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ABSTRACT

The reading instruction experiment described in this report is based on the theory that, if a child learns to talk without formal instruction solely by being exposed to language and if written language is to be considered as an independent system, a child could learn to read at the same age and in the same way as he is learning to talk, solely by being exposed to written language. He would then attack the written material, forming hypotheses, building models, and discovering the code of the written language--its morphemic, syntactic, and semantic systems. The author describes 14 months of work teaching a two-year old to read. Details of the procedures and the results are provided. After this period, the child is capable of storing, analyzing, and comparing written words and arrives at a knowledge of the grapho-phonemic correspondences that is a prerequisite for being able to decode any written message.
(Author/VM)

Ragnhild Söderbergh:

Reading in Early Childhood.
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This paper is a summary of my book "Reading in Early Childhood. A Linguistic Study of a Swedish Preschool Child's Gradual Acquisition of Reading Ability" (Stockholm 1971).

I have closely studied a child learning to read from the age of two years and four months by the method accounted for by Glenn Doman in his book "How to Teach Your Baby to Read" (New York 1964). By this method the child learns whole words as entities. I have shown how the child, as it learns more and more words, gradually breaks down these words into smaller units: first morphemes, then graphemes. At last the child arrives at an understanding of the correspondences between sound (phoneme) and letter (grapheme) and is able to read any new word through analysis and synthesis. In my experiment this stage is reached after 14 months of reading, i.e. when the child is three years and a half.

The findings of this study have been viewed in the light of recent linguistic theories as presented by research workers in child language inspired by Chomsky - such as Brown, Bellugi and Lehneberg.

Chapter One.

Learning to read. Theories and methods confronted with different linguistic theories.

In this chapter a short summary is given of the debate on reading in the USA in the 1950s. The author's main source here has been Jeanne Chall "Learning to Read. The Great Debate" (New York 1967).

According to Jeanne Chall there are - theoretically - two dominating methods in reading instruction, the phonics method and the reading-for-meaning method. In practice however there is often a mixture between the two.

The pure phonics method implies that the pupil is taught the letters of the alphabet and the corresponding sounds. Then he is taught to read by "sounding and blending", i.e. he sounds out the new words and then synthesizes the sounds so that the right word is produced.

The sponsors of the reading-for-meaning method oppose this - as they think - unnatural and boring way of reading and instead teach whole words and sentences from the very beginning, thus giving their pupils at once the experience of what are the ultimate goals of reading: comprehension, appreciation and - finally - application.

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In the pure phonics method the child is presented with the code and taught how to use it. In the extreme reading-for-meaning method the child is not taught the code.

Jeanne Chall has summarized the results of recent research in England and the USA on methods in beginning reading and arrives at the following conclusions: "Early stress on code learning ... not only produces better word recognition and spelling, but also makes it easier for the child eventually to read with understanding" (Chall, p. 83).

Chall gains support for the view that an early acquisition of the code is necessary also from the theoretical considerations of linguists, particularly Leonard Bloomfield and Charles C. Fries. These linguists, however, both consider written language as secondary to and completely dependent on spoken language. Bloomfield is apt to disregard written language altogether, from a scientific, linguistic point of view: "Writing is not language but merely a way of recording language by means of visible marks" (Language, p. 21).

Bloomfield was the linguistic pioneer of his time, and his views dominate the opinions of many linguists during the 1940s and 1950s. Recently, however, the written language has been considered an object worthy of investigation independently of the corresponding spoken language. There has been a strong tendency among linguists towards stressing the differences between the two codes, differences not only on the phonemic-graphemic level but also as regards morphemics and syntax. Linguists have even claimed that written language should be considered as a more or less independent system. (See Sture Allén, W. Nelson Francis, H.A. Gleason and H.J. Uldall).

The current trend in linguistics represented by Chomsky and his school has more or less revolutionized the ideas about language learning and language acquisition. According to Chomsky we have a biologically founded innate capacity for language. This means that when a child is exposed to language he does not just imitate but attacks the language he is being exposed to, observing it and constructing hypotheses about it. He builds his own model of the language, working out his own linguistic system consisting of sets of rules which are gross approximations of the correct system. As he is exposed to more and more linguistic material and as he is able to test his model by actual use of the rules when speaking, these rules are continually reconstructed and modified until, finally, the model becomes identical with the normal adult model. Chomsky's theories have been partly verified by many studies on child language presented during the 1960s, by Robert Brown, Ursula Bellugi, Colin Fraser, Paula Menyuk and others. Belief in the

biological foundations of language has been convincingly advocated also by Lenneberg in a book so titled which appeared in 1967. According to Lenneberg it is undisputable that the onset of speech and of certain linguistic abilities such as babbling, speaking isolated words, producing two word sentences etc. are determined by maturational processes (Lenneberg p. 127 f.).

The maturational processes and the innate capacity that cause children to start learning to speak at a certain age (18-28 months) without any form of instruction - the only requirement being that they are exposed to language - should also explain why this highly complicated learning process is being completed so quickly: within a period of two years all basic syntactic constructions of the language are mastered by the child.

Now, if a child learns to talk at a certain age without formal instruction, solely by being exposed to language, and if written language is to be considered as an independent system, why cannot a child learn to read at the same age and in the same way as he is learning to talk, solely by being exposed to written language? He would then be supposed to attack the written material, forming hypotheses, building models, a l l b y h i m s e l f discovering the code of the written language, of its morphematic, syntactic and semantic systems etc.

That this is possible we know from the fact that some children learn to read "all by themselves", i.e. just by observing a text while listening to other people reading it.

In a talk given at the annual meeting of American reading specialists in Boston, in April 1968, professor Arthur I. Gates, one of the foremost reading specialists in the United States, said that a recently finished investigation in the USA has shown that 80% of the children beginning school in the USA can read a certain number of words. There are also facts revealed in this investigation that hint at the possibility that very soon children will learn to read exactly in the same way as they now learn to understand and express themselves in spoken language, i.e. by living a normally active and verbal life.

That children can learn to read at an early age without real instruction is well known, but how children succeed in doing so has not yet been systematically studied. The chief interest then - when the child is learning to read a language written with an alphabet - must be centered on the following question: how does the child on its own discover the relations between letters (graphemes) and sounds (phonemes) Not until these correspondences are evident to the child, he can be said to have achieved full reading ability, i.e. to be able to read any

word irrespectively of whether he has seen that word earlier or not.

Chapter Two

The aim of this treatise. Method used in the experiment

The author decided to learn a child to read from about the age of two in a way that as much as possible resembles the way in which spoken language is acquired, i.e. to present (written) words and sentences in such contexts as to make clear the meaning of these words and sentences. Then the author intended to study the process by which the child arrives at full reading ability, i.e. at the understanding of the correspondences between letters and sounds.

For me to be able to follow this process, however, the child must in some way communicate it to me. The most reasonable way of communication, then, seemed to be through speech: the child must read aloud, which meant that I had to present written language to the child through the medium of spoken language, by showing written words and telling what they said. But this had to be done with an absolute minimum of instruction. To this end I chose the Doman method.

For the benefit of the reader, I shall here give an account of Doman's method, trying to analyse it and to state in what respects it might accord with or violate our principle of "free exposure" without inflicting any instruction on the child.

Words are written on cards, one word on each card. To begin with the letters should be red and 12.5 cm high ¹⁾ The cards are presented to the child at a maximum rate of one a day.

The first word is mother. When the child says "mother" as soon as you show that card, you go to the next card, which reads father. When you are sure that the child can discriminate the "mother" card from the "father" card you proceed to nouns denoting parts of the body (hand, nose, ear etc.). These words are written with 10 cm high red letters.

1) The letters should be red to attract the attention of the child and they should be big enough to make even a small child able to perceive the word. Doman makes a great point of this. In his opinion the reason why small children do not learn to read all by themselves at a very early age is that the letters of printed matter are generally not big enough.

Then you go on to what Doman calls the vocabulary of the home: words denoting the child's toys and other personal belongings, words denoting well-known things in the house etc. The child should be able to see and touch the thing at the same time as the "teacher" pronounces the word and shows the card to him ²⁾.

The domestic vocabulary also includes some verbs denoting simple actions well known to the child. The teacher may, to begin with, illustrate a verb by performing the action at the same time as he pronounces the corresponding word and shows the card. The domestic vocabulary should be written down in red letters 7.5 cm high.

All the time the "teacher" should be careful not to go on presenting new words without making sure that the child recognizes the old ones.

Then a book is provided. It should be a very simple and short book, not containing more than 150 different words. The letters should be $\frac{3}{4}$ cm high.

The "teacher" copies the book, rewriting it in black letters 2.5 cm high. Then each word is written on a card, in 5 cm high black letters. These cards are presented to the child one by one in the same way as before.

When the child knows all the words, the words are put together to form the sentences of the book. The cards are put on the floor side by side, and the child now learns to read sentences, one sentence a day. When the child can read all the sentences of the book in this way he is given the handwritten copy of the book and is taught to read the sentences from this copy: reading left to right, from the top of the page to the bottom of the page.

When the child is well familiar with this handwritten copy, the printed book is presented to him. And now he will be able to read this fluently, in spite of the fact that the letters are only $\frac{3}{4}$ cm high. ³⁾

You go on with other books, and now it is not necessary to have an intermediate handwritten copy. All words new to the child are written down on cards and shown to him. When the child knows these words he gets the new book etc.

2) In this way one makes sure not only that a strong association is established between the written and the spoken form but also that meaning is attached immediately to the written form.

3) Note the successive adaptation to smaller and smaller letters.

After the child has read one or two books, you write down the alphabet small letters and capitals, each letter on one card. You present the cards to the child, telling him the names of the letters like this: about a "This is a small 'ei' ", about A "This is a capital 'ei' ", etc.

It is to be observed that the child is not taught the sound values of the letters but is just given the conventional names - with the qualifier "small" and "capital" included in the name of the letter. This is obviously done to help the child to discern the letters within the word units.

By presenting the letters you no doubt draw the child's attention to the code. But as one avoids any kind of sounding and instead obscures what associations there might occur between letter and sound by adding the qualifier "small" and "capital" to the conventional name of the letter, this presentation cannot be said to help the child to discover the relations between letters and sounds. Nor, as the letters are presented in their alphabetic order without being grouped according to distinctive features, do you give any hints about the graphematic system; instead the child is left to make the discoveries totally on its own.

The real instruction given is purely technical and non-linguistic. The child is taught to read from left to right and from the top of the page to the bottom. The child is taught to turn the pages right-left.

By using the Doman method you leave it to the child to find out the interrelations between the codes of the written language and the spoken language all by himself.

The Doman method is, then, a way of presenting written material to a child with a minimum of instruction and through the medium of the spoken language.

Using the Doman method it is therefore possible to make observations about how a child discovers the correspondences between letters and sounds, how he succeeds in interrelating the graphematic and the phonematic systems - in "breaking the code" - which is the necessary prerequisite if he is to attain full reading ability.

Chapter Three

The experiment.

The experiment started at the end of September 1965. A girl, two years and four months old, was taught to read. During the first six weeks she was shown 50 concrete nouns and verbs.

From the middle of November the vocabulary of the first book was shown to her, and the girl read this book on the 22nd of December 1965.

The experiment was then continued with new books. All the time notes were taken about the girl's reactions and comments on reading-cards and reading.

At the beginning of March, 1966, the girl spontaneously tried to read some of the new cards I presented to her. These readings were noted down. At the beginning of April 1966 these spontaneous readings had become so frequent that I changed the method of showing new cards. Instead of taking a new card and saying "This reads X", I took the new card, showed it to her and asked "What does this read?". Often she suggested many different readings. Every attempt at reading was carefully noted down. In cases where the girl did not succeed in arriving at a correct reading, I finally read the cards aloud to her.

In August there was no reading because of my holidays. On September 1st the experiment was continued. At the beginning of November 1966 the child was able to read almost any new word presented to her on a card: the code had been broken.

From the beginning of December 1966 the child was given new books directly, without the intermediate stage of showing cards. The girl read the books aloud to me and I took notes. Some grapho-phonetic irregularities in Swedish (such as the spelling of /ç/) were not mastered by the girl until the autumn of 1967.

Chapter Four

First period (Sep. 30th 1965 - Dec. 22nd 1965):

From the first word to the first book

From the very first day the girl was enthusiastic about the reading cards. She treated the cards as if they actually were the persons or things written on them. The cards with mormor (grandmother) and morfar (grandfather) became favourites, and words with unpleasant associations were met with disgust ("Mother, I get so frightened when it says frightful on a reading card").

When we started with the vocabulary of the first book, the girl was shown a few so-called functors (prepositions, conjunctions, pronouns etc.). These turned out to be difficult to grasp. It is to be observed, that children learning to talk acquire - the often unstressed - functors later than nouns, verbs and adjectives, which normally have heavy stress (comp. Robert Brown and Ursula Bellugi "Three Processes in the Child's Acquisition of Syntax" (1964)).

Already at the end of the first reading month the girl observed similarities between different words: "Mother mage (stomach) is like öga (eye)".

In the third month of reading the girl learnt the word precis. She then observed: "precis liknar pappa" (precis is like pappa) - pointing at the p in precis - "men i pappa e de tre stycken" (but in pappa there are three of them).

This shows three things: 1. she was able to discern the letter p in precis and looked on it as an entity; 2. she was able to identify and sum up three samples of the same entity; 3. she had a visual image of the word pappa that was strong enough to enable her to pick out the three p's from it.

The visual image of the word pappa must have been very clear. This does not imply, however, that all the other words the girl was able to recognize were necessarily as clear in her visual memory. Pappa belonged to the early words; it does contain only two different kinds of letters; it is symmetrically built up with the double p surrounded by a's on each side, and it appealed to the girl's emotions.

Nevertheless her observations on precis and pappa give us a cue to the process behind the acquisition of reading ability: words are learnt visually and s t o r e d. As soon as a new word is introduced, this word is not only "put into the bag" but it is analysed and compared with the visual images of the words learnt before. By means of such comparisons structure is discovered.

Further evidence of this process is that the girl, when she was shown a new word that very much resembled an earlier learnt one, often told me to show her this earlier word. On being shown the new word det she said "det is like dem, show dem to me and let us compare".

Chapter Five

Second period (Dec. 23rd 1965 - March 31st 1966): The first attempts at spontaneous reading of new words

During this period functors still seemed to be a bit difficult, but the girl solved the problem by immediately putting them into a linguistic context. On getting fram (along) she said "Vi går fram" (We go along). Many other examples can be given.

From the beginning of March the girl made spontaneous efforts to read new words by herself.

The new words that the girl tried to read were all made up of material from words learnt earlier, i.e. they might be: 1. parts of already learnt words 2. combinations of words and/or parts of words learnt before.

The method of putting all the words of the books on reading cards gave me a complete index to the child's reading vocabulary. This enabled me to find very easily the patterns for every attempted independent reading of a new word.

According to how the girl made use of already learnt material when trying to read new words, the attempted readings could be divided into three groups, here called adjunctions, deletions and substitutions.

Adjunctions. On the 1st of March the girl was shown the new word bäcken and read it correctly. Earlier she had learnt to read bäck. The rest of the word was also well known to her as she had already met en as an indefinite article eleven times in her first book. I assume the underlying process producing the correct reading bäcken to be as follows.

1. First bäcken is analysed into two parts, bäck and en. The child is able to make this analysis because she is well acquainted with these parts as written entities.
2. The two parts are then read together, forming a spoken entity that is well known to the child and immediately associated with a meaning.
3. Thus the new graphic entity bäcken is tied to the corresponding spoken entity and is associated with the same meaning, all without the interference of the teacher.

Putting the stress on the second step in the process, which is the adding up of already known entities, we call this reading adjunction.

In the examples given above two parts already learned as separate graphic entities are put together. A more complicated kind of adjunction was made for the first time at the end of March when the new word pengarna was read correctly. Earlier the girl had learnt to read pengar. But the rest of the word, -na, does not occur as an isolated entity; it is a so-called bound morpheme, functioning as a definite article in the plural: pojkar_{na}, flickor_{na}, ballongerna etc. The adjunction here implies putting together one entity already learnt as a "word image" with another entity that is only a part of word images learnt before.

To be able to read pengarna the child must thus be able to recognize -na from previously learnt written words with this ending, i.e. she must already have made a grapho-morphemic analysis of these words.

At the moment of the independent correct reading of pengarna the girl had already met the following words ending in -na: tassar_{na}, kattungarna, fjärilarna, fåglarna, grodorna, insekterna, blommorna. The

question is now: How did she succeed in distinguishing -na as an entity?

Above we have shown that as soon as the girl learnt a new word, she compared this word with similar ones learnt earlier and tried to find out the differences between them. In two of the books read by the girl before she made the correct reading pengar-na she had met the word kattungar, which word appeared twice before she met kattungarna (compare above!). In the word pair kattungar - kattungarna the only difference is -na, and as soon as the child had found this out she had in fact made the grapho-morphemic analysis necessary to look at -na as an entity within the higher units tas-sarna, kattungarna, fjärilarna etc.

Theoretically she would now be able to read any previously learnt word + na.

Deletions. On the 2nd of March the girl read the new word ugglan. Earlier she had learnt ugglans. To make such a reading the girl must be able to analyse ugglans into ugglan + s, an analysis made possible by pairs occurring earlier, such as Anna - Annas, Astrid - Astrids, Mirran - Mirrangs etc. I assume the underlying process to be as follows:

1. ugglan calls up the mental image of ugglans, learnt earlier;
2. ugglan is compared with ugglans and the difference is observed;
3. on the basis of pairs like Anna - Annas etc. -s has already been identified as a meaningful unit. This helps the reader to analyse ugglans into ugglan + s and to recognize the new word ugglan as ugglan(s).

If we stress this last part of the process we might call the reading deletion.

Substitutions. On the 25th of March the girl was shown the word hittade. She read it as hittde. Although unsuccessful, this reading was the earliest example of a third type of spontaneous reading on the basis of material learnt earlier.

An already known word was hittat. The graphemic sequence de was well known as a separate word (she had not met it earlier as a bound morpheme in verbs because her books so far had been written in the present tense). The mental process is assumed to be as follows: When being shown hittade the girl remembers first hittat then de. She realizes that hittade is hittat minus something at the end plus -de, and she then deletes -at and adds -de, that is substitutes -de for -at getting the (incorrect) form hittde. This reading might thus be called a substitution.

Adjuncts, deletions and substitutions are the result of an analysis of the presented words; we therefore choose to call

these readings analytical readings.

During this period the girl also made technical progress in reading aloud.

When reading her first book the girl had been taught to point at the words. This was to accustom her to the left-to-right convention and to make sure that she did not skip any words.

On the 4th of March I noticed the girl sitting in a corner reading a book that she had finished a fortnight earlier. She read it whispering and without pointing. About three weeks later (March 23rd) she had just finished the reading-cards of another book and was going to read it aloud to me for the first time. She then read it without pointing. I did not make any comments to her about this, but I noticed that her reading now was much more like natural speech. When pointing she had been apt to make pauses between every word. After some minutes, however, she suddenly began to point, then interrupted herself: "No, it is much better not to point". "Much better" probably meant that she experienced reading without pointing as more meaningful. She was then able to take in bigger portions of the text at one time; her eyes could always be a good bit ahead of her voice and so the understanding of the text was better. Evidence of better understanding was the fact that her intonation, stress and reading rhythm improved when she did not point.

Chapter Six

Third period (April 1st 1966 - Oct. 31st 1966): Introduction.

The misidentifications

From April 1966 the girl is asked to try to read all new words by herself. Generally she makes at least one try to read every word. These tries may be analytical readings - right or wrong. They may also be so-called misidentifications, which means that a new word is mistaken for an already learnt word - as when mugg (cup) is taken to be mun (mouth) or sig (himself) is read sin (his). When making a misidentification the reader evidently is looking upon the new word as an entity.

It is significant that the proportion of misidentifications - where the new words are treated as entities - to analytical readings remains constant, during April, May, June, July and September, the analytical readings being 3,5 to 5 times as common as the misidentifications, until the month of October when the code is broken. Then the analytical readings become 18 times more numerous than the misidentifications.

The reason for this change is that in October when the code is broken - i.e. when the girl suddenly understands completely the correspondence between grapheme and phoneme - she begins to use a quite new analytical technique when trying to read new words that cannot be read by means of adjunctions etc. of previously learnt words or morphemes: she "sounds" the words letter by letter. Earlier, on being asked to read a word that resisted the operations of adjunction etc. she had often just suggested a word learnt previously that looked similar, i.e. made^{a)} "misidentification". At the time when, as soon as a difficult new word is attacked, the analytical-synthetic process of identifying graphemes, sounding them and adding the sounds replaces the mere "looking", we may safely presume that full reading ability is being attained.

Thus the increase in the analytical readings as compared with the misidentifications indicates that in October the girl is reaching the stage of full reading ability.

From what has been said above it might be concluded that the misidentifications are the result of an inferior kind of reading in which a new word is carelessly observed, without any kind of analysis, and mistaken for one learnt earlier. This is not true, however. Some of the misidentifications are the result of chance readings, but as a rule they are the outcome of most careful considerations.

An investigation of the misidentifications shows that certain rather constant relations, as to length, letters and position of letters, exist between a new word given and the word it is wrongly supposed to be.

As to the length of a new word given compared with the word it is wrongly supposed to be, the following observations have been made:

1. Out of 121 misidentified words 40 % (48) have been mistaken for words of exactly the same length and another 35 % (42) have been mistaken for words that are just one letter shorter or longer. 19 % (23) have been mistaken for words that are two letters shorter or longer and only 6 % (8) for words that are three to five letters shorter or longer.
2. Words shorter than three letters are not misidentified.
3. A word given that is three letters long or more is never mistaken for a word that is shorter than three letters.
4. Apart from this the length of a word assumed does not seem to differ from the length of the corresponding word given by more than about half the number of the letters in the word given.

5. It is also evident that the shorter a word given, the more often it is mistaken for a word of exactly the same length.

As to the number of letters common to a new word given and the word it is wrongly supposed to be, I have observed that when a new word is mistaken for a previously learnt word, on average 65 % of the letters in the new word are contained in the previously learnt word it is wrongly supposed to be.

In only 12 out of 121 cases of misidentification the order between the common letters is not the same in the new word given as in the word it is assumed to be.

At last the author has tried to find a way to measure the degree of similarity (S) between a word given and the word it is assumed to be, a way which takes into account the following facts: length of words, letters in common, order of common letters and position of common letters.

An investigation shows that this S is surprisingly constant. There is some tendency, however, towards a lesser degree of similarity when the word given becomes longer.

Chapter Seven

Third period (April 1st 1966 - Oct. 31st 1966): Analytical readings of morphemes

The growing reading skill - that is the gradual development towards an insight into the grapho-phonematic correspondences, and a capacity for using this insight actively when reading new words - is reflected in the a n a l y t i c a l r e a d i n g s. Both independent and dependent morphemes are involved in the processes. Analytical readings with only independent morphemes might be considered as comparatively easy, because these morphemes may occur as separate graphic entities. The handling of dependent morphemes is, however, a bit more complicated, as these only occur tied to other morphemes. The reader must thus be able to abstract the dependent morphemes from previously learnt words in order to cope with them in analytical readings of new words presented.

The dependent morphemes are only gradually mastered. In the table below we have a survey of the use of simple dependent morphemes in analytical readings during the different months. The first appearance of a morpheme is marked with an italicized x.

- 34 -

	March	April	May	June	July	Sept.	Oct.
-a	x	x	x	x	x	x	x
-an		x			x	x	x
-ande				x		x	
-ar	x	x	x	x	x	x	x
-are			x	x		x	x
-d				x		x	
-de	x	x	x	x	x	x	x
-e			x	x	x	x	x
-el							x
-en	x	x	x	x	x	x	x
-er		x	x	x	x	x	x
-et			x	x	x	x	x
-ig			x				
-ing			x				
-is					x		
-it					x		
-n				x	x	x	x
-na	x	x	x	x	x	x	x
-or		x	x	x	x	x	x
-r		x	x	x	x	x	x
-s	x		x	x	x	x	x
-t			x	x	x	x	x
-te				x		x	x

When we looked at the analytical readings pengar+na and ugglan(s) above, we found that there were patterns in the earlier reading material which made these readings possible. An investigation of the 23 morphemes in the table above shows that 18 of these have clear patterns in earlier reading material, when they appear for the first time in an analytical reading. The five morphemes without immediate patterns (-ande, -d, -ig, -ing and -is) might themselves be explained as the result of analytical readings: -ing for instance might be looked upon as a deletion ing(en), where en (one) has been deleted from ingen (nobody).

Dependent morphemes are being used in analytical processes from March and on. As March is the very first month of analytical reading, it is quite evident that the processes themselves (adjunction, deletion, substitution) are very difficult to the reader. Deletion, however, being a passive process, must be easier than adjunction. In the same way the first part of a substitution (which is in fact a deletion) must be easier than the second part (which is an adjunction). An investigation of the material shows that during March and April dependent morphemes are always introduced in passive processes. From May onward, however, not only morphemes previously introduced figure in the active processes; all "new" morphemes occur directly in adjunctions and in the active part of substitutions. That the reader has attained greater skill in May is also evident from the fact that in this month for the first time we find correct readings of new words containing dependent morphemes without immediate patterns in earlier reading material (compare above).

The reader's growing skill also manifests itself in an ability to cope with more and more complicated structures. In March only *s i n g l e* dependent morphemes are used in the analytical readings. But from April *s t r i n g s* of morphemes also appear, as when the new *bilarna* is read correctly because the reading material already known contains *bil* and pairs like *boll - bollar*, *klapp - klappar*, *ankor - ankorna*, *blommor - blommorna* etc. from which the dependent morphemes *-ar* and *-na* might be drawn.

As time passes on, more and more strings of dependent morphemes are introduced into the analytical readings. A table of these strings and their occurrence during the different months, with the first appearance of every string denoted by an italicized *x*, looks like this:

	April	May	June	July	Sept.	Oct.
<i>-a-de</i>	<i>x</i>		<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
<i>-a-de-s</i>				<i>x</i>		
<i>-an-de-s</i>			<i>x</i>			
<i>-ar-na</i>	<i>x</i>	<i>x</i>		<i>x</i>	<i>x</i>	<i>x</i>
<i>-are-n</i>				<i>x</i>		

	April	May	June	July	Sept.	Oct.
<i>-de-s</i>			<i>x</i>			
<i>-en-s</i>				<i>x</i>	<i>x</i>	
<i>-er-na</i>		<i>x</i>				<i>x</i>
<i>-ing-ω</i>				<i>x</i>		
<i>-lig-u</i>		<i>x</i>				
<i>-lig-ast</i>						<i>x</i>
<i>-lig-en</i>						<i>x</i>
<i>-lig-t</i>					<i>x</i>	
<i>-na-de</i>					<i>x</i>	
<i>-na-r</i>					<i>x</i>	<i>x</i>
<i>-na-s</i>					<i>x</i>	
<i>-ning-en</i>				<i>x</i>	<i>x</i>	
<i>-ning-s</i>						<i>x</i>
<i>-or-na</i>		<i>x</i>	<i>x</i>			<i>x</i>
<i>-r-na</i>				<i>x</i>		
<i>-st-e</i>					<i>x</i>	

Now, what are the patterns for each one of these strings of dependent morphemes when they first appear in analytical readings?

Three cases occur:

1. There may be patterns for the *w h o l e s t r i n g* of morphemes, as when *somliga* (16.5) is read as an adjunction of *som* and *-liga* - where the combination *-lig-a* might be drawn from *vän - vänliga*, which words occur already in March. When there are patterns for the whole string, the analytical reading is mainly of the same kind as where a *s i m p l e* morpheme is involved.
2. The process is more complicated, however, when there are patterns only for each one of the morphemes in the string, i.e. the reader must herself combine the parts. This is the case when *bilderna* (22.5) is read as an adjunction of the earlier learnt *bild*, *-er*, mastered

in April, and -na mastered in March.

3. We have a slightly more complicated case when one or more parts in the string has no immediate patterns but must be produced by means of analytical readings. This happens when, in September, jätteroligt is read as an adjunction, where -lig must be formed on the base of the already mastered -liga by deleting -a.

The material shows that the more complicated types 2 and 3 increase whereas the easier type 1 decreases as time is passing.

Now what about the wrong analytical readings? The number is steadily decreasing, from 44% in April to 25% in October. It should also be noted that the mistakes very seldom occur with the dependent morphemes: in only 13% of the analytical readings containing dependent morphemes there is a mistake involved in the reading of a morpheme during April - July; in September the percent is still lower, only 5. The mistakes instead occur with the bases of the words, as when gröten is read grönen, i.e. the base gröt (porridge) is supposed to be grön (green).

Chapter Eight

Third period (April 1st 1966 - Oct. 31st 1966): Analytical readings of graphemes

We have observed that the analytical readings start in March with simple morphemes; strings of morphemes do not occur until April and are only gradually mastered. In April there are also instances of readings of "false" morphemes. The word fönster-ruta (window-pane) is read as fönster + ut + a (window + out + "a"), where the identification of the a is made possible by the fact that -a has previously been learnt as a dependent morpheme and that -a in fönsterruta takes the same position as the dependent morpheme -a in grön-a, läs-a etc. - it is a "false" morpheme.

With the "false" morphemes the reader is not supported by the semantic component. To make the reading fönsterruta she must depend solely on her knowledge of grapho-phonematic correspondences in certain positions: that, for instance, an -a corresponds to an /-a/.

From here it is a short step, however, to the realization that a certain grapheme may correspond to a certain phoneme in many positions, some times in a n y position. When this is realized the reader has left the morphematic level and has entered the g r a p h e m a t i c r e a d i n g l e v e l. A still more advanced stage has been reached when the reader makes analytical readings using graphemes which are not homographic with morphemes, such as b, k, l, m.

A reading is, however, very seldom solely graphematic. Often one or two dependent and/or independent morphemes are involved in the reading process together with one or many graphemes. A reading is, however considered as graphematic when the child's way of reading or the child's own comments give clear evidence. A few examples should be given.

A m i s r e a d i n g may often give us the clue to the reading process, as when gråta (weep) is read /grɔta/, with a short ä-vowel, which shows that -åta has been mistaken for åtta (eight), part of the earlier reading material. Thus the reading process must be an adjunction of the grapheme string gr- and the independent morpheme (word) åtta.

Two or more s u c c e s s i v e r e a d i n g s might give us the clue. This is the case when ägg (egg) is read "lägg ... ägg": the earlier material contains lägger (puts) from which the morpheme -er is first deleted. Then the grapheme l is taken away. Other examples are länge read "hängde ... längde" (hängde was part of the old reading material), bur read "bu ... bur" and brum "rum ... brum" (bu and rum being part of the previous reading material).

Another way of reading which reveals what parts are observed is s e c t i o n i n g. When musikkår (band) is read /mɔ:s-i:-k-spɔ:r/ (the earlier material contains the words mus, (mouse) i (in) and spår (track)), it is evident that k is added as a grapheme to the rest.

The sectioning is a most important criterion of graphematic reading. At the end of October högre is read /hø:-gr-e/ in spite of the fact that the earlier reading material contains both höga and högar, which would lead us to expect the morphematic substitution hög/a, -re or hög/ar, -re. In this case, however, /hø:-gr-e/ is considered to be a g r a p h e m a t i c reading on account of the sectioning, although there do exist patterns for a morphematic reading. It is to be observed that not until October do such instances occur.

Sometimes the girl herself reveals, by comments on the reading material, that the patterns she uses are graphematic. The earliest example is from the 16th of May. On being presented with the earlier unknown parken the girl reads it correctly. I ask her: "How can you read that?" She answers: "I have had marken before." The process must thus be substitution: m- in marken is replaced by p-.

Following Sture Allén the author makes a distinction between autographemes and syngraphemes. In Swedish the autographemes are a, e, i, o, u, y, å, ä, ö, the syngraphemes are b, c, d, f, g, h, j, k, l, m, n, p, r, s, t, v, w, x and z. Then the grapho-phonematic relations in Swedish are discussed.

The author then treats the readings where the girl handles such syngraphemes as are not homographs of morphemes. (The autographemes are excluded for two reasons. First some of them are homographs of independent or dependent morphemes. Second all autographemes correspond to one long phoneme-variant which is used when the alphabet is recited.)

Eleven syngraphemes without corresponding homographic morphemes appear in graphematic readings during the period of April - October 1966. In the table below first appearance has been italicized. If a grapheme during one month only occurs in passive processes - deleted or substituted - it has been put within parentheses.

April	May	June	July	Sept.	Oct.
	<i>p</i>	(p)	p	p	p
<i>b</i>	b	—	b	b	b
	<i>m</i>	—	m	m	m
			v	v	v
	<i>k</i>	k	k	f	f
<i>g</i>			g	k	k
			j	g	g
		(h)	j	j	j
		l	h	h	h
			l	l	l
					c

From the table above we see that more and more syngraphemes without homographic morphemes are used in graphematic readings: in April there are only b and g; then one or two further graphemes are added every month, until in October all 11 syngraphemes are used. It is to be observed that the syngraphemes with one or several phonematic correspondences are always read in the most "normal" way: k is read /k/, g /g/, j /j/ and c /s/.

When a graphematic reading is made, this means that the reader has realized the "sound-value" of a grapheme or a sequence of graphemes, which is to say the grapho-phonematic correspondence in question. Such correspondences must be drawn from the reading material learnt earlier. By reading words beginning in ba ... /ba:/, ba ... /ba:/, bu ... /bu:/, ba ... /ba:/, etc. where the second element is an autographeme, the sound value of which is known from the reciting of the alphabet, the specific sound-value of b is easily perceived. If we look at the first correct readings of syngraphemes (cf. the table above: b and g in April, p, m and k in May etc.) and examine earlier reading material, we will find that there are always such clear patterns in this material.

If we look at all the graphematic readings during the April - October period we shall find that very often there are strong patterns in earlier reading material for exactly the grapho-phonotactic structure of the surroundings of the grapheme thus read. This tendency seems, however, to be weaker in the readings of September and October, which should indicate a growing reading skill where the occurrence of direct patterns is no longer necessary for the reader to produce a correct graphematic reading.

Let us take a few examples. 13 graphematic readings of k from May to September all have immediate patterns for the grapho-phonotactic structure of the immediate environment of the k. We find k in the initial combinations skr-, kr-, kl-, kv-, ka-, ko-, in the final combinations -ka, -kade, -kar, -ken, and in the medial combinations -ik- and -uk-. In September, however, the reading /faskiti:sa/ - wrong for faktiskt - and in October the reading /k-i:-lade/ for kilade show a complete knowledge of the correspondence between k and /k/ without the support of surrounding graphemes. A k before an i being normally pronounced /ç/, there are no patterns for the correspondence ki /ki/. In the same way, the reading in October of förrarhytten as /fö:rarhten/, where the y is overlooked, shows a sure knowledge of the correspondence h /h/.

The development towards analytical reading on the graphematic level is clearly illustrated by the fact that during the three last days of October the reader overlooks in many cases a more simple way of reading a word - through analysis into morphemes - and makes a more complicated graphematic reading.

As an example might be mentioned the reading of bakåt, where the easiest way would have been an adjunction of the wellknown parts bak and åt, but where the girl reads the word in three sections /ba: - k - ɔ:t/, isolating the syngrapheme in the middle of the word.

The final evidence, however, that the code has been broken and the child attained full reading ability was given on the 31st of December. Some weeks earlier I had told her a story in which the Nordic goddess Freja plays an important part. It may be noted that she had never seen the name Freja printed. On the 31st of December the girl asked me "Who do you think I am today? It begins with an f ... (spelling in a loud voice) f, r, e ... (almost silently, to herself) fre ..., frej ... (spelling again in a loud voice) j, a."

This transforming of a word from the spoken language to the written, from phonemes to graphemes, which is the reversed process (No)graphematic reading, gives full evidence that the code has been broken by the child.

After a period of 14 months the child has, by observing, learning, storing, analysing and comparing written words, and through the processes of adjunction, deletion and substitution - first of morphemes and graphemes homographic with morphemes, then of non-morphematic graphemes - arrived at a knowledge of the grapho-phonematic correspondences that is a prerequisite for being able to decode any written message.

Chapter Nine

Capital letters. Double syngraphemes. Some grapho-phonematic irregularities

New words written all in capitals are not mastered by the girl until November, i.e. when the code has been broken.

In Swedish double syngraphemes indicate a short vowel. Thus hat is pronounced /ha:t/, but hatt /hat/. This rule is not mastered by the girl until February - March 1967, and she still violates the rule now and then in April and May.

At the end of the chapter the grapho-phonematic irregularities of Swedish are discussed, and the girl's gradual mastering of the difficulties is described. All irregularities are mastered before November 1967. It is also evident that the rules are discovered gradually as the reading material affords patterns that might be imitated.

Chapter Ten

Conclusions. Some additional remarks on intonation, meaningful reading, application, appreciation, writing and spelling.

In this chapter the result of the experiment is compared with the recommendations of Jeanne Chall, that the child should be taught the code. An important thing is that the children studied in the research work mentioned by Jeanne Chall are school children who start learning to read at the age of five and a half to seven. With Lenneberg, Chomsky and others in mind, we may suggest that a child two to three years old, the age of the extraordinary linguistic capacity, might profit more from a method which enables him to find out of the system all by himself.

At last some additional remarks on intonation etc. are made. The girl was not taught intonation when reading aloud, nor did she receive any instruction about punctuation marks. She also here found out by herself. It seems that much of this discovering was made when she re-read the books. I sometimes noticed her sitting practising different

intonations and stress patterns when rereading the books aloud to herself.

From the very beginning the girl intimately connected reading and reality. New words on reading cards were often, in the girl's comments, put in relation to known linguistic and non-linguistic contexts. On reading the surname Larsson she interrupted herself saying: "The little baby's father living down there, he is called Larsson, and her grandfather (i.e. the baby's) is a bit bald".

Naturally, reading was experienced as more meaningful when the girl read about things that were well known to her from real life. But I have also witnessed that when she had first read about certain things and phenomena in her books, her later experience of the thing in real life became much more intense and rich than it would probably have been without the literary anticipation. Thus her first sunset, experienced in August, 1967, was a sheer delight; and the first time she saw cows grazing she was in a rapture, stopped and shouted in a voice full of joy: "Oh, this must be a pasture!" The sunsets and pastures of literature had finally come to life.

The girl's books also inspired her non-verbal life in many other respects. She often introduced scenes from books into her games, building houses after having read The New House, constructing roads for her cars after having read The New Road. Last but not least, she identified herself with all the heroes of the literature she read.

The problem of fiction and its relation to reality was very keen to her. When, at the age of three years and nine months, she was reading the Dutch author Ninke van Hichtum's book about Mother Afke's ten children she asked: "Have these people really existed?" "Possibly", I said. "Yes", she replied, "for if so, we will meet them in Heaven and then they can teach us to speak Dutch".

It is also evident that a small child can appreciate literature. An example is given at the end of chapter ten:

A favourite book was The Children's Bible by Anne de Vries. I noticed that the girl often stopped her oral reading of the Bible after having finished a very dramatic passage, and then she went over this passage again, silently. On the 21st of October, 1967, at the age of four and a half, the girl had read about the crucifixion. She went back and reread the passage telling how Jesus asks St. John to take care of his mother Mary and be like a son to her ("When Jesus therefore saw his mother, and the disciple standing by, whom he loved, he saith unto his mother, Woman, behold thy son! Then saith he to the disciple, Behold thy mother! And from that hour that disciple took her unto his own home".) She then said: "Det här var en fin liten dikt."

Mittemest i en litte poesie. (This is a fine little poem in the middle of all the frightful things there is a fine little poem.)

At about the age of three and a half the girl began trying to write letters herself. For some reason she concentrated on the capitals. By July of 1967 she could write all capitals except B, J, M, N, Q, U, V and X. Only X was still missing, and she then also failed to write and round Y. On the first of November, 1967, I tested her again and found that she then could write the whole alphabet, capitals and versals. By that time she had also begun to write little missives to invented persons.

When the girl was four and a half her spelling had already become remarkably good. Now, at the age of five and a half she simply knows how to spell and needs not devote any time to learning how. This skill, which is normally attained only after many years of hard school work, had come to her quite unconsciously as a by-product of her early reading. Would it not be a good thing if all children had this experience; of learning to read as they learn to talk and of having attained full literacy at an age when they are learning how; of having now being devoted to school years a lot of time and hard work and spelling. With these skills already at the pupil's command there could be time for more meaningful and stimulating work and activities at school. Thus still more could be made of the wonderful, receptive and harmonious years before puberty.

Chapter 11
Suggestion for further investigation

Here it is stressed that this preliminary study of one single child being finished, the experiment should be carried out on many children of the same age, let us say 100 - 150. Such an extended study would be done by a team of linguists and psychologists. The experiment of early reading should be followed through the years, and the development of their general and linguistic development investigated on.

Similar studies might also be carried out on children speaking other languages than Swedish. Do different languages raise different problems? Is it easier to find out the code of written Finnish, which is most completely phonetic, than the code of written Finnish? Might early reading along these lines be of importance to retarded children?



ded children? What about deaf children, if spoken language as a medium is replaced by pictures, gestures and film?

There are numerous tasks involved in further investigation on this subject. As I see it, there is great hope that both normal and retarded children might benefit from this approach to attaining literacy, where learning to read is defined as learning a written language and where the learner is therefore exposed to suitable reading material at the age when spoken language is normally acquired - not acquired because the environment imposes language upon the child at that age, but because the child has then reached a biological stage where his preparedness for language is at its prime.

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44

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