

METACOGNITIVE ABILITIES IN WORD IDENTIFICATION
AND ITS RELATIONSHIP WITH READING COMPETENCE

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Abstract

While much research is available in the literature regarding metacognitive abilities in reading, particularly reading comprehension, little has been done specifically at the word level. This paper reports on a study which examined the relationship among metacognitive abilities at the word level, word identification skills and reading comprehension competence in a group of Year 5 students. Findings indicated that poor comprehenders were inferior in metacognitive abilities in word identification, in phonemic awareness and in word identification skills. Further, metacognitive abilities at the word level, including both phonemic awareness and metacognitive abilities in word identification, were found to be directly related to reading comprehension performance, and indirectly through the mediating variable of word identification skills.

METACOGNITIVE ABILITIES IN WORD IDENTIFICATION AND ITS RELATIONSHIP WITH READING COMPETENCE

In recent years a lot of interest is shown in the literature on learning theories, including reading acquisition, that emphasise the importance of the learners' metacognition, or the knowledge and control learners have over their thinking and learning activities (Baker & Brown, 1984; Paris & Oka, 1986). Much research has been devoted to studying the cognitive and metacognitive processes that are necessary to sustain rapid, fluent reading. But while most research has examined metacognitive factors in reading comprehension (see review by Haller, Child & Walberg, 1988), there is an increasing volume of evidence indicating that the cognitive processes that support word identification are also significant contributors to variance in reading competence (Perfetti, 1984; Stanovich, 1982b).

The findings of a number of recent research studies suggest that a primary specific mechanism that promotes reading acquisition and competence is metacognitive abilities in decoding, or phonemic awareness (Share, Jorm, Maclean & Matthews, 1984; Stanovich, Cunningham & Cramer, 1984; Stanovich, Cunningham & Feeman, 1984; Tunmer & Nesdale, 1985). Many researchers have suggested that phonemic awareness is a metacognitive ability at the very centre of early reading success (e.g. Byrne, 1984; Ehri & Wilce, 1985; Stanovich, 1986). Stanovich (1986), for example, comprehensively reviewed the empirical and theoretical literature relating to early reading achievement and proposed that "...If there is a specific cause of reading

disability at all, it resides in the area of phonological awareness. Slow development in this area delays early code-breaking progress and initiates a cascade of interacting achievement failures and motivational problems" (p.393).

It has been proposed that a minimal level of explicit phonemic awareness appears to be required for the acquisition of the letter-sound correspondence knowledge that supports independent decoding. To segment words into phonemes and to blend phonemes into words are phonemic awareness skills that have been shown to be predictive of reading performance (Elkonin, 1973; Golinkoff, 1978; Tunmer & Bowey, 1980; Venezky, 1976). Phonemic awareness skills would therefore appear to be relevant to initial reading, and to a lesser degree to later reading competence. Recent findings which suggest that word identification skills are mediated through phonological decoding (e.g., Doctor & Coltheart, 1980) hold implications for the poor reader. If some poor readers have inadequate phonological awareness skills they may not be able to mediate their own word identification and may not learn to read fluently.

While much research into metacognitive abilities and reading to date has largely focused on metacognitive awareness about reading, metacomprehension, and phonemic awareness, it is at the word identification level that many poor readers, especially children with learning difficulties, experience problems (e.g. Perfetti, 1984; Stanovich, 1982b). Word identification, as the term is used throughout this paper, refers to the process of extracting enough information from word units so that a location in the mental lexicon is activated, thus resulting in semantic information becoming available to consciousness (Stanovich, 1982b). The term mental lexicon has been used to refer to a structural storage space in memory where information about words is represented (Barron, 1981). It has been suggested that "lexical access is important to reading because it is the central recurring reading process" (Perfetti, 1984, p.44). It has been maintained that the skilled reader has accessible representations of many specific words and a system of implied rules for word formations (Perfetti, 1984).

Stanovich (1982b, 1986) has suggested that two basic mechanisms can be used for identifying words. The first involves the use of phonological information and phonological processing. The second involves the direct recognition of the printed words' meaning on the basis of visual representation. After reviewing relevant research, Stanovich (1986) proposed that, according to research evidence, normal beginning readers rely on phonological information to identify words. However, with age, skilled readers switch to direct visual processes for the recognition of familiar, high frequency words, whereas low frequency words are recognised on the basis of phonological information. It is generally believed that both access processes execute simultaneously when a word is presented (Stanovich & Bauer, 1978). Word identification is not a unitary process but one which involves both sight word recognition and code breaking.

While the term word identification has frequently been confused with the term decoding, these are not interchangeable terms. Decoding or phonic skills are only one of the many word identification skills a reader must possess. Word identification skills involve not only phonetic analysis or decoding, but also visual analysis, semantic and syntactic analysis, structural analysis or morphemic analysis and syllabication skills (Ives, Bursuk & Ives, cited in Bos & Vaughn, 1988). As distinct from word identification skills, metacognitive abilities in word identification would appear likely to include the awareness and regulation of the strategies that one can employ to recognise the available clues in unfamiliar words to allow these words to be identified.

Phonemic awareness is only one set of metacognitive abilities underlying word identification and is related mainly to identifying words using a phonological approach. Since word identification involves more than phonic skills, then so must metacognitive abilities in word identification include more than phonemic awareness. A variety of clues are normally available to allow unfamiliar words to be identified. A metacognitive approach to word identification would involve the reader recognising an appropriate clue, such as visual configuration, picture clues, semantic clues, syntactic clues, phonetic analysis, structural analysis and context. The reader must be able to make use of the clue to help the word identification process, must monitor and check to see if the response makes sense, and must select and try another clue if it does not.

The involvement of such metacognitive processes in word identification may be seen in the following example. If an unknown word is encountered during reading, the student may initially decide whether it is necessary to work out what the word is or whether to ignore it and continue reading. If it is decided that the word must be identified an attempt may be made to use the visual configuration of the word or context to assist in identification. If this is not successful the student may attempt to break the word into syllables and sound these out. If this is also unsuccessful, the student may look for prefixes, suffixes, or endings and may separate these from the root word. If still unsuccessful the student may decide to look up the word in a dictionary. Such a process indicates that the student is aware of different strategies for word identification, is able to monitor their application, and is able to take remedial action whenever necessary in order to identify the word.

As discussed earlier, research studies examining the role of metacognition in reading have focused on reading comprehension. As a result of research in this area of metacognition, training programs have been developed to assist readers in acquiring effective comprehension skills (e.g., Bruce & Chan, 1991; Chan, 1991; Chan & Cole, 1986; Palincsar & Brown, 1984). However many poor readers and children with learning difficulties experience reading problems at the word level, and it is at this level that an examination of the metacognitive abilities involved may provide helpful information to assist these children.

Before attempting to use metacognitive training programs to assist poor readers to acquire effective word identification strategies, it must first be established empirically that phonemic awareness and metacognitive abilities in word identification are related to reading comprehension competence. Metacognitive abilities at the word level, including both phonemic awareness and metacognitive abilities in word identification, may be directly related to reading comprehension performance, or indirectly through the mediating variable of word identification skills. The present study aimed to explore such relationships. Specifically, the study reported here sought to:

- (i) explore efficient ways of assessing metacognitive abilities in word identification;
- (ii) assess metacognitive abilities at the word level of a group of poor readers; and
- (iii) examine the relationship of metacognitive abilities at the word level (phonemic awareness and metacognitive abilities in word identification) with word identification skills and reading comprehension competence.

METHOD

Subjects

The subjects in this study were Year 5 students in a state primary school in New South Wales. The school comprises approximately 370 children, from Kindergarten to Year 6, with many children coming from a low socio-economic background. The chronological age of the subjects ranged from 9 years 8 months to 10 years 10 months (Mean Age = 10 years 2 months). Of these, thirty were girls and twenty-five were boys. More than half of this group were described by their teachers as poor readers with below average ability in reading and frequently with deficits in other subjects, such as mathematics and spelling. Although 60 subjects were initially included, only 55 children with complete data were included in the statistical analysis.

Assessment Devices

Measures of reading comprehension competence, word identification skills, phonemic awareness and metacognitive abilities in word identification were obtained using the following instruments:

Reading Comprehension Competence. The Progressive Achievement Test in Reading Comprehension (PAT), Form A (Reid & Elley, 1986), was used to assess reading comprehension competence. PAT was chosen as it had been normed for the Australian population.

Word Identification Skills. Word identification skills were assessed using two subtests from the Stanford Diagnostic Reading Test, Level II (Karlsen, Madden & Gardner, 1966): Syllabication and Blending.

Phonemic Awareness. Two separate tests of phonemic awareness were employed, Bruce's Phoneme Deletion Test (Bruce, 1984) and the Yopp-Singer Phoneme Segmentation Test (Yopp, 1988).

Metacognitive abilities in word identification. For the purpose of this study, five tasks were designed to assess metacognitive abilities in word identification. The first of these tasks assesses word awareness, while the other four tasks examine the child's metacognitive abilities in the use of four different clues to assist word identification: phonological, orthographic, morphological and context clues. In order to overcome some of the problems associated with the assessment of metacognitive abilities in earlier research, the assessment tasks used in this study combined observation of task performance, interview and self-report techniques. By incorporating both interview and behaviour techniques in the assessment, it was hoped that the problem of lack of correspondence between what children say they would do and what they do in fact do would be overcome. This may help to disentangle the confounds between children's verbal skills and reported knowledge and may help to isolate the functional aspects of metacognitive abilities in word identification as they affect reading competence.

Each of the four tasks required the students to respond by using a specific word identification strategy. The students' performance during each task was observed, responses were recorded, and the students were probed to assess their awareness of the strategies they had used. A correct response to a given task item would indicate that the student had recognised the particular clue and was using the appropriate word identification strategy. Following the completion of each task item the students were required to justify their response in order to assess whether they were also aware of the strategy they had used. The scoring for each task item attempted to reflect the student's use of strategies and awareness of that usage. The five tasks and their scoring procedure are described below. Sample items for the five tasks appear in Table 1.

1. Word Awareness. This task aims to assess awareness of the word as a spoken unit of language and the ability to recognise the boundary of words. The student was asked to identify from each orally presented sentence the word containing a given syllable. One point was awarded for each correct response.

2. Phonic Clues. This task is designed to assess the children's use of phonic clues in reading unknown words and in monitoring their use of phonic clues in word identification. Each student was initially presented with two commonly encountered words, both containing the same grapheme, which were read by the researcher, e.g. 'bear, pear'. The student was then asked to say the pseudoword which also contains the same grapheme as the first two real words, e.g. 'grear'. After that another real word containing the same grapheme but with a different pronunciation (e.g. 'fear') was presented. The student was asked to read the word and to explain why they read it that way. In order to read the pseudoword correctly the student has to make use of the phoneme-grapheme correspondence clue provided by the two given words. In order to read the next target word which is a real word correctly, the student must be monitoring his/her own performance to realize that the cued phonic rule does not apply in this case.

Two points were awarded if students were able to read the real word correctly and to give an acceptable justification, thereby demonstrating that they have both used the appropriate strategy and are aware of the strategy and have monitored its use. If the student was unable to give an acceptable justification, but was able to perform the task correctly, one point was awarded for the use of the word identification strategy.

3. Orthographic Clues. This task is designed to assess the student's use of orthographic clues in reading unknown words. Each student was presented with a pseudoword containing all or part of a real word embedded in it (e.g. `grundred'). The student was asked how they would say the pseudoword. If the response was incorrect, the student was shown a second card showing the embedded word or related word (e.g. `hundred') and was asked to read it. The student was then presented with the first card again and was asked to justify their response. This task required the use of orthographic clues in order to decode a pseudoword with all or part of a real word embedded in it. If the student does not recognise the embedded word initially, the presentation of the second card should prompt the student to use this strategy.

Two points were awarded if the student was able to read the pseudoword (even if they succeeded only after the prompt was provided) and provide an acceptable justification of their answer, thereby demonstrating both strategy use and awareness of the strategy. One point was awarded if the student was able to read the pseudoword correctly but was unable to provide an acceptable justification for their response.

4. Morphological Clues. This task requires the use of morphological clues in order to decode an unknown word, which is a pseudoword. The student was presented with two real words, each containing the same common prefix or suffix (e.g. `bicycle' and `biplane') and was asked to pronounce each and provide the word meaning. If the student was unable to give the correct pronunciation or meaning of the words, the correct responses were supplied by the researcher. The student was then presented with a nonword containing the same prefix or suffix as the previous two real words (e.g. `bifoot') and was asked to give both the pronunciation and the meaning. In order to read the nonword correctly and provide a meaning for it the student must make use of the morphological structure of the two real words presented initially.

No score was given for the student's pronunciation of the pseudoword, since the aim of this task was for the student to utilise morphological clues to work out word meanings. Two points were awarded if the student was able to provide an acceptable meaning for the nonword and an acceptable justification for their response. One point was awarded if the student was able to provide an acceptable meaning for the nonword but was unable to provide an acceptable justification for their response.

5. Context Clues. This task attempts to assess the child's use of context clues to identify words and to monitor word identification. The student was asked to read an irregular word (which may have several acceptable pronunciations) on a card (e.g. `wound"). After the student had given a

response another card was presented which showed a sentence containing that word (e.g. 'The spear caused a bloody wound' or 'He wound the fishing line onto the reel'). The task was manipulated so that of the first three items, the child must confirm their initial response once, and must self-correct their initial response in two of the items in order to be correct within the context in which the word is used. In order to monitor their pronunciation of the irregular words included in this task the students must make use of the context clues provided. This would enable them to confirm those pronunciations which were initially correct and to self-correct those items manipulated by the experimenter to make initial pronunciation incorrect. For students who were initially unable to identify the irregular words when presented in isolation, the use of context clues in the sentence presentation should enable them to identify the word from context.

Two points were awarded for the correct pronunciation of each word after presentation of the word in context in a sentence, together with an acceptable justification of that pronunciation, indicating both the use of the strategy and awareness and monitoring of its use. One point was awarded for a correct pronunciation without an acceptable justification, indicating strategy use only.

Procedures

The four sets of assessment devices were administered to all the subjects within a three-week period in March of 1990, and were administered to all subjects in the same sequence by the researcher. The two Stanford subtests were administered first, then the five metacognitive abilities in word identification tasks, followed by the PAT and finally, the two phonemic awareness tests.

RESULTS

Data on ten variables were obtained. These include the two phonemic awareness variables (Bruce's Phoneme Deletion Test and the Yopp-Singer Phoneme Segmentation Test), the five metacognitive abilities in word identification task variables (word awareness, phonic clues, orthographic clues, morphological clues and context clues), two word attack skills variables (Syllabication and Blending) and the reading comprehension variable (PAT). All statistical analyses were conducted on the computer program SPSSx.

Performance of poor readers

For the purpose of this study those subjects who scored below the 20th percentile on the PAT Reading Comprehension Test were classified as the poor readers group (N=22). A comparison group of average readers was obtained by selecting those who scored above the 50th percentile on the PAT Reading Comprehension Test (N=17). The range of percentile rank for this group of average readers was from the 50th to the 96th percentile. Of these, more than half scored between the 50th and 60th percentile (N=9). Of the remaining students, three scored above the 70th percentile, three scored above the 80th percentile, and two scored above the 90th percentile.

The performance of the two groups was compared on all measures. Results are presented in Table 2. The poor readers were found to have significantly lower scores than the average readers group on most measures apart from word awareness and phonic clues.

Relationship among variables

The intercorrelations, means and standard deviations of the ten variables are presented in Table 3.

Intercorrelations among variables. On the whole the variables within each set of measures were significantly related. Both the correlation between the two phonemic awareness variables (Bruce's Phoneme Deletion Test and the Yopp-Singer Phoneme Segmentation Test) and that between the two word identification skills (blending and syllabication) were moderate and significant ($r=.50$ and $r=.47$, respectively). Among the five metacognitive abilities in word identification measures, only the correlations of word awareness with phonic clues, morphological clues and context clues and that between phonic clues and morphological clues was not significant, the remaining six correlations all being significant.

Phonemic awareness was found to be significantly related to all other measures. As indicated in Table 3, both phonemic awareness measures correlated highly with all five measures of metacognitive abilities in word identification, with the exception of the correlation between the Yopp-Singer Segmentation Test and word awareness which correlated less highly but was still significant. Correlations of these two phonemic awareness measures with word identification skills ranged from .31 to .74 ($r=.74$ for the correlation between phoneme deletion and blending) while those with reading comprehension were moderate to high ($r=.50$ and .63).

Of the two word identification skill variables, blending correlated highly with four of the metacognitive abilities in word identification measures, and moderately with one (word awareness). On the other hand, syllabication was found to correlate significantly with only two of the five metacognitive abilities in word identification measures. Both were significantly correlated to reading comprehension as well as to the phonemic awareness measures.

All of the variables were significantly related to reading comprehension competence, with blending showing the highest positive correlation with reading competence ($r=.75$) and word awareness showing only a moderate correlation ($r=.25$).

Regression analysis. A multiple regression analysis was conducted to examine the additional contribution of the two sets of metacognitive abilities variables, namely, metacognitive abilities in word identification (five variables) and phonemic awareness (two variables), to explaining variances in reading comprehension over and above that explained by the set of two word identification skills variables. Results of the regression

analysis indicated that the three sets of predictors together explained 68.8% of reading comprehension variance. Further, metacognitive abilities in word identification had an important additional contribution (7.6%) in explaining variation in reading comprehension competence, over and above that explained by word identification skills. The contribution of phonemic awareness over and above that accounted for by word identification skills and metacognitive abilities in word identification was not significant, possibly because of the amount of common variance phonemic awareness shares with word identification skills and metacognitive abilities in word identification.

Path analysis. A path analysis was conducted to examine the relationship of metacognitive abilities at the word level, that is, metacognitive abilities in word identification and phonemic awareness, with word identification skills and reading comprehension competence. The resultant model is presented in Fig.1 with standardised beta weights depicted on each path. Unbroken lines indicate significant paths at the .05 level, while broken lines indicate paths approaching significance ($p < .10$). Only those variables and paths which were significant or which approached significance are included in the figure.

The path analysis revealed that one phonemic awareness measure (Phoneme Deletion) and one metacognitive abilities in word identification measure (phonic clues) had an indirect effect on reading comprehension competence through the word identification skill of blending. A possible direct effect of context clues on reading comprehension was also suggested. These results indicate that phonemic awareness ability of phoneme deletion and strategic use of phonic clues for word identification influence reading competence through their effects on blending skills. The influence of strategic use of context clues for word identification on reading competence, on the other hand, appears to be direct rather than through any mediating word identification skill.

DISCUSSION

As reported earlier in the paper, the present study sought to address three specific research questions. These are elaborated below.

Assessment of metacognitive abilities in word identification

The five tasks developed to assess metacognitive abilities in word identification were found to offer several advantages, one being the avoidance of over-reliance on any one procedure such as verbal reporting. Second, it also allowed direct observation of students performing a real task, rather than reporting on what they would do in a hypothetical situation. Third, each task forced the student to employ a specific word identification strategy. Fourth, prompting provided students with a specific clue for the strategy to be used. Finally, the scoring took into consideration both the use of a strategy and the student's awareness and monitoring of the strategy being employed.

Useful insights were also provided into students' awareness of the

clues available and their strategic use of these clues. The four metacognitive abilities in word identification tasks which required the reader to utilise a specific word identification strategy (the phonic clues, orthographic clues, morphological clues and context clues tasks) allowed for assessment of the readers' strategic use of the clues provided. These tasks showed that while readers may use an available clue, they may not monitor its use to determine whether given responses are correct. Further, even when readers made strategic use of the available clues, they were often not aware of the strategy they had used.

Performance of poor readers

Results of students' performance on the metacognitive abilities in word identification tasks reveal that there are great differences in the students' ability to utilise strategies in word identification and to demonstrate an awareness of the strategies used. Poor readers were found to be inferior in metacognitive abilities in word identification, in phonemic awareness and in word identification skills.

While there are no previous research findings available regarding the metacognitive abilities in word identification of poor readers, findings from this study regarding poor readers' metacognitive abilities at the word level are consistent with the findings of studies examining metacognitive abilities in reading generally. More specifically, in the present study, significant differences were found to exist between poor and average readers on three of the five metacognitive abilities in word identification tasks: those requiring strategic use of orthographic clues, morphological clues and context clues. Poor readers were found to be less strategic in using these clues and were often unaware of the strategies they did use, as indicated by their inability to provide an acceptable justification for their responses. These observations support the suggestions made by other researchers that poor readers are often unaware of task demands and are less likely to use self-regulatory mechanisms to monitor and modify strategies in order to complete tasks successfully (e.g. Paris, Lipson & Wixson, 1983).

Both the poor and average readers in this study were found to perform poorly on the phonic clues task. This was largely due to both groups failing to monitor their use of this strategy to see whether their response made sense. However, it must be highlighted that the average readers in this study were students who scored above the 50th percentile on the PAT Reading Comprehension Test, with the majority scoring between the 50th to 60th percentile. Had a comparison group of good readers been employed, the results might well be different.

Relationship among phonemic awareness, metacognitive abilities in word identification, word identification skills and reading comprehension competence

The intercorrelations of the two phonemic awareness variables, the five metacognitive abilities in word identification variables, the two word identification skills variables and the reading comprehension variable

indicate that on the whole the variables within each set of measures were significantly related. Further, the relationship between the sets of variables were also high to moderate. The significant correlation of all variables with reading comprehension indicated that all the lower level reading measures are related to reading comprehension competence.

The results of the multiple regression analysis indicate that word identification skills, metacognitive abilities in word identification, and phonemic awareness measures contributed substantially to explaining variations in reading comprehension competence. Metacognitive abilities in word identification were shown to have an additional contribution in explaining variation in reading comprehension competence over and above that explained by word identification skills. While phonemic awareness was not shown to have an additional contribution to explaining variance in reading comprehension competence, this may have been because of the common variance phonemic awareness shares with the metacognitive abilities in word identification and word identification skills variables.

The results of the path analysis indicate that one phonemic awareness measure (phoneme deletion) and one metacognitive ability in word identification measure (phonic clues) affects reading comprehension competence indirectly through the mediating word identification skill of blending. The phoneme deletion task required the student to delete a specified phoneme from a given word and to say the remaining word. This task involves the manipulation of the constituent phonemes in a word. The phonic clues task requires a strategic approach to word identification: the initial recognition of a grapheme clue in a word, then applying knowledge of phonic rules and monitoring of strategy use to determine whether the given response was appropriate. The findings of the present study seem to suggest that those readers who were able to perform well on these two tasks would also be more likely to do well on the blending task, and subsequently on the comprehension test. It appears likely that the metacognitive processes reflected in the phoneme deletion and phonic clues task are related to successful performance on the blending task. The blending task required the student to select the appropriate sets of letters that represent the beginning, middle and final sounds of a word. A knowledge of phoneme-grapheme correspondence and the ability to blend phonemes together to form a word are necessary for the student to complete this task successfully.

The present findings hence suggest that the ability to manipulate individual phonemes in abstract thought, the strategic use of phonic clues for identifying words and the constant monitoring of the effectiveness of one's word identification process are all closely related to one's skills in employing phoneme-grapheme correspondence knowledge in identifying individual words, which subsequently also affects one's comprehension of continuous text.

Another metacognitive ability in word identification task, context clues, was found to have a possible direct effect on reading comprehension

competence. This relationship may reflect research findings which support the interactive-compensatory process of reading whereby a higher level skill is used, in this case context clues, to assist in the lower level skill of word identification.

Of the five metacognitive abilities in word identification measures, three were not found to affect reading comprehension competence at a significant level either directly or indirectly. These three measures were word awareness, orthographic clues and morphological clues. In the case of the word awareness measure, it appears likely that by Grade Five most students were aware of word parameters and it may no longer be a critical factor in explaining variations in reading competence (although it is possible that it may be a critical factor during the initial stages of reading acquisition). Orthographic structure, or the knowledge a reader has about permissible letter patterns (i.e., well-formed grapheme strings) is a potentially important level of knowledge (Perfetti, 1984). While it appears likely that skilled readers use orthographic structure to speed word recognition (Smith, 1971), studies which have examined the effect of orthographic structure on the speed of word identification have found that this variable does not distinguish good from poor readers once the child has passed the initial stages of reading acquisition. It may be for this reason that, while strategic use of orthographic clues was found to show a significant correlation with reading comprehension, given the presence of the other metacognitive abilities measures in the same model, no significant direct or indirect effect of this measure on reading comprehension was observed.

A similar explanation could apply to the lack of significant direct or indirect effect of the strategic use of morphological clues measure on reading comprehension competence in this study, in spite of the significant zero-order correlation between the two measures.

Implications for remedial reading instruction

Much remedial effort to date has focused on blending skills, often with contradictory results. One implication from the results of this study is that problems with blending may actually reflect deficiencies in the metacognitive abilities that underlie this skill. Remediation must therefore be aimed at assisting students to acquire the necessary metacognitive abilities. Findings of this study suggest that such abilities appear to lie in the area of phonemic awareness and metacognitive abilities in word identification. Direct instruction in the metacognitive skills underlying blending, namely phonemic awareness and strategic use of phonic clues may most effectively assist the poor reader in word identification. This will involve instruction in both task-specific strategies (cognitive training) and instruction in techniques to monitor and appraise this process (metacognitive training).

It should be emphasised that over-reliance on any one clue to the exclusion of others is not successful. Readers need to be aware of a

variety of clues, rather than being reliant on the process of sounding out letters in order to identify an unknown word. Readers must become active participants in the reading process, making strategic use of all the clues available.

Limitations of the present study and suggestions for future research

Interpretation of the findings in the present study was limited by several factors related to the subject sample. Due to the contingencies of school organisation and management, and time constraints, the sample was restricted to one school in one region. This must be taken into consideration when examining the results of the study.

A further limitation of this study is that the findings are restricted to a specific age group (Year 5), and a restricted sample size (N=55). Future studies involving a larger sample size could examine the relationship among these variables at different age levels. Future research could therefore examine the relationships between phonemic awareness, metacognitive abilities in word identification, word attack skills and reading comprehension competence for other age groups (such as Year 2 to Year 7).

Another limitation was the poor to average reading performance level of the majority of the readers within the sample. While this study was initially designed to focus on poor readers, inclusion of more readers at a higher ability level may shed more light on how good readers compare with poor readers on these measures.

Given the findings of this study which suggest that problems with blending may reflect deficiencies in the metacognitive abilities that underlie it, future studies could examine effective ways of teaching the metacognitive abilities that underlie blending and hence reading comprehension competence.

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Table 1
Metacognitive abilities in word identification tasks

Task	Example
A. Word awareness	chap The answer was in chapter five. bit The Earth is orbiting the sun.
B. Phonic clues	bear pear gear fear smooth groove cloth brook
C. Orthographic clues	scrapple apple meauty beauty
D. Morphological clues	bicycle biplane bi-foot typist cyclist sweepist
E. Context clues	wound The spear caused a bloody wound. He wound the fishing line onto the reel.
