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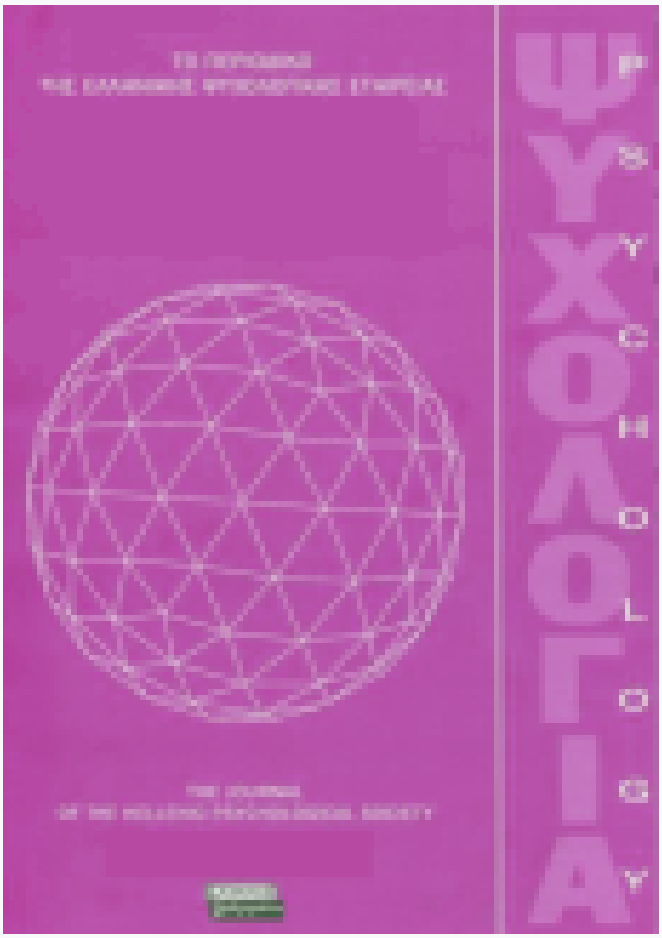

Towards a method for assessment of reading-related development in preschool children: Print awareness and metaphonological skills in practical application

Ake Olofsson

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Towards a method for assessment of reading-related development in preschool children: Print awareness and metaphonological skills in practical application

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ABSTRACT

A method for systematic description and evaluation of preschool children's reading-related development was evaluated in a small pilot study. Longitudinal data were collected by the ordinary preschool teachers as part of their reguiar work. The focus was on the years immediately before school start and the onset of formal reading instruction (i.e., the age of three to five years). The aim of the testing was to describe the individual development of the concepts of reading and writing and the initial stages of language awareness. Children were followed for two years by repeated testing twice a year. Results indicated a substantive improvement in name-spelling and letter-naming abilities as well as in phonological awareness.

Key words: Emergent literacy, Name writing, Phonological awareness.

The first precursors of reading acquisition can be found early during the preschool period, long before the onset of formal reading instruction. (See, e.g., Snow, Burns, & Griffin, 1998; Teale & Sulzby, 1986). Before starting conventional reading young children gain knowledge of a variety of functions, procedures and units of print, and it is generally believed that children lacking this preparedness for reading are facing a more difficult task at the moment when formal instruction starts. However, recent research has shown positive causal effects for several of the predictors of reading achievement and also demonstrated positive training effects in practical applications. Among the most effective interventions are programs for the training of phonological awareness of which some have long lasting effects on reading acquisition (Ball & Blachman, 1991; Kozminsky & Kozminsky, 1995; Lundberg, Frost, & Petersen, 1988; Olofsson &

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Lundberg, 1983, 1985; Schneider, Kuespert, Roth, Visé, & Marx, 1997). Further, for younger children and children in less supportive environments interventions using storybook reading have shown positive effects on children's reading related literacy skills (Neuman, 1999; Senechal, LeFevre, Thomas, & Daley, 1998; Whitehurst, Arnold, Epstein, Angell, Smith, & Fischel, 1994). In most preschool settings resources like teacher and time are limited and there is need for an early detection of those children who are in need of extra stimulation and help. One way of detecting these children is to use a comprehensive screening battery, a way that involves both knowledge and resources in the form of planning and organisation. The approach taken in the present study is to use a longitudinal but rather simple testing procedure that can be carried out by ordinary preschool teachers. Before the assessment method is described and some pilot data are reported, we first give an overview of factors that are seen to affect reading-related development prior to the onset of formal reading instruction.

The dominating view for hundreds of years has been that reading acquisition starts when children receive the first reading instruction, usually when the child is around six years old. Whereas children acquire language without any formal instruction they hardly ever learn to read without some formal teaching. There are few children that learn to read and write spontaneously, even in most literate environments. An apparent reason for reading acquisition to take place after the development of spoken language is simply that print is invented to suit a person who already knows the spoken language. Written Swedish is "made" for a person who already has some proficiency in spoken Swedish. Thus, in order to learn to read and write you first have to know some spoken language. Since it takes some four to six years for a child to acquire language it is not surprising that reading acquisition normally starts at this age.

Aspects of language development: Phonology

All normal children learn to produce and understand language and demonstrate practical lexical, pragmatic, semantic, syntactic, morphological and phonological knowledge. Yet, knowing a language does not require a conscious awareness of its structure. The focus of attention in normal language use is on the content, the meaning, and only rarely on formal aspects of the language. That is, in normal language activity our attention is fully directed towards the semantic, pragmatic, or social content of the communication situation. If we also had to simultaneously attend to formal aspects of the language, like the order and identity of speech sounds, or the syllable structure in a word, then we would run the risk of seriously disturbing our comprehension processes.

It is assumed that a young child initially has a rather holistic impression of the sounds in a word, thus perceiving the word as a unitary speech gesture (Jusczyk, Friederici, Wessels, Svenkerud, & Jusczyk, 1993). The child's representation of phonological structure is then gradually refined during the years. When the vocabulary is expanding the child identifies more and more of the phonological elements in the language. The syllable is assumed to be more physically salient than the phoneme. Syllabic structure is inducing a rhythmic variation in the speech due to changes in pressure and energy. The syllable is composed of consonants and vowels and a typical syllable consists of one consonant or a consonant cluster followed by a vowel. Languages differ in the way syllables are constructed. Swedish is a Germanic language with many closed syllables and complex consonant clusters in both the onset and coda positions. Swedish orthography is generally considered more shallow than, e.g., English, French and Danish orthography but less shallow than for example Greek, Italian and Spanish. The Swedish language has several syllables with

three initial consonants followed by a vowel (e.g., *skri-va* [write]) but a syllable can also consist of one vowel (e.g., *ä-ta* [eat]).

The smaller segments, the phonemes, are much harder for a child to detect in the continuous speech stream since the phonemes tend to be coarticulated, i.e., the realisation of a phoneme is affected by both the preceding and the following phoneme. Thus, a phoneme is an abstract unit, which has different realisations depending on its phonological surrounding. In order to discriminate between, for example, the two consonants [s] and [ʃ] before a vowel the listener can use the acoustic information found in the noise burst at time before the vowel onset, or alternatively the listener can to a large extent use information found within the vowel (the nature of the formant transitions at vowel onset). There are convincing results showing that younger children tend to use information from the whole syllable in the identification of consonants more often, but that there is a developmental trend towards a stronger reliance on the acoustic information within the smaller segment (phoneme). Thus, with increasing age the child becomes more able of using smaller segments in speech perception (Nittrouer, 1996; Nittrouer & Miller, 1997a, 1997b; Nittrouer, Neely, & Studdert-Kennedy, 1996).

As the child's vocabulary is increasing, the child's language system will profit from processing different speech segments (phonemes) compared to processing each word as a unique holistic sound pattern (Walley, 1993). According to this theoretical framework vocabulary growth is seen as an important causal factor behind the development of a more segmented representation of lexical items (see also Elbro, 1996; Fowler, 1991).

Within the outlined theoretical framework, it is believed that preschool children can understand and talk without problem but still their phonological representations of words are still different from the adults. It is also widely believed that learning to read – i.e., learning the alphabetical principle – forces the child's language system to develop segmented phonological representations.

With this background there are two possibilities. Either the child's first encounter with print takes place without prior knowledge of written language. However, equiped with a relatively large vocabulary and impressive cognitive abilities the seven years old child has a natural and implicit pre-knowledge of the smallest segments of the language, the phonemes. It will be a tough period to many children but most of them will do it.

The alternative is that the child already in preschool is introduced to a variety of aspects of written language and for an extended period of time gains knowledge about print and other reading-related perspectives. During this period the child gradually becomes aware of those details of print and language it at each point in time is receptive to. (See, e.g., Chaney, 1992, for descriptions of early stages of this development.)

Phonological awareness means developing a dissociation between the sounds of words and their meaning. The child can attend both to the meaning and to the sounds of a spoken word. Such awareness can cover different levels of phonology, such as syllables, onset-rime or phonemes. The last level, also called phonemic awareness, is for most children the hardest level to reach, and also the most critical kind of awareness for reading acquisition (Høien, Lundberg, Stanvoich, & Bjaalid, 1995).

Why do some children run into problems?

An overwhelming part of the research during the last two decades strongly suggests that children having problems with handling, i.e., talking about and playing with, the small language segments, the phonemes, are at risk for problems in learning to read. It seems that a certain degree of phonological awareness is required for a normal reading acquisition.

Why do some children then have problems in

their development of phonological awareness? What factors can block the children from making the necessary developmental spurt when encountering reading instruction? Two different explanations have been put forward. Either the child is delayed in its metalinguistic development due to lack of environmental stimulation or the child is suffering from a general problem in phonological development. However, the question seems not to be one or the other but rather a question of an intricate interaction between the environment and some hereditary dispositions (Snow et al., 1998). A crucial point in this interplay is the young child's ability to unconsciously and instinctively affect, create and select its own environment. An example may clarify the picture. Suppose we have a little lad who is talented in other areas than those related to speech sounds. That is, he is poorly equipped for language and reading. His language development, however, proceeds normally and he is a happy fellow. His parents are aware of the importance of storybook reading and they read aloud to their son daily. He is making drawings and paintings like most children and he signs the works with the initial letter of his name and later on he can spell the whole name. There are no discernible problems in language development – *hakuna matata*.

But if we look more closely at the situation we may find some interesting details. Most children every now and then want their parents to read more. "Read more" is a well-known cry, which can make any parent tired. However, our little lad almost never asks for more reading. He is quite satisfied even if his parents for some reason do not have time to read a bedtime story. He sometimes gets tired in the middle of the story and wants to sleep. He does not suggest a storybook if not asked to and he does not look at the books by himself. He does not interrupt the reading by asking questions about the words in the text. He may, on the other hand, in the middle of a reading session suddenly come to think of things in another room or recall unrelated events or start listening to sound from outside. He is not scribbling his name everywhere and he is not interested in how to spell the names of people he knows. He does not make any nursery rhymes of his own, he does not create poems or play with words, and he does not expect others to do so either.

The question is now, how our lad affects his immediate environment. His parents will probably accept that it is enough to read a single short story and there is no need for any "time-consuming" talk around the story. When they want him to play quietly, they do not ask him to sit down and look at storybooks. The parents are not stimulated to discuss words or expressions with him. Rather unnoticed the parents have accepted and adjusted to the fact their little lad is simply not interested in books and print (cf., Olofsson & Niedersøe, 1999, who found that parents reports of children's yearly interest in book reading predicted later reading achievement).

Why is not our lad interested? One explanation might be that his phonological system has not reached the stage that allows him to catch all new words and refinements in the storybooks. Nor does his phonological system allow him to appreciate language games and nursery rhymes. His phonological system is processing language in a way that is functional for extracting meaning from normal conversations and for learning new words but does not have words in their fully segmented form yet (Elbro, 1996). In communication situations he may sometimes be slow in finding words. This may be a drawback when it comes to turn-taking or causing a change of topic in the discussion. Occasionally he produces a wrong word or mispronounces some words. The mistakes seem to embarrass him particularly if they amuse other people (cf., e.g., Rice, Hadley, & Alexander, 1993). For reasons like these he decides that there are more interesting things in life than literacy and language. In this way our little lad, who is in great need for language stimulation, has now created himself a less supportive environment.

There is a great pedagogical challenge embedded in our story. The problem is how to arrange a preschool environment so that it stimulates those children who themselves are not especially interested in and supporting such an environment (cf. "the broccoli effect" discussed in Scarborough & Dobrich, 1994. See also, Wells, 1985).

Developmental survey of the individual child

A primary tool in the process of supporting children at risk for reading problems is presented here. By means of systematically evaluating the initial stages of the development of emergent literacy and phonological awareness it is possible to detect the children who need extra support and stimulation. By repeating the evaluation twice a year the child's developmental trend can be described. Children with problems or with a slow developmental trend do not necessarily need any dramatic interventions. On the contrary, the fundamental idea is only to adjust the normal daily preschool environment so that the children in a regular and playful manner are stimulated to further develop their language awareness and emergent literacy.

Method

Design

The Swedish preschool children were tested in total four times, once when they were three and a half years old, once when they were four, once when they were four and a half, and, finally, once at the age of five years. The same assessment form was used for all children and at all points of measurement but the number of tasks and items completed were a function of each child's ability level. The tasks were sorted in ascending difficulty order and the assessment was ended as soon as the child no longer could solve the tasks. The testing could be divided into two or three sessions if the child grows tired or becomes less concentrated. So far, only two small groups of Swedish children have been scored for the whole body of measurement points and thus the complete series of data is only available for 10 children. The reported data are part of an ongoing study on language awareness training in preschool and during the data collection the preschool staff had close contacts with the researchers and the local Center of Special Education.

Tests

A. Concepts about print

Does anybody usually read to you? The aim of this question was to measure if the child regularly listened to written language. Of most importance was whether reading takes place at home. If the child did only tell the names of the preschool staff then the child was explicitly asked about reading at home. If unknown names were mentioned the child was asked who these persons are and how often they read aloud to the child. The score zero was given to the answer "nobody" and the highest score (5) to an answer containing more persons than parent(s) and preschool teachers.

Do you have any favourite book? The names of mentioned books and authors were recorded. If the answer was somewhat inconclusive the child was asked to be more specific. The answers were scored on a 5-point scale, from negative answers ("no", "don't know", "don't remember"), mixed up or imprecise answers like "a yellow book" or "comics", general answers like "the horse book", names like "Bert" to precisely defined titles like "Alice in wonderland" or "The house at Pooh corner".

Why is it good to read? The answers were scored on a 4-point scale. The lowest score was given to answers like "I don't know", one point to generally positive statements like "because it is

good", 2 points to answers referring to entertainment or leisure reading, e.g., "it is easier for children to go to sleep", and, finally, the maximum score was given answers including practical or academic motivations, e.g., "you can read notes" or "you can find out what's in a book".

Why is it good to write? The answers were scored in a similar way as the former task but with the difference that answers referring to the surface level of writing were given two points, that is, answers like "because you can make letters of equal size" or "because you use correct letters".

Recognition of peer names. The names of all children in the preschool group were written on a piece of paper and the child was asked to try to recognise them. The number of correctly recognised names was scored.

Nursery rhyme knowledge. This task measures the child's knowledge of nursery rhymes. The child was presented the first line of six nursery rhymes selected from the repertory of the actual preschool class. The child's task was to as to continue. If the child could continue beyond the first rhyme one point was scored. (Normally, a correct answer was equivalent to three lines.) This task was modelled from Bryant, Bradley, Maclean, and Crossland (1989).

B. Writing

Writing own name. The child was asked to write the name on a piece of paper. The "signature" was scored on a 6-point scale (cf., e.g., Mann, Tobin, & Wilson, 1987; Senechal, LeFevre, Thomas, & Daley, 1998). Any letter or letter like writing scored 1 point whereas a single letter representing the first phoneme received 2 points. Three points were given if two or more letters were correctly spelled, 4 points were given for an almost correct spelling, and 5 points were given for a correct spelling.

Writing a familiar name. The child was asked to spell the name of another person. Any name would do (Even "Mummy"). If the child could not suggest any name the researcher proposed a few peer names. Two points were given a correct spelling and any spelling was given 1 point.

Writing an unknown name. Children were asked to write down a name that was new to them. The pseudo-names *Eska* and *Nori* were used in the present test. The spelling was scored on a 5-point scale. A single letter representing some part of the name scored 1 point whereas a single letter representing the first phoneme received 2 points. Three points were given when the name was "recognisable" (readable) and 4 points were given for a correct spelling.

Alphabet knowledge: Capital letters. Children were shown on a piece of paper all Swedish capital letters in random order and asked to name as many as possible of the letters. (The Swedish alphabet contains three more letters than the English, namely*Å Ä Ö* representing three of the Swedish totally nine vowels.) Each correct identification of a letter, with its name or its sound, received 1 point (maximum 29).

Alphabet knowledge: Lower-case letters. The task was similar to the previous, but the 29 Swedish lower-case letters were used.

C. Phonological awareness

Rhyme recognition. The child was shown a picture representing the target word and then asked to select the one of three other pictures rhyming with the target. The word was given at the same time as the corresponding picture was presented. Half of the words were monosyllabic and half were bisyllabic. One point was scored for each correct choice.

Blending. The child was presented two or more markers (counters) and the tester pronounced a word-part or syllable for each marker. The child was asked: "What word do these markers make"? The first item was a compound word (foot-ball) followed by a

bisyllabic word (få-gel, eng. *bird*), a three-syllable word (te-le-fon, *telephone*) and, finally, a four-syllable word (ma-ka-ro-ner, *macaroni*). Scores were computed as the number of correct items.

Word counting. The child was asked, "How many words do I say now? ...", and had to answer by putting down the appropriate number of markers. The material consisted of four simple sentences with two, three, five and four words respectively. The following sentences were used; *Pelle hoppar* (Pelle jumps), *Stina går ut* (Stina goes out), *Dockan Karin ligger i sängen* (The doll Karin is in bed), *Nalle sitter på stolen* (Teddy bear sits in the chair).

Syllable segmentation. The child had to put down a marker for each part of the presented word. The syllabic structure of the words was similar to the words in the blending task (see above). The following words were used: *banan* (banana), *kaka* (biscuit), *apelsin* (orange), and *målarpensel* (paintbrush).

Initial sound identification. The format of this task was similar to the rhyme task (see above). The child was shown a picture with the target word and then had to select the one of three pictures having the same initial sound as the target. The following target words and alternatives were used; *ros* (rose) - *pil* (arrow), *råtta* (rat), *vas* (vase); *fisk* (fish) - *morot* (carrot), *flagga* (flag), *bulle* (roll); *orm* (snake) - *öra* (ear), *fot* (foot), *ost* (cheese); *svamp* (mushroom) - *vante* (mitten), *katt* (cat), *säng* (bed).

Phoneme segmentation. This task used a similar procedure as in the word counting and the syllable segmentation tasks (see above). The child was told to segment words into parts and place a marker for each part. The following five words were presented by the tester one at a time; *sy* (sew) *pil* (arrow) *is* (ice) *bok* (book) *ruta* (square).

Phoneme blending. The tester pronounced a phoneme sound and placed a marker in front of the child and then repeated the procedure with the next phoneme. The child had to synthesise the phonemes and re-create the word. The following words were used; *år* (year) *ko* (cow) *ost* (cheese) *sko* (shoe) *mage* (stomach).

Results

On most of the variables the data showed a strong positive development during the assessment period. The results for a sample of the variables are presented in the format of individual developmental curves. The curves are purely descriptive and no parameters are estimated. The development of letter-naming ability for lower-case letters is presented in Figure 1. None of the children showed any letter knowledge at the age of 3 years and 6 months whereas half a year later there was one child who knew most of the lower case letters and one who knew half of them. Another six months later, at the age of 4 and a half, there were 3 children with maximum scores and only one child with lowest scores. Finally, at age five, about three months before entering the kindergarten class, practically all children had gained complete letter knowledge.

Figure 2 presents the development of the ability to spell the own name. Only two children have bottom scores at the first measurement. It can be seen that already at age 4 about half of the children spell their names correctly and at age 5 practically all children spell their names correctly. When comparing the name-spelling results (Figure 2) to the letter-naming results (Figure 1) it can be found that at age 4 several children who spell their own name correctly use letters which they can not name the upper case version of.

Figure 3 presents the results of a summary variable created by adding the results on the phoneme manipulation tasks. The results show a remarkable spurt during the last preschool year and at the last measurement point none of the children score low on phonemic awareness. A very similar pattern was found for the children's ability to write an unknown name, except for one child. who still scored zero at age 5. The

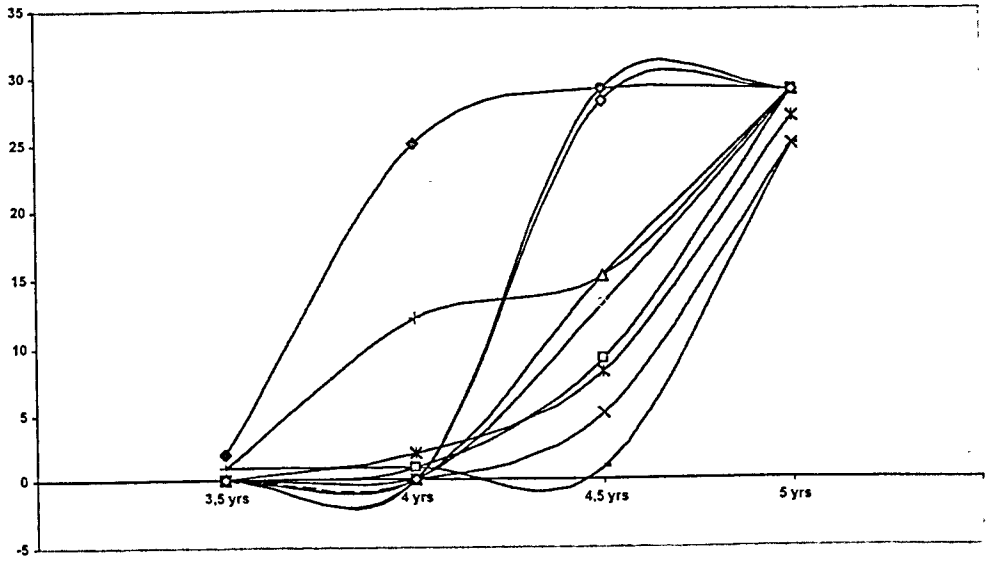

Figure 1
Longitudinal development of letter-naming ability for upper-case letters for 10 Swedish preschool children.

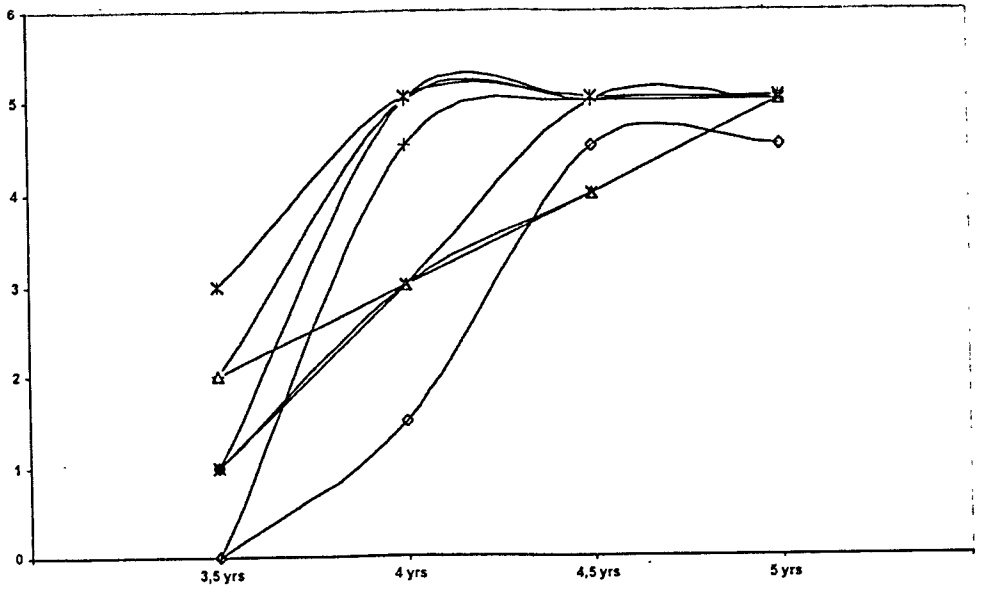

Figure 2
Longitudinal development of the ability to write own name for eight Swedish preschool children.

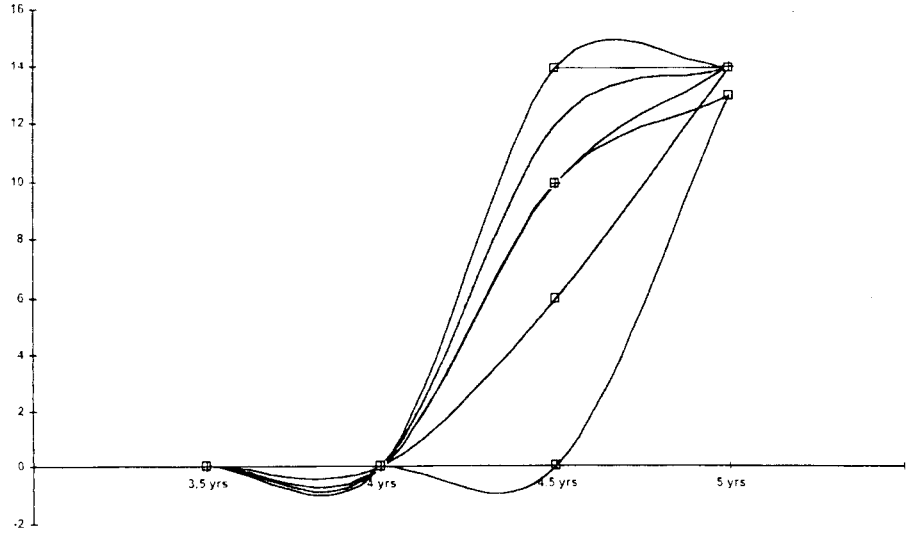

Figure 3
Longitudinal development of phonemic awareness in 10 Swedish preschool children.

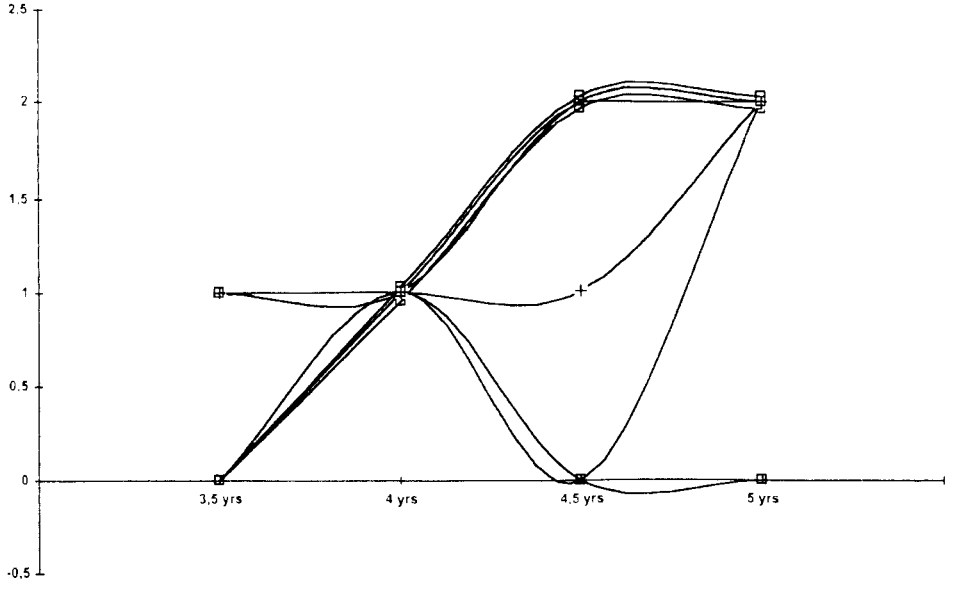

Figure 4
Longitudinal development of the ability to write a known name (peer's name) for 10 Swedish preschool children.

children's ability to spell a familiar name (friend's name) showed a more varying developmental pattern (see Figure 4) than the previous variables. However, the regression in development for two children in Figure 4 may be explained by the fact that the children selected different peer names to write at different test occasions. A similar kind of procedural problem is present in the measurement of nursery rhyme knowledge (see Figure 5) where a performance drop at the age 4 years and 6 month is the result of the start of a new preschool year meaning new nursery rhymes. The overall impression from Figure 5 is nevertheless that the ability to recite nursery rhymes emerges relatively early and has a less steep slope than, e.g., the phonemic awareness variable (cf., Figure 3).

The developmental curves for listening to reading is presented in Figure 6. Here the developmental pattern is even more varying and the mean score does not seem to increase over the preschool years, whereas the variance is probably higher at age 5. It should be remembered that this variable measures the number of persons reading to the child, which of course is an indirect measure of amount of reading.

Discussion

The present data, although only a pilot study, are congruent with the findings in Chaney (1992) in that preschoolers were found to show clear signs of meta-linguistic and reading-related knowledge. These findings together with Chaney's findings demonstrate that reading-related development starts early in the preschool years and is not something that emanates abruptly at schoolstart. The longitudinal design with repeated measures revealed a developmental spurt in phonemic awareness after age 4, a finding that replicates the results in Bloodgood (1999). A very interesting and promising feature in the data was the rich amount of information extracted from the name writing tasks. These tasks, to write the own name, a peer name and an unknown name, were highly appreciated by both the children and the staff and seem to be a developmentally and "ecologically" meaningful and valid task to most children already at age 3. The present small-size study of Swedish children can not fully evaluate the unknown name writing task. Further research is needed to evaluate the full potential of this task, a task that easily can be expanded to contain pseudo-names and thus tap nontrivial levels of orthographic knowledge. The interested reader is referred to Bloodgood (1999) for an exhaustive treatment of name writing.

The phonological awareness tasks constituted a large part of the present test battery, although not reported here in any detail. The tasks measuring awareness of words and syllables suffered from ceiling effects already for the youngest children. The phonemic tasks, as reported in Figure 3, showed satisfying measurement properties (yet, remember the small sample size). However, it must be noticed that the language awareness tasks are rather time consuming and can be slightly unpleasant for some children and consequently also for the tester. The utility of the phonological awareness tasks should be set in relation to the information extracted by the effective and nonobtrusive name writing and letter-knowledge tasks.

The assessment was accomplished by the preschool staff, which experienced the testing procedure as rather time consuming but feasible and very rewarding. The general impression was that the testing schedule, with fall and spring tests, was nearly optimal. A shorter test interval would be too demanding and a longer interval (annual tests) would be of less value for the monitoring of the individual children's continuous development.

The two preschools in which the present data was collected have a considerably developed programme for early phonological awareness training. The materials used are largely based on Olofsson and Lundberg (1985) and Lundberg et al. (1988. See Adams, Foorman, Lundberg, &

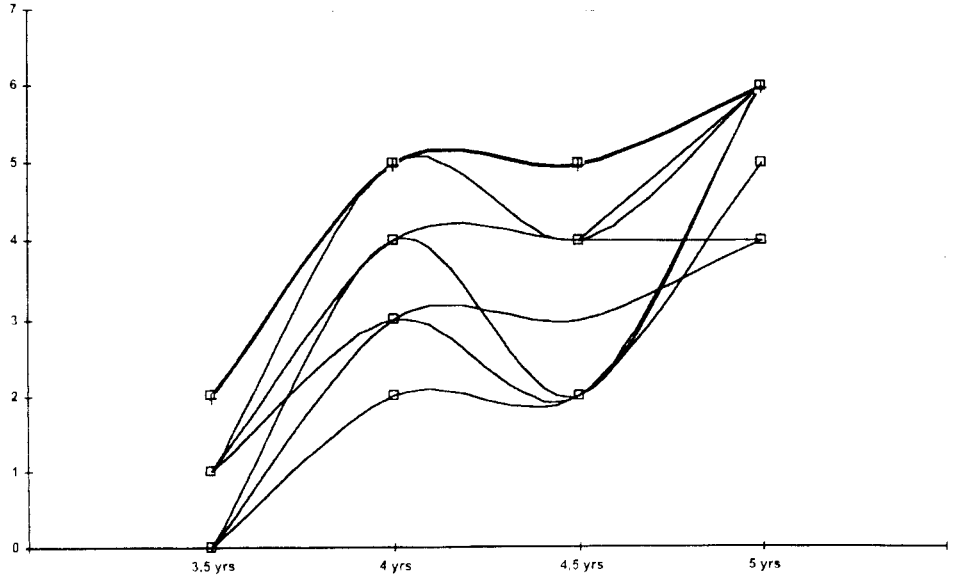

Figure 5
Longitudinal development of the ability to recite nursery rhymes in 10 Swedish preschool children.

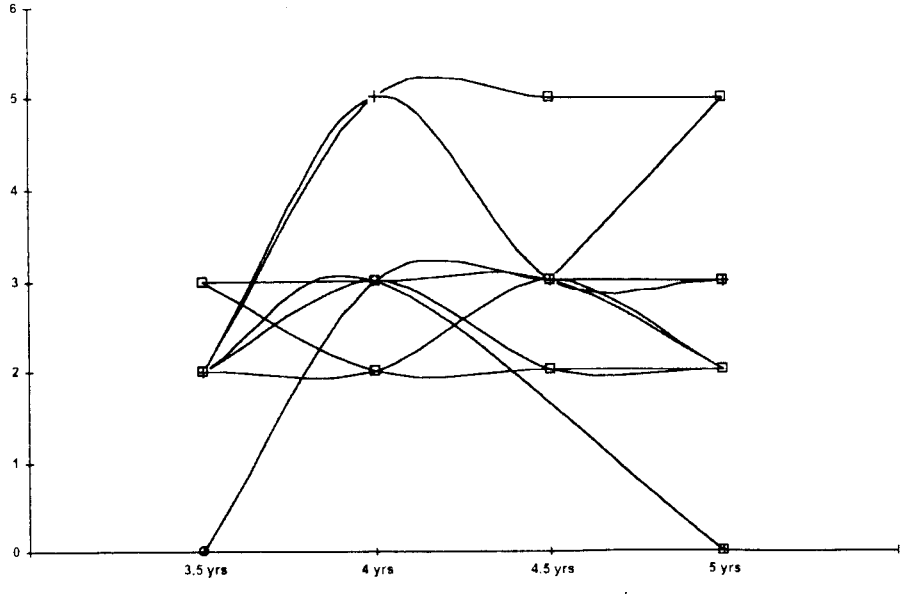

Figure 6
Longitudinal change in listening to reading for 10 Swedish preschool children.

Beeler (1998) for an English version.) In both participating preschool groups large amounts of spontaneous literacy-related activities were reported. Thus, the level of performance of the children in the present pilot study can be expected to be slightly above average for Swedish preschools. Furthermore, the staff must be considered rather experienced, a fact that should be kept in mind when implementing similar assessment systems in other educational settings.

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