

The Development of Precursors to Literacy in Mentally Disabled Children

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ABSTRACT

This study aimed to investigate metalinguistic precursors to literacy in mentally handicapped children, with a view to improve literacy training in this population. Language proficiency and environmental literacy factors were explored, and an analysis was made of proficiency in several metalinguistic tasks (i.e., higher level language awareness skills). Six children who are educable mentally retarded, with mental ages between five and seven years (chronological ages between six and sixteen years) were assessed. Results showed that environmental factors of literacy socialisation and print awareness were adequate, with reasonable exposure to literacy artifacts and events. Language abilities were also adequately developed. Isolated metalinguistic skills (e.g., phonemic segmentation) had developed in those children who had received reading instruction, however, most metalinguistic precursors were not adequately developed for their mental ages and were below a five year level.

OPSOMMING

Hierdie studie het verskeie voorlopers tot geletterdheid ondersoek onder ses verstandelik gestremde kinders, met die oog op verbetering van leesvaardigheid van verstandelik gestremde kinders. Die kinders se verstandsonderdomme was almal tussen vyf en sewe jaar, met kronologiese ouderdomme tussen ses en sestiën jaar. Taalvaardigheid en omgewingsgeletterdheid-faktore is ondersoek, sowel as hulle vaardigheid met die verskillende metalinguistiese take (m.a.w. hoër kognitiewe taalbewustheid). Die bevindinge het bevestig dat omgewingsfaktore van skrifbewustheid voldoende was met aanvaarbare blootstelling aan geskrewe items en leesgebeurtenisse. Taalvaardigheid was ook toepaslik. Die kinders wat reeds leesinstruksie ontvang het, het ontwikkeling van geïsoleerde metalinguistiese vaardighede vertoon (bv. fonetiese analise), maar die meerderheid metalinguistiese voorlopers tot geletterdheid was nie toepaslik vir hulle verstandsonderdomme nie en was onder 'n vyfjarige vlak.

Literacy is not merely an academic pursuit, but has become an essential skill for many employment opportunities, for daily living activities such as shopping and cooking and also for recreation. It is particularly important for mentally disabled people if they are to attain a measure of independent functioning in everyday life (Singh & Singh, 1986).

Research (Riese, 1956 in Singh & Singh, 1986) which indicated that trainable mentally handicapped people could be taught to read more than a few simple words has led to the reassessment of our expectations and the need to develop appropriate instruction techniques for teaching them to read. This re-evaluation has led us to reconsider their potential despite many difficulties mentally handicapped children have on language, cognitive and perceptual levels.

This introduction will mention some shifts in reading models, explain how reading can be redefined as a metalinguistic task, and explain the implications of this in the light of cognitive psychological research in mental retardation. Some questions will be posed regarding the area of metalinguistic abilities in reading acquisition and instruction, and how the speech-language pathologist in whose domain this area falls can play a

role in developing more effective intervention and instruction techniques for facilitating reading acquisition in the mentally handicapped population.

Research into reading and reading acquisition has begun to investigate the higher cognitive functions associated with reading. Reading can be redefined as primarily cognitive and linguistic, rather than visual and perceptual (Reid, 1981). Reading acquisition models have introduced the concept of *reading evolution* where reading is viewed as a gradual, spontaneous process beginning with the holistic attribution of meaning to print, and later becoming refined so that knowledge about the component elements of language is mastered (Reid, 1981). This knowledge of the components of language can essentially be seen as a *metalinguistic skill*.

Tunmer, Pratt & Herriman (1984) have defined a metalinguistic skill as the ability to reflect upon and manipulate structural features of spoken language, treating language itself as an object of thought. Reading acquisition is a complex process which requires the learner to distance himself from spoken words in order to analyse them and impose a new form and structure on language. The strong correlation between metalinguistic ability and reading ability suggests that

reading is essentially a metalinguistic task (Flood & Salus, 1982). Researchers (Cherkes-Julkowski & Gertner, 1989; Reid, 1981; Berger & Reid, 1989) have shown that improved meta-cognitive strategies (e.g., meta-memory) can be elicited through training, but tend not to be invoked spontaneously by mentally handicapped children and adults, as well as by children with language disorders. This has led to the hypothesis that mental handicap is primarily a meta-cognitive disorder (Cherkes-Julkowski & Gertner, 1989).

Since mentally handicapped children need assistance with the development of meta-cognitive skills such as reading, it is possible that they would benefit from specific training in metalinguistic skills, particularly those which aid to reading acquisition. There is little research dealing with these aspects of learning to read (Singh & Singh, 1986), so it is necessary to draw on knowledge in this field from the development of normal children.

Current theory in research on preliteracy development (Van Kleeck & Schuele, 1987) indicates that the development of the "early underpinnings of literacy" begins long before formal schooling. This "wealth of knowledge many pre-school children gain about print before they actually learn how to read" has been termed *emergent literacy* (Van Kleeck, 1990; Garton & Pratt, 1989). These emergent literacy skills not only form the foundation for formal reading instruction, but some skills such as phonemic segmentation skills and awareness of aural word boundaries have even been cited as predictors of reading achievement (Share, Jorm, McLeams & Matthews, 1984 in Tunmer, Pratt & Herriman, 1984; Evans, 1987 in van Kleeck & Schuele, 1987). Some models have been proposed in order to describe and investigate these skills. The framework used by Van Kleeck and Schuele (1987) will be used in the following discussion.

Two main areas of consideration in emergent literacy are literacy socialisation and language awareness (Van Kleeck & Schuele, 1987). Firstly, *literacy socialisation* is the broad social and cultural aspect of learning to read. This can be divided into three main areas: literacy artifacts; literacy events; and knowledge about print, which is acquired before learning to read.

Secondly, language awareness or *metalinguistic skill* is knowledge about the linguistic code which is needed for mastering literacy. The main aspects of language awareness are: word consciousness, knowledge that language is a system with elements and rules, and phonological awareness.

The metalinguistic area of preliteracy knowledge and its relation to formal reading instruction has become a controversial topic of research which has developed into a debate of the chicken and the egg. However, despite differing theoretical viewpoints, reading acquisition at pre-school level has become a valid concern for speech-language pathologists, due to its language and metalinguistic basis (Van Kleeck & Schuele, 1987). Research which has shown that metalinguistic skills are underdeveloped in learning disabled children (Kamhi & Koenig, 1985; Van Kleeck & Schuele, 1987) has led to investigation into alternative strategies in reading instruction. This area of emergent literacy, and particularly those metalinguistic skills which children with learning problems have difficulty mastering, can now

be assessed and remediated (Van Kleeck & Schuele, 1987). If mentally handicapped children also experience difficulty with metalinguistic skills related to emergent literacy, then these developments in intervention could prove to be valuable in improving the quality of reading instruction for mentally handicapped children.

Van Kleeck (1990) stated that facilitation of the foundations of literacy plays an integral part in the process of reading acquisition as it provides a solid foundation on which to build further literacy experiences. If mentally handicapped children are to benefit from this approach, more needs to be known about their development and mastery of these emergent literacy skills. For this reason, this study aims to investigate emergent literacy skills in mentally handicapped children.

METHOD

This study aimed to describe the development of metalinguistic (language awareness) precursors to literacy in six mentally handicapped children of mental ages between five and seven years (chronological ages between six and sixteen years) who had received varying amounts of formal reading instruction. Since the procedure used in conducting this study is described in more detail elsewhere (Marais, 1991) only a brief outline of the method and aims is given here.

Six subjects were selected from special schools for mentally handicapped children in consultation with their teachers according to the following criteria:

- *Cognitive developmental age* comparable to ages four to seven, since this is the age level in which precursors to literacy develop in normal children (van Kleeck & Schuele, 1987; Smith & Tager-Flusberg, 1982 and Fox & Routh, 1975).
- *Chronological age* between six and sixteen years since this is the traditional school-going age, and the time in which these abilities will be developed and used during reading training in mentally handicapped children.
- *Intelligence*: Educable mentally handicapped children, (i.e., an IQ of approximately between 50 and 70).
- *Socio-economic background*: Good socio-economic status with exposure to literacy artifacts and events in the home to exclude factors of environment deprivation.
- *Home language*: All subjects have the same home language for the purpose of uniformity in testing. Afrikaans was selected.

Please refer to Table 1 for a description of the subjects.

A test battery was compiled using material available for the sample group as well as adapted and translated subtests drawn from research (Fox & Routh, 1975; Smith & Tager-Flusberg, 1982). A pilot study was conducted before formal testing began to ensure the test battery was suitable for a five year old Afrikaans speaking child. Testing was done in two sessions to complete the test battery, and the data was analysed according to the results available in research and standardised tests. Each candidate's parents were interviewed to obtain a case history and relevant information regarding literacy de-

velopment and the literacy socialisation background. (Checklists used were adapted from those listed in Van Kleeck, 1990.)

The formal test battery covered the following areas, using the framework in Van Kleeck (1987) as well as language and cognitive test material:

- *Language and cognitive functioning* using the Draw-a-man test (Goodenough, 1926), the Peabody Picture Vocabulary Test (Afrikaans translation) (Gouws, 1975), and the Afrikaans Test of Oral Language (Vorster, 1980).
- *Literacy Socialisation* was assessed in two ways, firstly the family background and home and school environments were analysed using checklists and a rating was given. Secondly, the subject's print awareness was assessed using the book-handling and situation dependent print subtests (Edmiaston, 1988 with adaptations for the South African context by Sher, 1989).
- *Language awareness (metalinguistic) subtests:* Subtests were selected from research which had been done successfully with three to six year olds, and covered the areas of:

- * word consciousness (the concept that words are separate from the things they represent and that they are arbitrary in nature).

- * segmenting sentences into words i.e., the ability to isolate a separate word from the acoustic flow of speech - this is also closely linked with word consciousness in normal children and has been identified as a significant predictor of early reading achievement (Evans et al., 1979; McNick, 1974 in Van Kleeck & Schuele, 1987).
- * phonological awareness i.e., the ability to analyse a spoken word into its component syllables and phonological units and also to synthesize these units to produce a word. Language play such as rhyming also reflects this ability. Three tasks were used on a sub-word level:

- segmentation of bisyllabic words,
- analysis of single syllables into sounds and
- a rhyming task.

RESULTS

Firstly *language and cognitive functioning* were assessed. Four subjects displayed a general cognitive level between 6-0 and 6-9 years, with subject A obtaining an age equivalent of 5-3 years and B of 4-9 years. All except subject A had above average scores for receptive vocabulary, using norms for 6-0 years (Peabody Picture Vocabulary Test, PPVT). Expressive language profiles for the TMT (Afrikaans Test of Oral Language Produc-

Table 1. Description of subjects

Chronological age	Sex	Draw-a-man age level	IQ Approx. (*)	Medical diagnosis (*)	Exposure to literacy training (*)
6,2 yrs	M	5,3 yrs	Not available	Down Syndrome	No formal training Use of Bliss symbols
10,6 yrs	F	4,9 yrs	Not available	Athetoid	Elementary grapheme-phoneme matching. Three letter word analysis and synthesis.
12,3 yrs	M	6,0 yrs	56	Spastic diplegic	Limited sight vocabulary Grade 1 reader level. Elementary grapheme-phoneme matching, word analysis and synthesis.
13,2 yrs	F	6,3 yrs	58	Head injury at at age 5y 5m	Limited sight vocabulary. Some grapheme-phoneme matching.
14,8 yrs	F	6,9 yrs	63	Cerebral handicap	Well developed analysis and synthesis of short words, with grapheme-phoneme matching. Reading comprehension good, writing functional.
15,11 yrs	M	6,3 yrs	52	Cerebral handicap with epilepsy.	Good analysis and synthesis of short words with grapheme-phoneme matching. Writing functional.

(*) Obtained from school files and teachers

Table 2. Language and cognitive functioning

Subject	Draw-a-man test age level	PPVT scored at 6y age level norms (*)	TMT scored at 6.0 6.2y age level norms:- Average stanine score []
A	5,3 yrs	below average	4,1
B	4,9 yrs	above average	4,5
C	6,0 yrs	average	5,5
D	6,0 yrs	above average	5,6
E	6,9 yrs	above average	5,1
F	6,3 yrs	above average	4,3

(*) T-score interpretation where a score of 40-60 is average for 6 year olds.

[] Stanine score: 5=average, standard deviation of 1,96.

Table 3. Rating of Literacy Socialisation Environment

Subject	Literacy artifacts	Ratings*	Literacy events	Rating*
A	Good exposure to books and magazines. Parents academically orientated and interested in overseas literature. Lots of education toys and books. Bliss symbols books.	Good	Often looks at books and magazines. Parents and older sister spend a lot of time reading with him and he often draws and writes "letters" to friends. Uses and reads Bliss.	Good
B	Good exposure to reading and writing materials. Beginner reader's books.	Good	Enjoys "reading" with much use of pictures and memory. Draws and "writes letters" regularly.	Good
C	Good exposure to education books and beginner reader series. He enjoys "Spot" series (Otto)	Good	Both parents are teachers and spend time reading with him. He is involved with compiling shopping lists, signing his name in cards and "writing letters".	Good
D	Good exposure to books, writing materials, little table and chairs, children's encyclopaedia and beginners reading book.	Good	Lost interest in reading after head injury. She makes extensive use of pictures to assist recognition of items, and "writes letters" and enjoys drawing.	Good
E	Good exposure to books, writing materials and sound and flash cards which her mother made to help her learn to read.	Good	Excellent exposure. Mother is highly motivated and has very high expectations for her. She spends a lot of time teaching analyses and synthesis of phonemes. The subject can read a recipe and go shopping.	Good
F	Adequate exposure to writing materials and books and magazines.	Adequate	Parents do not have high education level and spend little time on reading and writing with the subject. He does write letters to friends, looks up TV programmes himself and reads beginner readers occasionally.	Adequate

tion) were plotted using norms for 6-0 to 6-2 years. All subjects attained scores which were adequate for this age level, and are therefore on a par with a six year old age level. (See Table 2 for scores.)

Since language and cognitive functioning met the criteria, environmental factors needed to be considered, as these play a large role in forming preliteracy awareness of print.

Literacy socialization i.e., the role *literacy artifacts and events* play in developing literacy, was assessed according to the home and school environments and case history using checklists during the interview with the parents, and also according to the subject's print awareness in the print awareness subtest. All the parents were cooperative and enthusiastic during the interview and gave detailed information about the subject's background and exposure to print. All parents seemed motivated to assist their child in attaining his or her potential and had done all within their power to provide normal, and in most cases, exceptionally good exposure to literacy artifacts and events. According to the rating given from results of the checklists (see Table 3), only subject F obtained a rating of 'adequate', with all the other subjects rated as 'good' environments for fostering literacy.

The *print awareness* subtest (Figure 1) assessed book-handling skills and situation dependent print (which assesses knowledge of brand names and names of high personal interest) to determine the subject's familiarity with the conventions of purposes of print.

All subjects obtained scores between 86% and 100% for book-handling skills and handled books correctly, showing some knowledge of what print is used for as well as how it is used. Situation dependent print was well developed in three subjects, however, subject D was unsure of several items and subjects A and C scored below 50%. (See Figure 1.)

It would seem that all subjects have language and cognitive levels which are above a five year level, with the majority on approximately a six year level, except for subject A. Their exposure to literacy artifacts and events is adequate, and in many cases exceptionally good. Most subjects also displayed good knowledge of the purpose and conventions of print (print awareness), though situation dependent print was not well developed in some subjects. The final factor to consider is that of language awareness or metalinguistic ability.

A profile of age equivalent scores for the five subjects who completed the *language awareness subtests* is given in Figure 2. The youngest subject (subject A) had little comprehension of the various tasks and gave many guessing and perseverative responses. He was unable to complete the battery and his results are excluded from the presentation of the results for the language awareness subtests. Further discussion is available in Marais, (1991.)

From the age equivalent profile in Figure 2 it is clear that more than half the scores are on a four year level and below, with some scores even below a three year level. This is in sharp contrast to the language and cognitive abilities which are all above a five year age level. Let us consider the results of the subtests individually.

The *word consciousness* test was completed successfully by all five subjects, and all met the criteria of 80%,

which determined mastery of the skill. Two subjects (B and F) fell between the norms for three and four year olds, while the other three obtained scores of 100% which is above a four year level.

The *sentence analysis* subtest (segmenting sentences into words) proved particularly difficult for the subjects, despite the opportunity this task afforded for learning. Only subject E had mastered this skill, with subject F on a three to four year level. A comparison of the scores for sentence analysis with the scores obtained with normal three to five year olds is presented in Figure 3.

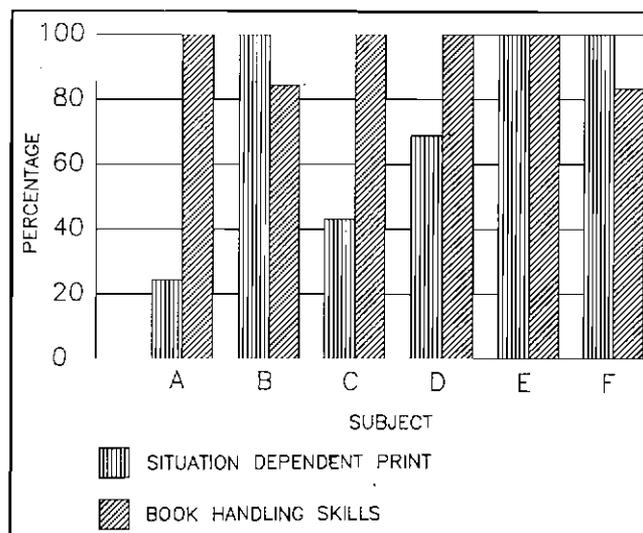


Figure 1. Scores for print awareness tests

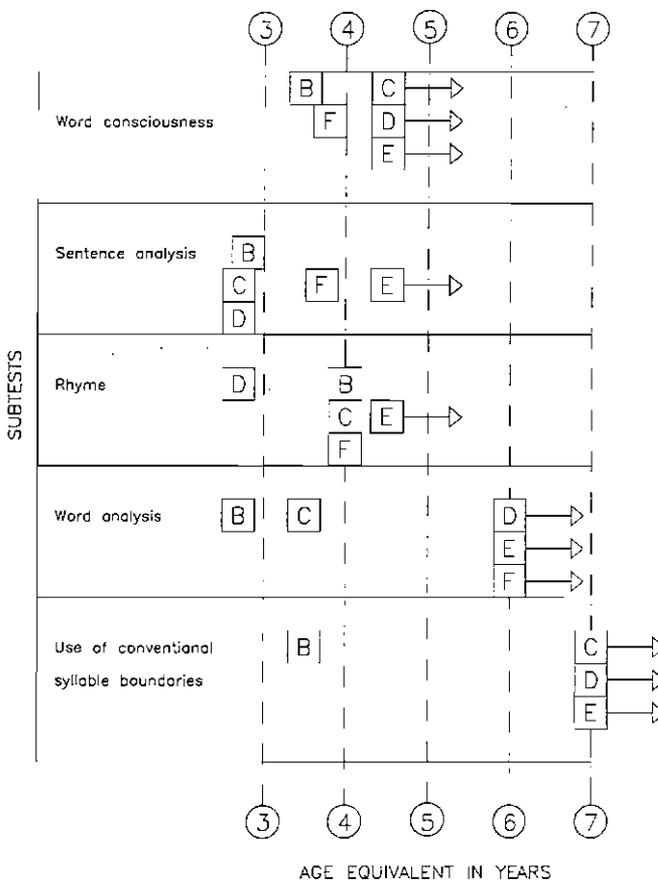


Figure 2. Profile of age equivalent functioning on the metalinguistic test battery.

The results for the *word analysis* subtest (segmentation of bisyllabic words) are compared with results obtained with normal three to six year olds in Figure 4. The three oldest subjects achieved scores of 100% which places them on a six year old level. Subject C scored on a three to four year level and subject B on a level below three years. The literature from which the task was drawn (Fox & Routh, 1975) found that most children made use of conventional syllable boundaries to break up the words, which was also the case for subjects C, D and E, who scored 100% for this task (see Figure 2). Subject F, however, segmented 7/8 of the stimuli by giving only the initial phoneme which reflects ability to analyse words on a sub-syllable level, but not sensitivity to syllabic boundaries.

The *rhyme subtest*, (Figure 2) which assesses phonological awareness, had a criteria of 90% to determine mastery of the skill. Only subject E met the criteria, with subjects B, C and F on a four year level and subject B below a three year level.

DISCUSSION

The results of this research project support the hypothesis that metalinguistic (or language awareness) abilities in mentally handicapped children do not necessarily develop spontaneously as they do with normal

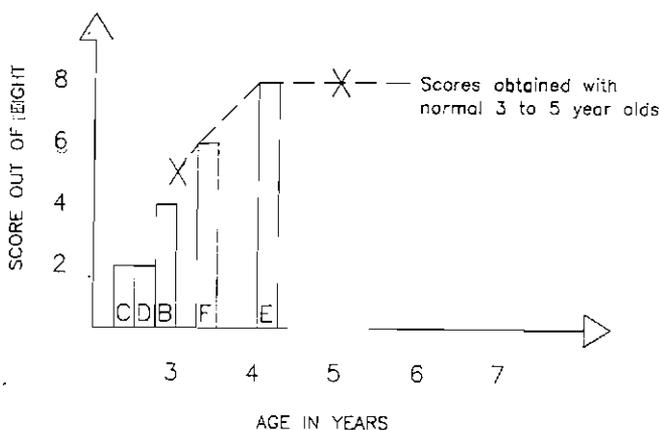


Figure 3. Comparison of scores for sentence analysis with normal 3 to 5 year olds.

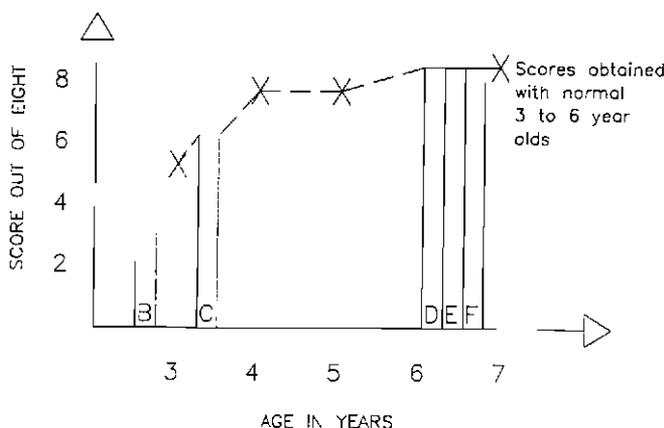


Figure 4. Comparison of scores for word analysis with normal 3 to 6 year olds.

children, which is also the case with learning disability. The fact that these language awareness skills are lacking, makes it plausible that the difficulty many mentally handicapped children experience in learning to read could be contributed, at least in part, to inadequate metalinguistic skills. Many mentally handicapped people derive benefit from training in other metacognitive skills. This makes it seem possible that this population could benefit from training in metalinguistic skills.

Word segmentation skills were well developed in three subjects, i.e., on a six to seven year old level. These abilities contrasted sharply with *poor sentence segmentation abilities* in all but one of the subjects. Poor performance on this task was shown despite the nature of the task which gave much opportunity for learning to take place (Van Kleeck et al., 1987). One subject even gave responses which broke phrases up at sub-word boundaries, and others gave perseverative responses after the sentence had been broken up into two or three phrases. Three of the five subjects yielded scores which fell below scores attained by three year olds. Thus the awareness of the word as the basic unit of speech was clearly not well established.

The discrepancy found between word and sentence analysis abilities in mentally handicapped children contrasts sharply with results obtained for the same two tasks in normal children. The research from which the tasks were drawn (Fox & Routh, 1975; Smith & Tager-Flusberg, 1982) found such close correlations between these two abilities that they postulated that the same cognitive process underlies both skills. Some could argue that this difference between mentally handicapped and normal children is merely another reflection of the differences between the two populations, and that comparisons between them are of little value. However, if the factor of reading instruction is introduced into the discussion, another possibility is raised. All the children who obtained high scores of word segmentation had received formal reading instruction, much of which focusses on word and phonemic analysis. They made use of word analysis and synthesis skills throughout the testing, and seemed proud of this ability which they had mastered. It could be the case that these high scores were a reflection of training in isolated metalinguistic skills, rather than a reflection of development of metalinguistic abilities. Since some learning had taken place, despite the discrete nature of the skills, this again strengthens the case raised in the first section that mentally handicapped children can benefit from training in metalinguistic skills.

A last point to consider with regard to sentence analysis abilities is the strong correlation that has been found between the ability to segment sentence into words and *reading performance*. Evans et al., (1979) and McNich (1974 in Van Kleeck & Schuele, 1987) and Tunmer et al., (1984) found awareness of aural word boundaries to be a significant predictor of early reading achievement. This ability was poorly developed in all but one of the subjects. Subject E, who had mastered this skill (see Figure 4), was also the only subject who was functionally literate. Thus it would seem that awareness of aural word boundaries had a similar correlation with reading performance in the mentally handicapped population as well.

CONCLUSION

The mentally handicapped children used in this study displayed inadequate and incomplete development of the metalinguistic precursors to literacy which were investigated, despite these children having language abilities comparable to a six year old age level, good literacy socialisation environments and receiving formal reading instruction. Trends which were noted in all subjects could be indicative that the difficulties uncovered here are difficulties that many mentally handicapped children experience. This metalinguistic deficit could be due to the difficulty that many mentally handicapped children have with meta-cognitive abilities, and could also be a contributing factor to the difficulty that this population experiences with reading acquisition. More research using larger sample groups is needed to establish this. It is also possible that reading acquisition could be enhanced by training metalinguistic skills which are valuable for reading, since splinter skills had been developed in some of the subjects. Since training these skills has become part of the speech pathologist's role in intervention with language disabled children (Van Kleeck & Schuele, 1987), speech pathologists may need to play a role in training metalinguistic skills in the mentally handicapped population as well, in order to improve literacy in this population.

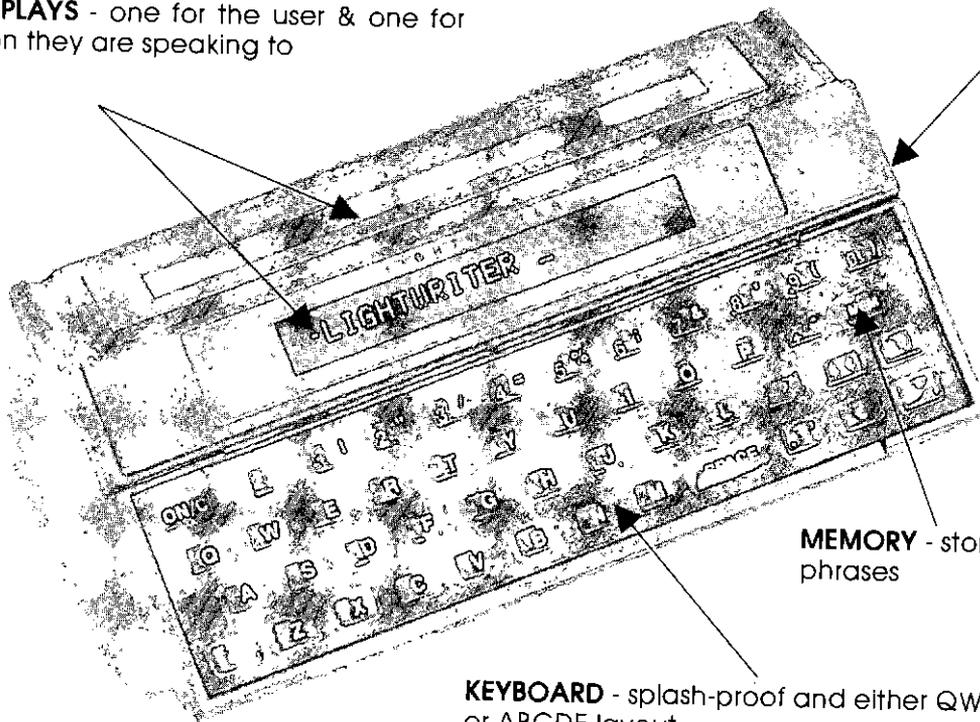
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