum)
   2C (Flækjumamma)

22.-26. feb.
mán. 5C (Ég hugsa um, ríðja stutt upp og svo: Tilbrigði)
   3C (Æfingar með orð og setningar, kubbar)
   4G (Samstöfúbolti)
miðv. 3D (Æfingar með stutt/löng orð)
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5C (Ég hugsa um: Tilbrigði)
3F (Ljúktu við setninguna, Tilbrigði, samtal með kubbum)
föst. 5D (Hljóð tekið burtu, útskýrt sbr. íngang, taka svo 1. dálkinn)
5C (Ég hugsa um: Tilbrigði)
4C (Þrautakóngur)

01.-05. mars
mán. 5D (Hljóð tekið burtu, rifja upp og taka 2. dálkinn)
4E (Tröllaevintýrið)
4G (Samstöfubolti)
miðv. 5D (Hljóð tekið burtu, 3. dálkur og þrjú fyrstu orð í 4. dálki)
5C (Ég hugsa um: Tilbrigði)
3F (Tilbrigði, samtal með kubbum)
2B (frjálst val)
föst. 5D (Hljóð tekið burtu, 4. dálkur allur)
5D (börnin prófa að taka sjálf fyrsta hljóðið framan af eigin nafni)
5B (Að finna hlut, en nú finna börnin sjálf í hugum orð sem byrja eins)
5F (Köngulóarvefurinn, stutt)

08.-12. mars
mán. 5D (Hljóð tekið burtu, 5. dálkur)
5C (Ég hugsa um)
5F (Köngulóarvefurinn)
3I (Að bala afturátak I, ef tími vinnst til)
miðv. 5C (Ég hugsa um)
5B (Að finna hlut, börnin finna sjálf orð sem byrja eins)
3I (Að bala afturátak I)
föst. 5D (Hljóð tekið burtu, 6. dálkur)
4G (Samstöfubolti)
5F (Köngulóarvefurinn)

15.-19. mars
mán. 5E (Hljóði bætt framan við, kynning og síðan fyrstu 4-5 orðin á listanum)
5E (Kenn. segir nafn e-s barnsins en sleppir forhljóðönu, “hver er þetta?”)
5B (Að finna hlut, börnin finna sjálf orð sem byrja eins)
miðv. Öskudagur
föst. 5E (Hljóði bætt framan við, næstu 5-6 orðin á listanum)
5D (Hljóð tekið burtu, upprifjun, e-r orð)
5F (Köngulóarvefurinn)

22.-26. mars
mán. 5E (Hljóði bætt framan við, klára orðalistann)
3F (Ljúktu við setninguna, tala með kubbum)
5G (Flétan)
miðv. 5G (Flétan, nýtt orð í hverri umferð)
5F (Köngulóarvefurinn)
5I (Hvaða hljóð er fremst? Kafli nr. 1)
3H (Ljúktu við orðið)
föst. 3D (Æfingar með stutt/lóng orð, taka orð í umhverfinu)
5H (Hlutir í poka (ath. hér þarf að finna hluti))
5I (Hvaða hljóð er fremst? Kafli nr. 2)
4C (Þrautakóngur)
29. m.-09. apr.  Páskahlé (dymbilvika og næsta vika á eftir)
12.-16. apr.

mán.  5A (Nafnþraut)
      5I (Hvaða hljóð er fremst? Orðin: fiskur, níu, sykur, súpa, risi, mala, namm, fótur, rok, folald, lamb)
      2A (Frjálst val)
      3F (Ljúktu við setninguna, tala með kubbum)

miðv.  5C (Ég hugsa um)
      5H (Hlutir í poka (ath. hér þarf að finna nýja hluti að e-u leyti))
      5I (Hvaða hljóð er fremst? U.þ.b. helmingur af kafla nr. 3, ath. að hann getur verið erfiður)
      5G (Fléttnan)

föst.  5I (Hvaða hljóð er fremst? Kafli nr. 3, seinni helmingur)
      3-4 “sjálfvalin” verkefni sem gaman hefur verið að
### APPENDIX G

**SPSS Output for Alpha Coefficients of Rhyming and Syllable-Analysis lists**

**RHYMING LIST**

***Method 2 (covariance matrix) will be used for this analysis***

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Correlation Matrix

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Statistics for Mean Variance Std Dev N of Variables

| Scale | 17,3115 | 14,0014 | 3,7418 | 13 |

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Reliability Coefficients 13 items

Alpha = 0,8710 Standardized item alpha = 0,8751
CLAPPING SYLLABLES LIST

*** Method 2 (covariance matrix) will be used for this analysis ***

RELIABILITY ANALYSIS - SCALE (ALPHA)

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N of Cases = 120.0

Statistics for Mean Variance Std Dev N of Variables
Scale 21.2750 13.9321 3.7326 16

Item Means Mean Minimum Maximum Range Max/Min
Variances

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Item Variances Mean Minimum Maximum Range Max/Min
Variances

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Reliability Coefficients 16 items

Alpha = 0.8257 Standardized item alpha = 0.8257
APPENDIX H

Tölvunefnd - Heimild (The Icelandic Data Protection Commission Approval)

Heimild samkvæmt 3. mgr. 4. gr. laga nr. 121/1989 til að safna og skrá persónuupplýsingar.

Tölvunefnd vísar til umsökn ýrar fyrir bænd leikskólanna Heiðarborgar og Rauduborgar, Seláshverfi og grunnskólans Seláskóla, daga. 29. f.m., um leyfi til að skrá persónuupplýsingar vegna könnunar á stammiði leikskóla og grunnskóla í Seláshverfi. Í umsökn ýrar kemur fram að úll börn í Heiðarborg og Rauduborg fædd árin 1992, 1993 og 1994 munu að næstu 2-3 árun taka þátt í könnumni. Rannsóknaraféður er svo lýst í umsökn ýrar:


Kyn, fæðingarar og árskóðungur verður skráð á úrvinnuslóðið. Þessar upplýsingar eru nauðsynlegar, þar sem gera má ráð fyrir að talsverdur munur geti verið á tökum barna á þessum aldri á viðfangsefnum eftir því hverna árs þau eru fædd. Auk þess er mikil óvissa ríkjandi um hvernig lestarfærni, leitir skóla o.fl. eru ólíkt eftir kyni nemenda.

Hverju barni verður gefið órekjunlegt númer, þ.e. órekjanlegt胸怀 eftir greiningarlykill. Verkefnisstjóri mun einn varðveita greiningarlykill á stöð utan nefndi þriggja skóla, þar til verkefni lýkur, þar sem eftirlygdir er að ræða um a.m.k. 2, ekt. 3 ár.“

Fjallað hefur verið um erindi ýtar og meðfrægandi gögn verið skoðið.
Upplysingar þær sem þær hyggist safna og skrá í fyrirhagaðri könnun varða einakalifæstriði, sbr. 1. mgr. 4. gr. laga nr. 121/1989 um skráningu og meðferð persónuupplýsinga. Hefur verið samþykkt, þeð við einum laga, að heimila yður söfnun persónuupplýsinga vegna verkefnis þessu, með því skilyrði að kynningarbréfi til foreldra verði breytt þannig að þar komi fram að þér munuð geta ráðið göga til einstakra barna, hveru lengi og með hvaða hætti.

Heimild þessi er eumfremur bundin efthirarandi almennum skilyrðum:

1. Að fullkominnar nafnleyndar og trúnaðar verði gætt.

2. Að óheimilt er að veita óvindkomandi aðilum aðgang að upplýsingum þeim sem skráðar hafa verið.

3. Að óheimilt er að nota skráðar persónuupplýsingar til annars en þess sem var tilgangur könnunarinnar.

4. Að nöfn þáttakenda eða önnur persónuaðkenni komi hvergi fram á könnunarðögnum.

5. Að einungis má birta niðurstöður úr könnunnini á þann hátt að ekki megi rekja þær til ákvæðinna einstaklinga.

6. Að öll frumgögn könnunarinnar verði eyðilögð að lokinni úrvinslu og Tölvunefnd tilkynnt um eyðingu gagna.

7. Að Tölvunefnd getur hvenær sem er sett frekari skilyrði varðandi könnun þessu ef hagsmunir lógaðila eða einstaklinga krefjast þess.

F.h. Tölvunefndar
e.u.

[Signature]

Sigrún Johannesdóttir, framkvæmdastj.
CURRICULUM VITAE

GUÐRÚN BJARNADÓTTIR

Education

June 1990 B. A. in Psychology (The University of Iceland).
1971 Logoped (Speech-language therapist) from The School of Special Education, Norway.

In addition conducting and attending several courses, presentations, and workshops, mainly on child welfare, computer technology and software, ethics, language development and disabilities, powerlifting, psychological/educational evaluation and interventions, and quality management.

Professional Experience

Since 2000 Psychologist on the diagnostic team at The Centre for Child Health Services (CCHS), Reykjavík, Iceland. E-mail: gudrun.bjarnadottir@hr.is
Since Sep.’02 Chair of the quality management team at CCHS.
1995 - 2000 Teacher (psychology, pedagogy) in Hamrahlið College, Reykjavik.
Summer 1994 Internship with Dr. Reedy, Cen–Clear Child Services, Inc.
1989 Summer job in a residential home for adolescents with severe multihandicaps.
1980 - 1984 Preschool teacher, Copenhagen, Denmark.

In addition various summer jobs in the fishing industry, hotels, restaurants, and other companies (charwoman, clerk, telephone-operator, waitress, etc.)

Professional Affiliations

Since 2000 Member of The Icelandic Psychological Association.
Since 1996 In the education group of The Icelandic Association for Quality (GSFI). Research project: High-school students’ drop out in Iceland.
Since 2000 On the credentialing board of The Icelandic Association of Speech/Language Therapists.
1986 - 1987 Chair for the preparation of The Nordic Summer University ’87-conference.

Publications

