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DISCOVERING FEATURES OF LANGUAGE: METALINGUISTIC AWARENESS OF ADULT ILLITERATES

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1 Introduction

What do illiterate adults know about writing and language? Can they recognize environmental print? How do they think about the representational nature of writing? How would they judge word length? Do they know where in a spoken sentence one word ends and the next begins or that the word *cat* is made up of three speech sounds? Those questions arose after we had been researching the acquisition of reading and writing in a second language of adult illiterates and had been observing the students for about a year (Kurvers & Van der Zouw, 1990). Many observations seemed to suggest that the concepts on language and literacy teachers brought to the classroom often did not match with what the illiterates were thinking. In answering questions about a story they just had been reading, the beginning readers often used their own experience, and not the text. In copying written words, they seemed to use incidental features instead of the distinctive features the teachers were looking at. And in talking about language, words like 'empty' or 'hole' confused them, because they could not understand how something could be a word, "when there is nothing".

Many studies around these and other questions have been carried out among pre-reading young children (Teale & Sulzby, 1987; Adams, 1990; Gombert, 1992; Tolchinsky, 2004), but only a few were focused on illiterate adults. Most studies in which 'illiterate' adults were involved focused on adults in Western countries who went to school as children but did not learn to read properly (cf. Hunter & Harman, 1979; Scholes, 1993; Barton, 1995) or on illiterates in more or less oral societies (Luria, 1976; Scribner & Cole, 1981).

Illiterate adults in Western countries who never attended school are seldom investigated, although many have been living in advanced literate communities for a long time. Since young children's evolving knowledge of writing and language prior to being taught formally to read and write has been explored in many studies, one wonders why so little is known about the language conceptions of illiterate adults. Except for their phonemic awareness (cf. Gombert, 1992; Morais & Kolinsky, 1995, 2004), hardly anything is known about their emergent literacy or metalinguistic awareness. Research on the language awareness of illiterate adults is scarce; moreover, hardly any investigation has been carried out in which the awareness of the two groups of non-readers (young children and illiterate adults) was compared in a direct way. We

examined illiterate adults by investigating their awareness of print and language. In this contribution, we only present some outcomes on language awareness.¹⁴

1.1 *Metalinguistic Awareness*

Metalinguistic abilities can be described as ways of conscious reflection on, and analysis and internal control of, different aspects of language, apart from the unconscious processes of understanding and production of language (Gombert, 1992, 1997; Karmiloff-Smith *et al.*, 1996; Tunmer, 1997). The term metalinguistic is used to cover a range of linguistic skills, such as segmenting words into syllables or phonemes, phoneme manipulation, segmenting sentences into words, separating words from their referents, or judging rhyme or syntactic properties of sentences. Phonological awareness refers to the ability to manipulate sub-lexical units like onset-rhyme, syllables, or phonemes. Lexical/semantic awareness refers to the ability to separate language forms from their meaning and to segment sentences along word boundaries. Syntactic awareness refers to the competence to judge the grammaticality of sentences or to explain or correct grammatical errors. Some authors also call syllogisms metalinguistic tasks, since solving a syllogism requires an explication of the meaning relationships between different sentences (Scribner & Cole, 1981; Ong, 1982; Olson, 1994).

We do not know much about illiterates' language awareness and their knowledge of structural features of language. There is one exception, however. It has been shown convincingly that illiterate adults, like young children, perform poorly in segmenting words into phonemes (Morais *et al.*, 1986; Bertelson *et al.*, 1989; Scholes & Willis, 1991; Prakash *et al.*, 1993; Gombert, 1994; Adrian *et al.*, 1995; Lukatela *et al.*, 1995). In all studies, illiterates differed significantly from readers in every phoneme manipulation task, such as phoneme segmentation, and phoneme deletion or addition. Differences in other phonological tasks like phoneme discrimination, rhyme judgment, or syllable manipulation turned out to be much smaller.

It seems to be presumed that adults in general share basic forms of language knowledge. Adults know where in a sentence one word ends and the next begins, and they know that a word is not the same as the referent, that a word like 'housekeeper' is composed of different parts, and that words like 'they all' in discourse refer to a group of people. Scribner & Cole (1981) found no consistent effect of literacy on the ability of different groups in Liberia to differentiate between words and referents, or to judge word length. This finding is partly confirmed by other research on adults, but not by all. Hamilton and Barton (1983, see also Barton, 1985) did not find any significant differences between three groups of adults of three different reading ages in word judgment and marking word boundaries in spoken sentences. Kolinsky *et al.* (1987) found significant differences between illiterate and literate adults in judging word length. Moreover, Gombert (1994) found that illiterate adults could not mark word boundaries in spoken sentences, but this result might be confounded by the fact that the participants' knowledge was judged in their second language.

On other levels of lexical/semantic awareness, studies of adult illiterates produced different outcomes. Both Luria (1976) and Scribner & Cole (1981) compared how literates and illiterates solved syllogisms. Luria found systematic and significant

¹⁴ This forms part of a larger study in which also the daily experiences with written language were investigated, and the illiterates' concepts of forms and functions of writing.

differences when the illiterates were compared with literates who had been to school for only three years. The former group systematically used their own experiences in solving the syllogism (*I have never been to England; So how can I know if cotton grows there*), while the literates used deductive reasoning based on the premises. On the other hand, Scribner and Cole (1981) found an effect of schooling: the literates who had been to school for more than eight years were significantly better at solving the syllogism than both the illiterates and literates who had learned to read without formal schooling.

Much is known however about young children's developing awareness of structural features of language (Sinclair *et al.*; 1978; Valtin, 1984; Yaden, 1986; Gombert, 1992). As far as metaphonological knowledge in the broad sense (see also Geudes, this volume) is concerned, the overwhelming outcome of many studies is that children who cannot read and write have difficulties in manipulating phonemes in words, while abilities like rhyming or manipulation of syllables are easier to handle, even for pre-readers (Bertelson, 1986; Goswami & Bryant, 1990; Adams, 1990; Gombert, 1992; Demont & Gombert, 1996; Byrne, 1998; Troia, 1999; Murray, Smith, & Murray, 2000). The outcomes of developmental lexical/semantic studies are more diffuse. Chaney (1989) and Karmiloff-Smith *et al.* (1996), for example, found that children as young as four or five years old had no real problems in marking word boundaries in ongoing narratives, while other studies report that children under age six have serious problems in isolating words in sentences (Ehri, 1975; 1979; Bowey & Tunmer, 1984; Gombert, 1992; Roberts, 1992; Homer & Olson, 1999; Edwards & Kirkpatrick, 1999; Kurvers & Uri, 2006).

In developmental studies with young children, often a sudden growth in phonemic and lexical awareness has been observed between roughly the ages of five and eight. Different explanations are brought forward for this sudden growth in metalinguistic abilities in different language domains of young children: (1) language development, (2) cognitive development, or (3) literacy as explanatory models (Watson, 1984; Tunmer, Herriman, & Nesdale, 1988; Dreher & Zenge, 1990; Francis, 1999). The first two models can be subsumed under the heading of developmental hypotheses; the last model can be distinguished under the heading of literacy hypothesis.

The metalinguistic knowledge of illiterate adults constitutes an excellent case for testing those contrasting hypotheses, because, unlike young children, illiterate adults are experienced users of language, and, like young children, they have not had any systematic introduction to written language. If metalinguistic knowledge is a direct consequence of development, no large differences in metalinguistic abilities between adult illiterates and low-educated adult readers are expected to be found, while differences between young children and adults are expected. On the contrary, the claim that explicit knowledge about structural units of language is a consequence of systematic introduction to the writing system predicts systematic differences between literate and illiterate adults, and much smaller differences between younger and older non-readers. Maturation hypotheses predict major differences between young children and adults (irrespective of their literacy skills). Literacy hypotheses predict major differences between readers and non-readers (irrespective of their age).

So, our research question was: What do illiterate adults know about the structural features of the language they understand and speak, compared with young children who can not yet read and with literate but low-educated adults? The literacy hypothesis

predicts differences between readers and non-readers, irrespective of age. The developmental hypotheses predict differences between children and adults, irrespective of literacy skills.

2 Method

2.1 Participants

The target subjects were illiterate adults, and the two reference groups were children with similar ethnic and social backgrounds just before entering first grade and literate adults with similar ethnic and social backgrounds who had no more than six years of primary education. Since almost all native adults in highly literate societies who cannot read or write have a history of formal education, albeit unsuccessful, illiterate adult migrants, who had just entered adult literacy classes, were selected. Those illiterate adults were selected who had less than two years of primary education and could not read simple monosyllabic words they had not learned beforehand. Literate adults were defined as able to read and write a simple text (either in their mother tongue or second language) and having no more than six years of primary education. The children selected were in the last term of pre-school, had not been in pre-school for more than three years, and were to go to first grade in the next school year. All samples started with 28 participants in each group. Between three and five subjects in each group dropped out, owing to external circumstances, like moving house or childbirth. The three groups of participants and the distribution over ethnic origins are presented in Table 1.

Table 1: Participants by research group and ethnicity

Ethnic group	Children	Illiterate adults	Literate adults
Moroccan	14	14	11
Turkish	3	3	5
Somali	3	6	3
Other	4	2	4
Total	24	25	23

All participants came from medium-sized cities in the southern part of the Netherlands. The children were attending the last term of pre-school, all schools being so-called 'black' schools, which means that at least 60% of the school population had an immigrant background. The adults took part in adult literacy classes (illiterates) or participated in classes in Dutch as a second language (literate), in the same neighborhoods as where the schools of the children were located.

Of the 14 illiterate Moroccan adults, eleven had Tarifit, one of the Berber languages, as their mother tongue, and three Moroccan Arabic; of the literate Moroccans, six were Tarifit speakers and five were Moroccan-Arabic. Of the Moroccan children, seven had Tarifit as their home language. All Somalis had Somali as their home language, and all Turks Turkish.¹⁵ The other participants were mainly children and adults from the

¹⁵ Both Tarifit and Somali belong to the Afro-Asiatic languages, Somali to the Cushitic branch, Tarifit is one of the Northern Berber languages. Both languages have, compared to English, a

former Dutch colonies of Surinam and Curaçao, and spoke both Sranan Tongo (Surinam) or Papiamentu (Curaçao) and Dutch at home. The mean age of the children was 6.4 years, with a range from 5 to 7. To be sure that the differences between the two groups of adults would not be caused by unintended differences in their background (which might also explain the difference between being literate and illiterate), additional background data were gathered and checked. In both groups, the majority of the participants were women (19 in both groups); the difference was not significant (chi-square = 0.32, df=1, n.s.). In both groups, about half of the participants came from villages and the other half from smaller or larger towns (chi-square=0.09, df=1, n.s.). Of the 25 illiterates, 15 lived with a partner and children in a one-family home and the others with a partner, with children, alone, or with parents; of the literates, 12 of the 23 lived with a partner and children in a one-family home (chi-square=0.38, df=1, n.s.). Twenty-two of the 25 illiterates were unemployed, while 17 of the 23 literates were unemployed (chi-square=3.68, df=1, n.s.).

The mean age of the illiterates was 38, ranging from 15 to 57, and the mean age of the literates was 34, ranging from 17 to 55. There was no difference between the groups in mean length of residence of the participants or their partners; in both groups, this ranged from less than a year to more than 20 years. Of the 25 illiterate adults, 19 had never been to school as children, whereas six had attended primary school for less than two years; the literate adults had attended primary school for about four years and a half, ranging from two to six years of schooling ($t=-13.22$, df=1, $p<0.01$).

All except for one illiterate and two literate adults used mainly their mother tongue at home; the difference between the groups was not significant (chi-square = 0.23, df=1, n.s.). Nearly all adults preferred to speak their mother tongue (no difference between the two groups; chi-square= 0.43, df=1, n.s.). All literate and 20 illiterate adults reported some knowledge of another language, mostly Arabic or Dutch ("I can understand Dutch, but I can not talk back"). All except two literates attended Dutch (second-) language classes, while four literates had had some years of primary education in Dutch schools.

Except for the deliberately intended difference in years of primary schooling, there were hardly any differences in background data between the two groups of adults. The illiterate adults had all started literacy classes in Dutch as a second language. The number of hours they had already attended these classes at the moments of testing ranged from about 20 hours to about 200 hours: for each class about 4-6 hours a week. All literacy classes in Dutch as a second language start with a basic program in oral Dutch and some preparatory exercises; no one had actually learned to decode during that period.

Before the test sessions started, some visits were made to the classes and in-depth interviews were carried out with the illiterate adults, in which they talked about their own personal histories and their experiences with writing and language. Except for the few illiterate adults who had attended primary school for about one year, the illiterate adults did not have much exposure to print as children. A few remembered looking at what their siblings (mostly brothers) were reading, and being curious to find out what they were doing. All participants knew somebody who was able to read letters to them,

rich morphology. The agglutinating Turkish belongs to the Southern Turkic branch of Altaic languages. The basic word order is VSO/SVO for Tarifit, and SOV for Somali and Turkish.

in almost all cases a relative or neighbor, and two illiterate adults remembered the postman reading letters to their families. Except for one widowed woman, all illiterate adults had at least one reader/writer in their direct environment, mostly their partner or one or more of their children. Almost all illiterate adults had a fairly good idea of the functions and uses of literacy (Heath, 1983). They knew the purpose of a newspaper, they knew about subscriptions to television, they knew the uses of bills and billboards, and most of them knew the working of a calendar, agenda, or phonebook, although most did not and could not use these tools themselves. They knew they had insurance cards and identification cards, although many did not know where to look for specific information. All except five illiterate adults could write their first names, and fewer than half of them their surnames or addresses as well. In talking about reading, they all made a clear distinction between looking and reading (“I can look at the newspaper, but I still do not know what it says”); the difference between learning to read and learning a (second) language, however, was confusing (some assumed they would be able to write letters to friends in Morocco once they had learned to read and write in Dutch). None of them could read simple monosyllabic words they had not already learned.

All illiterate adults were determined to learn to read and write: “Otherwise I will stay like a blind person, who can look at the newspaper, and still do not know what it says” or “You are not a human being if you cannot read.” Most illiterate adults expressed a low level of aspiration for their own future (“Just reading and writing” or “One level up, some more Dutch to answer the phone”), while a few wanted more: “Later on, I am going to write a book about my life.” “Why later? Why not now?” the teacher asked. “Right now, I do not have enough letters.”

2.1 Materials

Several test instruments were used to investigate metalinguistic awareness. Table 2 gives an overview of these instruments, together with a preliminary analysis of their internal consistency (Cronbach’s alpha).

Table 2: Overview of test instruments, the number of items (k), and the internal consistency of the test instruments (Cronbach’s alpha)

Language level	Instruments	Number of items	Cronbach’s alpha
Phonological	Rhyme production	12	0.91
	Rhyme judgment	14	0.71
	Word segmentation	6	0.87
Lexical/semantic	Word/referent differentiation	3	0.87
	Word length judgment	10	0.76
	Word judgment	18	0.70
	Sentence segmentation	3	0.86
Textual	Syllogisms	5	0.84

Rhyme Production

After four examples were given with corrective feedback, 12 test items were presented orally. The participants were asked to react with a rhyming word, as in the examples. To

prevent word-finding problems from occurring, only those items were selected in the different languages that triggered several high-frequency words as a correct answer. Both monosyllabic and bi-syllabic words were used.

Rhyme Judgment

The rhyme-judgment task consisted of 14 orally presented pairs of words. The participants were asked to judge whether or not the words rhymed. Four examples were given before the task started. Six pairs consisted of rhyming words; in six other items, the words were semantically related (husband-wife); and in one item only the vowels were different. The participants were asked to explain their answers.

Word Segmentation

This task was part of the progressive segmentation task; see under progressive segmentation for further information.

Word / Referent Differentiation

To test the meta-semantic knowledge of the participants, a picture of a cat and a dog was presented and it was suggested to change the names. The participants were asked to answer a few questions about properties of the animals with the changed names (*What noise does the animal make that is called 'dog' now?*) and to explain their answers.

Word-length-judgment.

To test the participants' ability to judge words based on formal features only, 12 word pairs were presented orally and the participants were required to choose the longest word. Five items consisted of congruent pairs, meaning that the longest word corresponded to the largest object (*geit-olifant* 'goat-elephant'), six consisted of incongruent pairs, in which the longest word corresponded to the smallest object (*slangvogeltje* 'snake-little bird'), two items were neutral in this respect (*vork-lepel*, 'fork-spoon'), and one item consisted of a pair of names with no clear referent (*Margaretha-Leyla*). The difference in word length varied from one to three syllables, while word length varied from one to four syllables.

Word Judgment

The participants were required to judge if a given sound string ('utterance') was a word or not a word, and to explain their judgments. The task consisted of 18 items. The list contained content words (*monkey, book, walking*), different function words (*at, or, the*), word groups (*large trees*), and sentences (*He is reading a book*). Words differed in concreteness (*walking, thinking*), in number (*monkey, houses*), and in word class (*monkey, large, or*). The participants were asked to explain their answers.

Progressive Segmentation

A progressive segmentation task was developed to gain insight into the way the participants segmented spoken utterances. The participants were asked to break an orally presented sentence up 'into pieces' and to tell and demonstrate how many pieces they had. No demonstrations were given of any specific segmentation. The participants were free to choose their own way of segmentation. The first part of the task consisted of three sentences that in each of the languages used consisted of both content words and function words, and of both monosyllabic and polysyllabic words, like *the old man is*

going to the hospital tomorrow. After that, word groups of the formerly used sentences, like *the old man*, were presented again and the participants were asked to segment them into “still smaller pieces”. Next, the same procedure was repeated using polysyllabic words like *hospital* and monosyllabic words like *man* alternately. The task consisted of 12 items, three sentences, three word groups, and four polysyllabic and two monosyllabic words. Since this task concerned both metalexical and metaphonological skills, it is split into *word segmentation* and *sentence segmentation* in the overview (Table 2) and in the analysis of the results.

Syllogisms

To check if the participants were able to solve simple syllogisms, five syllogisms were presented orally and the participants were asked to solve them and to explain their answers. The same syllogisms were used as Scribner & Cole (1981) used in the second part of their research in Liberia, with minor adaptations to the Dutch context (f.e. Amsterdam instead of Monrovia). An example is the following: *All stones on the moon are blue. A man goes to the moon and takes a stone. What color is that stone?* The participants were asked to explain their answers (“How do you know that stone was blue?”)

Linguistically experienced bilinguals translated the tasks into Tarifit, Somali, and Turkish. Some minor adaptations were necessary to assure the comparability and equivalence of the tasks. Since Tarifit does not have a word for *word* like in English, the word *awar* was used, which has the broader meaning of ‘piece of language’ as well, in the sense of ‘saying something’. In the experiments, it was used together with the Dutch word *woord* and the Arabic *kelime*, both of which have the same meaning as the English *word*. Since neither Tarifit nor Somali uses a word for *rhyming* which has the same meaning as the Turkish and Dutch equivalents, the instruction was focused on the examples. Sentences of about the same length with the same formal characteristics were produced in all languages. Minor adaptations were necessary for a few function words and a few prepositions. In the Turkish version, the definite article *de* (= the) was translated as *şu* (= that); in Somali, the Dutch word *op* (= on) was translated as *ka* (multiple meanings like *on, at, near, with, against*). Because Tarifit and Somali do not have as many high-frequency monosyllabic words as Dutch and Turkish, some more items consisted of bisyllabic words in the rhyming task.

The same bilinguals who translated the tasks (and, therefore, were acquainted with the purpose and the wording of the tasks) assisted as interpreters during data collection in the participants’ first languages. The researcher and the interpreter had already visited the classes before data were gathered. Except for two illiterate adults, all those attending the classes agreed to participate in the project, although several illiterate adults wondered why the researcher wanted them to talk about language and writing: “Did you come all the way from the university for us? You better ask my sister-in-law. She went to school and can answer your questions better than I do.”

The tasks were carried out in either the subjects’ mother tongues or Dutch, depending on language dominance and preference. The subjects were asked which language they would prefer, their mother tongue or their second language, Dutch. Some adult participants who had been living in the Netherlands for more than 10 years, chose Dutch (5 illiterates, 11 literate adults). All data were gathered in two or three sessions of about one to one and a half hours, breaks depending mostly on the school timetables.

3 Results

All language awareness tasks were also carried out in either the first or second languages of the participants. Consequently, in a preliminary 3x2 analysis of variance, the main effects of both group (child, illiterate, literate) and language (L1 or L2), and the interaction between group and language were investigated (SPSS 12.0, GLM Univariate Analysis, model III). The idea was that if a significant main effect of language was found, and no effect of group, the results would only be presented for the mother tongues of participants, since our aim was not to measure command of a second language. This turned out to be the case only for the word judgment tasks ($F_{1,62}=9.29$, $p<0.05$). In all other cases, the outcomes could be aggregated over languages. Table 3 gives an overview of all language awareness tasks, split up into phonological and lexical/semantic and textual tasks.

Table 3: Means and standard deviations of language-awareness tasks per group and the statistical outcomes (F ratio)

		Children (N=24)		Illiterate adults (N=25)		Literate adults (N=23)		df	F-ratio
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Phono- logical	Rhyme production (range 0-12)	8.74	3.33	2.13	2.77	6.57	3.33	2,64	27.02**
	Rhyme judgment (range 0-14)	10.78	2.88	9.96	2.28	11.36	2.54	2,64	1.77
	Word segmentation (range 0-6)	4.24	1.73	1.65	2.12	3.73	2.30	2,60	10.17**
Lexical/ semantic	Word referent (range 0-3)	1.63	0.89	0.50	0.83	1.29	1.40	2,51	6.18**
	Word length (range 0-10)	7.23	1.80	6.79	2.11	8.91	1.53	2,63	8.68**
	Word judgment L1 (range 0-18)	12.29	1.98	13.0	2.17	15.55	1.81	2,35	7.30**
	Sentence segmentation (range 0-3)	0.19	0.40	0.09	0.28	2.14	1.13	2,61	60.05**
Textual	Syllogisms (range 0-5)	1.65	1.66	0.92	1.27	3.35	1.81	2,56	13.73**

$p<0.05$, ** $p<0.01$

For all but one task, the main effects of group were significant. The only exception was rhyme judgment, in which the mean scores of the groups did not differ significantly. In two of the three phonological tasks, the mean scores of the children were higher than those of the adults, while in most other tasks the scores of the adult literates were higher

than those of both groups of non-readers. We discuss these results more thoroughly below, and separately for the phonological and lexical/semantic tasks.

In Table 4, the outcomes of the post hoc analyses (Tukey HSD) are reported in order to demonstrate the differences per pair of groups. No results are given for rhyme judgment, because no overall group effect was found here (see Table 4).

Table 4: Pairwise comparisons of language awareness (Post hoc Tukey HSD)

Task		Child vs. Illiterate	Illiterate vs. Literate	Child vs. Literate
Phonological	Rhyme production	**	**	ns
	Word segmentation (all sublexical levels)	**	**	ns
	Word segmentation (phonemic level)	ns	**	**
Lexical/semantic	Word-referent differentiation	*	*	ns
	Word length	ns	**	**
	Word judgment (L1)	ns	**	**
Textual	Sentence segmentation	ns	**	**
	Sylogisms	ns	**	**

* $p < 0.05$; ** $p < 0.01$

As can be seen in Table 4, the illiterate adults differed significantly from the literate adults in all language awareness tasks that revealed group differences. The children differed from the literates in nearly all lexical/semantic tasks but not in the phonological task, except for phonemic segmentation. They were as good as the literates in rhyme production, and like the literates they succeeded in sub-lexical segmentation, although nearly all children segmented along syllables. The children did not differ from the illiterate adults in most of the lexical/semantic tasks, but they did differ from the illiterates in rhyme production and sub-lexical segmentation, and in word-referent differentiation.

3.1 Phonological Awareness

It can be seen in Table 3 that the children had the highest scores in two of the three phonological tasks, and that the scores of the illiterates were low compared to those of both the children and the literate adults. Analysis of variance returned significant differences among the groups in every task, the largest difference being for the rhyme-production task.

Rhyme Production.

Table 3 shows that most children were fairly good at rhyming, while most illiterate adults were bad at it. Post hoc analysis (Tukey HSD) revealed that the illiterate adults differed significantly from both the preschoolers and the literate adults ($p < 0.01$), while the difference between children and adult readers was not significant. Both children and adult readers produced a rhyming word for more than half of the items. Further analysis showed that the children often reacted with a pseudo-word in the rhyming task

(33.5% of all responses), and the adults much less so (6.8% of the rhyming reactions of the illiterates and 13.5% of those of the literates); adults more often reacted with an existing word. Most children did not hesitate either; they immediately came up with a rhyming word, while the more literate adults took some time to think about a word that fitted the criteria. The non-rhyming responses were further categorized as 'alliteration' (like *moos-mir* or *asinu-asia*), meaning association (like *hair-comb* or *costs-a lot*), or some other reaction (like repeating a word). All types of responses were found in all groups. Adults seemed to prefer alliteration (44.3% of the errors of the illiterates and 54% of those of the literates) and, to a lesser degree, meaning association (especially the illiterates, with 33% of the error responses). The most frequent error responses of children who did not rhyme belonged to another type, like repeating the word (44% of the error responses).

Rhyme Judgment.

The differences between the three groups were much smaller when it came to rhyme judgment. There was no difference between the groups in how well a pair of words was judged as either rhyming or non-rhyming. The scores of all three groups were significantly above chance level. Rhyme judgment was easier than rhyme production, especially for the illiterates. A 3x2 analysis of variance was carried out with group as between-subjects factor, and type (rhyming pairs versus meaning pairs) as within-subject factor. There was a significant effect of type ($F_{1,67}=37.04$, $p=0.000$) but no interaction between group and type ($F_{2,67}=0.12$, $p=0.89$). It was easier for all groups to judge two rhyming words as rhyming than to conclude that two words that were close in meaning did not rhyme.

Word Segmentation.

For the first analysis of word segmentation, the responses to both polysyllabic and monosyllabic words were categorized as either sub-lexical segmentation or not (this is the first response shown in Table 3). The number of words segmented somehow into sub-lexical units was much higher for children and literates than for illiterates. Most children were fairly good at segmenting words into sub-lexical entities, while most illiterates did not segment words into sub-lexical units at all. The range in scores of both groups of adults was maximal, but the median of the literates was 4, and of the illiterates 0. Post hoc analysis showed that the illiterate adults differed significantly from both other groups, but the children did not differ significantly from the literates.

Subsequent analyses revealed additional differences between non-readers and readers in type of sub-lexical segmentation. While the overwhelming reaction type of the children who did segment sub-lexically was segmentation along syllable boundaries (about 75% of their segmentations), most of the segmentations of the adult readers were phonemic (67% of their responses). In most cases, the illiterates did not segment words into sub-lexical units at all, but when they did they divided the words into syllables. Monosyllabic words were hardly segmented by the non-readers. Six out of the 25 illiterates reacted to the content, and not to the form, as in "Yes, you can divide *tomatoes*, into four parts." The conclusion is that phonemic segmentation is only used by readers, while the syllable seems to be a more natural linguistic unit to use. However, the young children's syllabic segmenting was also caused by the fact that they practiced this in pre-school.

In sum, most of the children and literate adults were good at rhyming, while the illiterate adults were not: they responded with alliteration, or they made associations on the basis of the meanings of the words. Differences between groups were much smaller and not significant when it came to rhyme judgment. The majority of the illiterate adults did not segment words into sub-lexical units, while young children preferred segmentation into syllables and literate adults segmentation into phonemes.

3.3 Lexical/Semantic Awareness

Mean scores, standard deviations, F ratios, and outcomes of the pairwise comparisons of the lexical-semantic tasks are presented in Tables 3 and 4. The results will be discussed below for each task.

Word/Referent Differentiation

When the participants were asked to mention some qualities of the animals after their names were changed, about half of the children and the literate adults were able to play the game, while most of the illiterate adults could not. The range was maximal for the children and the literate adults, while a correct score higher than 2 did not occur among the illiterate adults. Post hoc analysis showed that the difference between children and illiterates and the difference between literates and illiterates were significant, while there was no significant difference between children and the literate adults. There was, however, a difference in their argumentation. Most adults, especially the illiterates, shared the opinion that names cannot be changed, because God gave these names or because it would not be practical to do so (“Why would you do that? Even if we agreed to change the names, the dog would not listen to you.”). Those who did agree to do so found it difficult to answer questions about properties of the animals with new names. The children were better; but they did not argue, but simply played the game of changing names. In discussing this issue further, taking the difference between their first and second languages into account, most adults did not have any problem at all in differentiating word and referent. They all found it convenient that, for example, *akezin*, the word for dog in Tarifit, differed from the Dutch word *bond*: “Of course those are two different names; one is my language and the other is yours.” But in answering questions about the properties of a cat that was now called ‘dog’, they answered as if the referent *dog* was meant, instead of the animal now named *dog*.

Word Length

Of the ten pairs of words, about nine were done correctly by the literates, while about seven were done correctly by the children and the illiterates. Post hoc analysis showed that the two groups of non-readers (children and illiterates) differed significantly from the literate adults, but not from each other. The range of scores was much higher for the non-readers than for the literates. The only illiterate adult with a 100%-correct score had received some literacy instruction as a child. Most literate adults had a success ratio of 9 or 10. The differences between the groups were even larger when the analysis was limited to really incongruent items like *slang-vogeltje* (snake-little bird), in which the answer *slang* was based on the length of the referent, while the answer *vogeltje* was language-based. All participants were asked to explain their choices. The children often did not explain their answers, but if they did, they either referred to the length of the referent (6 out of 24 children), or they counted the syllables. One child showed how her

recently developed knowledge of language competed with her knowledge of the world: "I just count the letters (meaning sounds)," she said, and then concluded that *train* was surely the longer word in the word-pair *train-motorcycle*. With a few exceptions, all literate adults counted sounds, letters, or syllables. The explanations of the illiterate adults varied most. Six illiterates based their arguments on the length of the referent, but most of them judged the language, but not in the analytical way the literates did, but in a more holistic way. Their arguments could change for different items. Dajaad, for example, often selected the right words and gave explanations like "That is more aware" (more is said here), "It lasts longer," or "It sounds deeper." Many illiterate adults judged the items on the way they 'sounded'.

All in all, the literate adults were significantly better in judging word length than the other groups, and most of them made judgments on an analytic level. About a quarter of both children and illiterate adults based their judgments on the length of the referent. The other children counted syllables, while many illiterate adults used a holistic way of judging some characteristic of the word sound.

Word Judgment

The scores for the word judgment task were higher in the mother tongue than in Dutch as a second language. The main effect of language was significant ($F_{1,62}=9.29$, $p<0.01$). Since the purpose of the task was not to measure second-language ability, only the scores in the mother tongue are taken here as indicators of the word-judgment abilities of children and illiterate and literate adults. The range of scores was largest for the illiterate adults. Post hoc analysis showed significant differences between both groups of non-readers and the literate adults, but no significant difference between children and illiterate adults. There were few differences among the three groups for the judgment of content words (about 80% correct for all groups); the differences were larger for function words, and very large for the multiple word utterances (17% correct for both groups of non-readers and 50% for the readers), which were judged as words by most of the children and illiterate adults.

The explanations given by both groups of non-readers for perceiving a stimulus as either a word or not were interesting. Some children, for example, concluded that *rkead* (= monkey) was a word because "monkeys exist", that *brief* (letter) was a word "because you can read it", that *op* (on, up) was not a word because it is "much too small" or "because it is empty then", and that *De winkel sluit om zes uur* (The shop closes at six) was not a word "because there are two words, the shop / is closing at six".

The illiterate adults concluded that *rkead* (monkey) was not a word "because that is an animal, a word is spoken", or that it was a word "because it is the name of an animal", that *looga* (but) "is not a word, it cannot be alone", that *düşünmek* (thinking) was not a word "because I think, but I do not say it", that *televizyon* (TV) "is a word, it comes out of our mouth", that *guryo* (houses) was more than one word ("those are words, there are more than one"), or that *tien* (ten) was a word, "because you can write it down".

A number of the children 'argued' as they did in other tasks: they simply 'know' or 'hear' if something is a word or otherwise. A few children systematically used an implicit length measure, which implied that many function words failed to meet the criterion. Some children needed a clear and observable referent for confirmation, while others needed to know the meaning to accept an item as a word. Except for the length measure, all these criteria were used by the illiterate adults as well, but more often they asked themselves if an item could be used in the context of talking. Illiterate adults,

therefore, hesitated sometimes in labeling function words as words and added the explanation that function words, like *but* or *or*, are not words unless something else is added. A few literate adults used this criterion as well, but most of them just made a plain distinction between words and sentences.

Overall, most of the readers responded as expected and based their answers on linguistic units, while non-readers did not differentiate between single words and clauses or sentences, whereas function words apparently did not have a high status as words.

Sentence Segmentation

As can be seen in Table 3, the children and illiterate adults hardly segmented any sentence into isolated words, while the majority of the literate adults segmented the sentences along word boundaries. Two children and two illiterate adults segmented one of the sentences along word boundaries. There was a significant main effect of group and the post hoc analysis showed that both groups of non-readers differed significantly from the readers ($p < 0.01$), but not from each other.

The next stage of the progressive segmentation task included word groups like *apples and tomatoes* and *in the shop*. In general, the children and illiterate adults more often used word boundaries as the segmentation criterion, but, again, most non-readers preferred another form of segmentation. The most frequently used form of segmentation was of the type *apples / and tomatoes*, and many children again preferred to segment along syllabic boundaries like *a/ples/and/to/ma/toes*. Again, there was a significant main effect of group ($F_{2,61} = 15.46$, $p = 0.00$), while post hoc analysis revealed the same outcomes as for sentence segmentation: readers differed significantly from non-readers ($p < 0.05$), but not from each other.

When we placed the methods of segmentation in different categories, we found the following results. Illiterate adults preferred segmentation along word groups (30.3% of the reactions), and they did not isolate function words (25.8%), or they divided on the basis of content instead of form (21.2%). Most of the children used either syllabic segmentation (30.2%) or mixed reactions (25.4%), while segmentation in word groups (15.9%) and the category ‘not isolated function words’ (17.5%) were less frequent. Literate adults preferred to isolate single words (66.7%), but not isolated function words were also common among the literate adults (24.2% of all reactions), especially among speakers of Tarifit (and one Somali), who did not segment word groups like *rar seppitar* (‘to the hospital’), *di thanut* (‘in the shop’), or *n defah* (‘of apples’).

Overall, when asked to segment sentences or word groups, literate adults preferred to segment along word boundaries, while non-readers segmented the content, used clause boundaries, or negated function words.

3.4 Textual Awareness

Syllogism

A score of 1 was assigned when the answer was both correct and explained on the basis of the premises. In the syllogism *All women in Markey are married. Fatma is not married. Does Fatma live in Markey?* a negative answer was given a score of 1 when the explanation resembled “Because all women are married there” and a score of 0 when the same negative answer was supported by “Because I know Fatma, she lives here.” As can be derived from Table 3, the mean score of the literate adults was more than 3,

while the scores of both groups of non-readers were much lower. There was a significant main effect of group. The range of scores was maximal for both the children and the literate adults, but the median for the children was 1, and for the literate adults the median was 4. The groups of non-readers differed significantly from the readers, but not from each other.

All stones on the moon are blue. A man goes to the moon and finds a stone. What color is that stone? Some representative answers of the different groups are given below. The answers are followed by a short version of the clarification given".

Yellow, because the moon is yellow as well [child].

White, I once saw white stones [child].

Green with black, I've seen that in Turkey [child].

Black, because it's very hot there [illiterate].

Surely there are no stones on the moon [illiterate].

I have to see it first [illiterate].

Blue, all stones are blue there [literate].

If he really was there, and all stones there are blue, then it must have been blue [literate].

All stones there are blue, so that one too [literate].

Three types of argumentation were used most frequently. The first was deductive reasoning on the premises ("Because all stones are blue there"). The second was based on the experiences of the participant, irrespective of what the premise was about. Examples are the clarifications of the participants who relied on their knowledge that stones are brown, black, or gray, and of the participants who stated that they could not know, because they had never been to the moon. The third type comprised reactions that questioned the premise itself, and was used only by the adult participants. Their comment was that the premise made no sense: "There are no stones on the moon" or "There is no country where all women are married".

Most illiterate adults argued on the basis of their own experience (63.7% of all responses), while premise-related reactions (19.5%) and comments on the premise (10.6%) were scarcer. The majority of the literate adults' responses were premise-related (67.0% of all responses), and fewer were experience-based (25%). The reactions of the children were distributed more evenly (32.9% premise-related, 38.8% experience-based, and 28.3% no argument).

The overall conclusion is that adult readers with about four years of primary school can solve syllogisms significantly better than both groups of non-readers. Except for about one-third of the answers given by children, who did not argue at all, most of the 'wrong' answers were, in one way or another, experience-based.

4 Conclusions and Discussion

Overall, the outcomes of this study confirm the idea behind the literacy hypothesis that literacy brings a change in what people know about the language they already understand and speak fluently. There were many more differences between readers and non-readers in the language-awareness tasks than between children and adults. This was true for almost all lexical/semantic tasks. The phonological tasks showed a more complicated picture. It has been shown repeatedly that non-readers, both children and adults, are not aware of the phoneme as a linguistic unit. Non-readers did not produce

phonemic segmentation, but readers did. Non-readers who did segment sub-lexically segmented into syllables, the overwhelming strategy of the young children. The rhyme-production responses of the adult illiterates were quite different from those of the young children, who on average were very good at rhyming. Perhaps the rhyming of young children is more implicit and on-line than that of adults. Some justification for this interpretation may be found in the pseudo-word reactions of many children, which were rarely given by the adults. This may mean that rhyming requires more analytic processing from adults than from children. More research is needed to compare adults and children in different languages, especially research in which the phonological features of the different languages are taken care of (see Geudens, this volume).

The reactions of the illiterates to the lexical/semantic-level tasks can be divided roughly into two groups. About a quarter of the illiterates (about the same proportion of the children reacted in the same way) systematically judged or reacted to the content of the questions, not the language. A larger part of the illiterates reacted to language as an object, but differed from the literates, who mostly used an analytic strategy to come up with an answer. Most of the illiterates used a kind of holistic strategy. They judged word length on the basis of duration, they segmented sentences along conceptually or semantically meaningful units, or they mentioned speech acts as examples of words (Gombert, 1992; Doherty, 2000). It seems that content words like substantives, verbs, or adjectives have a much higher 'word status' than functors such as articles, prepositions, and conjunctives like *but* and *or*, which were not isolated or were just left out. This outcome concerning the word concepts of the illiterates does not fit well with Karmiloff *et al.*'s (1996) conclusion that even four-year-old children have a clear concept of words as linguistic units, nor does it confirm Scribner & Cole's (1981) outcome that there was no effect of literacy on the word concepts of the adults in their experiments.

The reactions to the syllogisms confirm Luria's (1976) finding of significant differences between illiterates and literates, and not Scribner & Cole's, although the syllogisms of the last study were used. This outcome should not be interpreted as showing that illiterates are not able to reason logically in general, as Scribner & Cole (1981) also noticed. There is a clear sense of logic in the reactions of the illiterates who rejected the premise of a syllogism "because there are no countries in which all women are married." A more plausible explanation for the differences between illiterates and literates can be found in Ong's (1982:53) statement that a syllogism is a self-contained, isolated text that needs decontextualising from real life experiences to be solved.

It may be this focus on the exclusive use of within-text relations that is brought forward by literacy instruction; learning to read and write may attend, more than any other use of language, to discourse in which sentences or words only refer to each other and to nothing else. The beginning reader probably has to learn to cope with that type of 'decontextualized' language. The illiterates systematically related the sentences of the syllogisms to their knowledge of the world; they did not separate 'imagination from real life' (Heath, 1986).

For most illiterate adults, language is a referential system and a medium of communication, but not an object accessible to reflection, or a string of elements that can be parsed into structural units. About a quarter of the illiterates systematically reacted to the content of a message/utterance only, and not to any more formal linguistic property. The other illiterate adults reacted in one way or another to more

formal language properties, but most of the time not in the analytical way that most of the literate adults demonstrated. Asked for examples of words, illiterate adults came up with 'speech acts' or concrete objects and activities. When talking about linguistic units, they considered things like unity of place (in the shop) or person (the old man), or the communicative domain of exchange of messages. When asked to segment sentences, they used semantic-pragmatic instead of formally oriented linguistic strategies. In solving syllogisms, their answers were directly based on their world knowledge, and not on any kind of formal premises. Illiterate adults are able to reflect on many language-related aspects: on the content, on the utterance as a whole, or on the way something is said. However, they are not able to reflect on more formal aspects of language, an ability they did probably not acquire because they did not receive literacy training.

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