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Teaching word recognition to children with severe learning difficulties: an exploratory comparison of teaching methods

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Background: Some children with severe learning difficulties fail to begin word recognition. For these children there is a need for an effective and appropriate pedagogy. However, conflicting advice can be found regarding this derived from teaching approaches that are not based on a shared understanding of how reading develops or the skills that the non-reader needs to master.

Purpose: In this research, three techniques for teaching word recognition in this context are described and compared: (1) the handle technique, (2) morphing method and (3) word alone. It also discusses whether it is appropriate for such small-scale research to influence pedagogy.

Programme description: The handle technique uses an abstract mnemonic cue used to teach word recognition, and previous research indicates it is more successful than the presentation of words alone. The morphing method transforms a word into a photographic picture and a previous study suggested that it might also be more effective than presenting words alone.

Sample: Six children between 11 and 13 years of age were selected. The criterion for selection was being unable to recognise any words from the British Ability Scales Reading Test. All the children attended a school for children with severe learning difficulties.

Design and methods: A three-condition related design was used. The order in which the conditions were presented was counterbalanced and each child was taught 12 words, four words in each experimental condition. The children encountered each of the three methods and overall each word was taught via each method. Within conditions (teaching methods), the presentation of words was randomised. The number of words that the children could read (without cues) before each session was recorded, following the presentation of the uncued words in a random order. The difference in the number of words recognised between the three conditions was considered using a non-parametric statistical analysis.

Results: The results suggest that the handle approach might be a more effective method of teaching word recognition.

Conclusion: Research in this area is necessarily small in scale. However, it is ongoing and cumulative, and can give insights into potentially beneficial changes in classroom practice.

Keywords: severe learning difficulties; word recognition; pedagogy; handle technique; morphing

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Introduction

There has been a recent move within the UK to look for an evidence base that might inform classroom pedagogies, which can effectively include children identified as having special educational needs (Rix et al. 2006). This has been tied to a critique of special, i.e. different, pedagogical approaches for children with learning difficulties (Lewis and Norwich 2004). However, within the area of teaching initial reading skills to children with severe learning difficulties, there appears to be an indication that current practices are failing this group and conflicting recommendations concerning pedagogy. This article looks at this area, gives the results of a small-scale study comparing three teaching approaches and considers the nature of evidence needed to produce a change in pedagogic practice.

Some children with severe learning difficulties struggle to begin word recognition (Sheehy and Howe 2001). Although large-scale data on the extent of this problem are lacking, recent longitudinal and cohort studies suggest this is likely to be a problem experienced by a significant number of these children. One study followed a sample of 82 pupils from eight special schools in the UK (Chadwick et al. 2005). After five years, only 20% of the children were able to recognise up to 10 familiar words and over 60% read below this level, and their reading skills were classified as 'little or none'. Another study, of 35 special schools, concluded that relatively few of the pupils would learn to read and write conventionally (Lacey et al. 2007). This evidence might indicate that developing initial word recognition skills is not possible for many of these children, or that the methods used to teach word recognition are not appropriate for some of these pupils. Lacey et al. (2007) found that phonic-based approaches were commonly being used as part of the daily literacy hour, which occurs in schools in England, and that this focus on learning was maintained even for pupils who would develop, at best, a very small sight vocabulary or 'a few key words' (Lacey et al. 2007, 157). This emphasis on a phonics-based approach would seem to be ineffective for many of these children (Lacey et al. 2007). There is evidence to suggest that as the learner's degree of intellectual impairment increases, the utility of phonic-based approaches decreases (Fowler et al. 1995, cited in Verucci, Menghini, and Vicari 2006) and it has been argued that a phonic-based approach assumes a skill base that this group of children may not have (Sheehy and Holliman 2009). Developmental models of reading describe the transition from non-reader to skilled reader (Seymour 2007) and would characterise the way these children tackle printed words as 'primitive pre-alphabetic visually based word recognition' (Seymour 2007, 2). At this stage of reading development, children demonstrate no phonemic segmentation skills and hence new isolated words are inaccessible. Furthermore, some of this group of children experience significant difficulty in learning such segmentation (Verucci, Menghini, and Vicari 2006).

In contrast, these children are able to learn to recognise logographic symbols (Figure 1) relatively easily (Sheehy and Howe 2001; Wu and Solman 1993). These symbols are more accessible because they represent a word or concept but do not require decoding via constituent sounds.

These symbols have become widely used within the teaching of children with severe learning difficulties (Abbott and Lucey 2005), in particular as part of language and communication development programmes (Makaton 2008). It is not surprising therefore that teachers and educational researchers have endeavoured to harness logographic symbols as a means of helping children to learn word recognition. One established approach uses the symbols in spatial conjunction with the printed word.

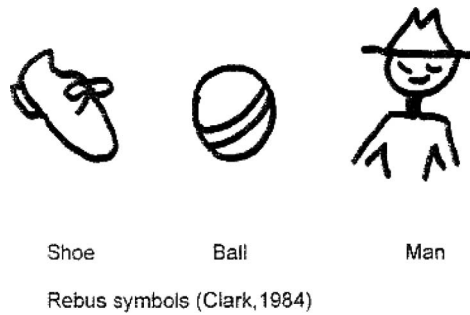


Figure 1. Examples of logographic symbols.

After repeated presentations, the symbol is gradually faded away. There is evidence that some children have consequently learned to recognise words (Detheridge 1993; Van Oosterom and Devereux 1982) and this method is a recommended approach within special education (Makaton 2008). The implied theory of learning here is a behaviourist one, where a transfer of association occurs between the symbol cue and the written word. However, this evidence arises from educational case studies and investigations without controls or comparison groups. A review of such evidence from a range of controlled empirical studies reveals that this approach is no better than presenting the 'word alone' (Solman and Wu 1995) and that the symbols may sometimes act to interfere with the pupils' development of word recognition (Solman and Singh 1992; Singh and Solman 1990).

The current situation suggests that there is a need for a demonstrably effective alternative to phonics and symbol fading approaches. One line of research, which attempted to develop such a technique, began by considering the skills used by children beginning word recognition. The assumption was that these skills might then be explicitly taught to children who were failing at this first step (Sheehy and Howe 2001). There is evidence that children, beginning to recognise words, can be described as 'logographic readers' (Frith 1985; Seymour 2007). These logographic readers do not use letter sounds to decode the alphabet script or relate graphemes to phones (Bowman and Treiman 2002) but rather make a connection between the visual symbol and its meaning (Genisio and Bastien-Toniazzo 2003). They make this connection using a salient visual feature of the word itself (Bowman and Treiman 2002). This recognition strategy has been noted in early educational research where young children described the parts of the words they used for recognition. For example '... monkey because it has a tail' (Gates and Boeker 1923, 470).

A new approach was therefore developed which attempted to use a salient feature to support logographic word recognition, i.e. it was based on an established developmental model of typical reading development. The technique was known as the handle technique (Sheehy and Howe 2001). It is essentially a mnemonic approach in which the child's understanding of the word is encoded as a non-pictorial cue called a handle (mimicking the salient local feature). A word is identified from the student's spoken or signed vocabulary and written on a flashcard. This word is discussed with the child and their personal associations and understanding of the word are noted. The teacher then selects the attribute that seems to have the most personal salience and adds a handle to the written word (Sheehy and Howe 2001). Table 1 below shows some words with their associated handles and illustrates their idiosyncratic nature.

Table 1. Words and their associated meanings.

Word	Associated meaning	Word plus handle
Birthday	Squirty ... gun	birthday
Katy	Gotta ponytail	Katy
Home	Signs 'Home'	Höme

Abstract words can also be encoded, often using aspects of the child's non-verbal communication (e.g. 'this' might be represented as a tongue shaped when saying the word or a pointing finger). This technique has been explored and refined through a series of experiments (Sheehy 2002a, 2002b; Sheehy and Howe 2001). The optimum site for a handle emerges as around the first or final letter (2002b) and there are several ways in which a handle might be faded or removed. The evidence suggests that a feedback cuing approach is most efficient. The word is shown first, then the word/handle compound shown briefly and finally the word alone again (Sheehy and Howe 2001). In all of these studies, the handle technique has been shown to be significantly more effective than a word alone approach. However, an alternative approach to the handle technique was developed and there was some evidence to indicate that it was also more effective than the simple presentation of words alone. This method, known as morphing method (MM) was derived from a symbol accentuation approach (Miller and Eller-Miller 2000). In this, a picture is gradually transformed into a word. Sheehy (2005) utilised morphing software, with a feedback cuing approach, transforming a word into its corresponding picture and then back again. This process is illustrated in Figure 2.

The apparent success of these two methods raises a question. The underpinning rationale for the morphing method was *not* based on developing local feature recognition; rather it arose from a refined symbol fading (i.e. implicit behaviourist) approach. This sees children with severe learning difficulties as learning to read words in a different way from other children. Its success, albeit in a single study, seemed to undermine the 'local feature' explanations, which had been given for how the handle technique worked (Sheehy and Howe 2001; Sheehy 2002b). There was therefore a need to make a direct comparison between these two approaches. Furthermore, given that other symbol-based approaches have been shown to be no better than the simple presentation of words alone, comparisons of both handle (HT) and morphing (MM) approaches needed to be compared with a simple word alone (WA) approach. This study therefore made a direct comparison between three approaches: the handle technique, the morphing method and the word alone method. In keeping with a local feature perspective, it was predicted that the handle technique would be most effective method overall.

Hypothesis

There would be a significant trend across the methods in the number of words recognised by the participants:

$$\text{HT} > \text{MM} > \text{WA}.$$

The null hypothesis was that there would be no significant difference between the three conditions.

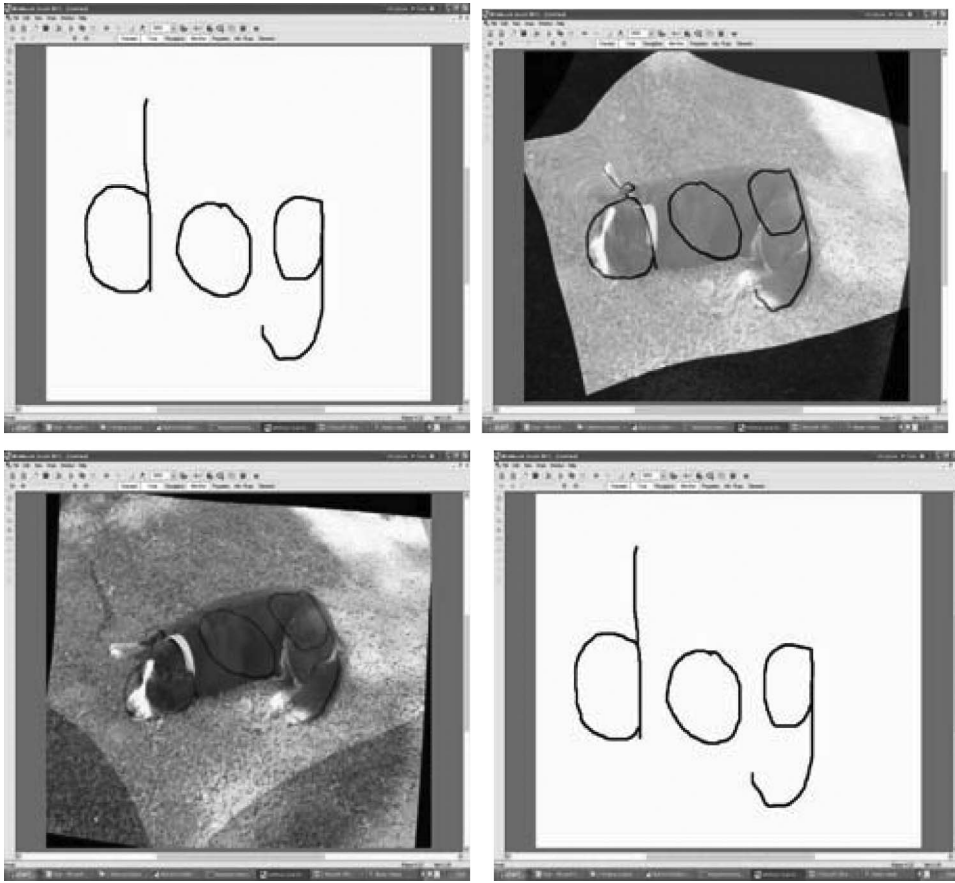


Figure 2. An example of morphing.

Method

Participants

Six children between 11 and 13 years of age were selected. As in previous research (Sheehy 2002b, 2005), the criterion for selection was the absence of a sight vocabulary following extensive focussed teaching. The children were unable to recognise any words from the British Ability Scales Reading Test (Elliot 1983). All the children attended a school for children with severe learning difficulties. As with other children for whom these pedagogies were developed, these participants could not be regarded as a homogenous group. Their individual needs encompass physical impairments, epilepsy and speech and language problems. Supportive signing was used by several children.

Ethics

The study was run in keeping with the BERA ethical research guidelines (BERA 2004). Initially the children's parents or guardian gave consent on behalf of each child, following the receipt of an information sheet and a written consent form. The

children were asked if they would like to volunteer. However, their communication difficulties and age meant that monitoring their ongoing assent was particularly important. The research sessions would be stopped if a child appeared upset by the programme or expressed unwillingness during a session.

Procedure

Because of the potentially significant variations between individuals regarding sensory and cognitive impairments, a between-groups comparison is inappropriate. A within-participant design was therefore used to control for this factor. A three-condition related design was used. This design had been trialled in previous research and found to be suitable for this group of children (Sheehy 2002b). The order in which the conditions were presented was counterbalanced and each child was taught 12 words, four words in each experimental condition. The children encountered each of the three methods and overall each word was taught via each method. Within conditions (teaching methods), the presentation of the four words was randomised.

Stimulus words

The use of a repeated measures design necessitated that the same words were used for each participant. This departed from the original HT method of taking words from the child's expressed vocabulary, but had been trialled previously (Sheehy 2002a, 2002b). The words used were taken from the Makaton Vocabulary: ball, car, biscuit, house, dog, bed, tree, egg, cake, banana, drink and chair (Walker et al. 1985). For each session, the same person undertook all the teaching. This happened within a one-week period, with a follow-up session one week after the final teaching session. Before each teaching session began, the teacher presented the child with the uncued words, in a random order. The number of words that the child correctly identified was recorded.

The three conditions

- (1) *The Handle technique (HT)*. In the first session, a handle was developed and attached to each word. The child was told 'this says ...' and then asked 'tell me about ...'. This was written on one side of the card, with the word alone on the other. In the sessions that followed, a feedback cuing method was used. The word (without handle) was shown. The child was asked 'what does this say?' and the word and handle was shown and then the word (without handle). In essence, the card was 'flipped over' briefly to show the handle.
- (2) *Morphing Method (MM)*. The words were presented on the screen of a laptop computer. The child was told 'this says ...'. To match the other conditions, in the first session the child was asked 'tell me about ...'. The child was asked to name the word as the morph began. If the child was unable to name the word, he or she was again told its name and prompted to repeat it (Sheehy 2005).
- (3) *Word Alone (WA)*. The words were presented, individually, on a card. The child was told 'this says ...'. To match the other conditions, in the first session the child was asked 'tell me about ...'. The child was asked to name the word and if unable to do so were told its name and prompted to repeat it.

Results

The results of the teaching sessions are summarised in Table 2. This shows the number of words recognised, for each method, without cues at the start of each session.

Table 2 illustrates that although words were learned in each of the three methods, more appeared to be learned through MM and HT. There is an association with a greater number of children achieving success with these methods.

In analysing such a small and idiosyncratic sample, standard parametric tests would present misleading findings (Leech and Onwuegbuzie 2002). For small samples that do not conform to a normal distribution, a non-parametric approach is needed (Siegel and Castellan 1988), which can have more power in this situation than parametric tests (Clark-Carter 1997). This form of analysis suggests that there was no significant difference between the conditions until the final teaching session. At this point there was a significant difference across the three conditions ($p < 0.01$, Pages L Trend Test, one-tailed; Siegel and Castellan 1988). As predicted, the trend, in terms of words recognised, was $HT > MM > WA$. At the follow-up session, the same trend was also found, with a significant difference existing across the three conditions ($p < 0.01$, Pages L Trend Test, one-tailed; Siegel and Castellan 1988).

This pattern was explored in more detail using a multiple comparison of conditions (Siegel and Castellan 1988). This analysis indicated that at the start of the final teaching session (i.e. session 4), there were significant differences between WA and MM ($p < 0.05$), and also MM and HT ($p < 0.05$). Thus both cued approaches were more effective than the presentation of words alone. One week later, at the follow-up session (session 5), a different picture is found. At this point, there is no significant difference between the WA and MM conditions. There is, however, a significant difference between WA and HT ($p < 0.05$), and also HT and MM ($p < 0.05$).

Discussion

At the final teaching session (session 4), both the cued approaches (MM and HT) resulted in more words being recognised than with the WA approach. This supports previous research where, under certain circumstances, additional cues can be used successfully in teaching word recognition (Carpenter and Detheridge 1994; Miller and Eller-Miller 2000). This contradicts the claim that additional cues are inherently detrimental to the process of learning word recognition or, at least, no better than the presentation of words alone (Solman and Singh 1992). The results at the follow-up session (session 5) show that learning words through the handle technique resulted in significantly greater retention of learning, at least in the relative short term, by this group of children. The morphing method at this point performed no better than the presentation of words alone. This result might be seen as supporting the 'local feature' view of beginning word recognition (Gough 1993). The HT approach was designed to support this process and therefore should be more effective than approaches that do not do so. In almost every session, the HT resulted in a greater number of words being recognised and at the follow-up session (session 5), there was no significant difference between the other, less effective, approaches.

The handle technique had the benefit of being an *individualised* mnemonic cue for each child, whereas the morphing method utilised the same set of photographs.

Table 2. Number of words (out of four) correctly recognised by each child in each experimental condition.

Teaching sessions															
1				2			3			4			5 (follow-up)		
WA	MM	HT		WA	MM	HT	WA	MM	HT	WA	MM	HT	WA	MM	HT
Child 1	0	3	3	1	3	4	2	3	4	3	3	4	2	3	4
Child 2	0	2	3	1	4	3	2	4	3	1	4	4	1	4	3
Child 3	1	0	0	2	2	0	3	0	0	1	1	1	1	1	1
Child 4	0	0	1	0	1	1	0	1	2	1	2	3	2	2	4
Child 5	0	0	2	0	0	1	0	0	3	0	0	2	0	0	2
Child 6	0	0	1	0	1	0	0	0	2	0	1	1	2	1	4
Total	1	5	10	4	11	9	7	8	14	6	12	15	8	11	18

Note: The presentation order of each method was counterbalanced to control for order effects overall. An individual child may score 'worse' on one method simply because they did that method last.

Previous research has suggested that, when developing word recognition, individualised mnemonics are more effective than 'given' ones (Sheehy 2002b). The individualisation is of the meaning that the child associated with a picture. This could not be used within a morphing method as these associations are not representations of the picture itself, or necessarily pictorial in nature. However, each child was able to name the photographs readily and without difficulty. In terms of cuing the correct word, the photographs worked well but, when used in the MM morphing, they were not efficient in leaving the child able to name the word without pictorial cues. This is in line with previous research in which pictorial cues are found to be readily recognised (Solman and Singh 1992), can be manipulated to become as effective as words alone (Sheehy 2005; Wu and Solman, 1993) but are not as effective in developing uncued recognition as HT (Sheehy 2002b). It has been argued that this performance reflects pictorial cues' inefficiency in developing local feature recognition (Sheehy and Howe 2001).

As in previous research, the children did learn some words from the presentation of words alone (Solman and Wu 1995; Wu and Solman 1993). Anecdotal evidence from the sessions reported that some of the children began looking for handles on the WA words, although none appeared to develop this further. This suggests that the children may have begun to change the way in which they approached the non-cued words, even within such a short period. Future research might consider if a transfer of strategy occurs and, if so, the extent to which it supports subsequent learning. Because the methods have been counterbalanced, it is difficult to unpick whether a particular word was recognisable because of its nature, because of the method used to teach it, or because it was the first, second or third method experienced by the child in a session. With this caveat, there appeared to be individual differences in the children's responses. In terms of individual words, some appeared to be more recognisable than others. For example, 'Egg' was learned relatively quickly in all three methods, whereas 'Chair' and 'Drink' were rarely recognised. This may be because 'Egg' is the most physically distinctive of the words. Its large 'E' followed by two 'swinging g's' seems to foreground salient features, which beginning readers use as recall cues (Gates and Boeker 1923).

Not all children preferred the cued methods. Child 3 found the HT method particularly difficult and she persisted with a single strategy, ignoring the handle altogether. She would point towards the first letter of the word and then 'guess'. This appeared to be how she thought reading was done and she maintained this approach in each session.

Another possible influence is the use of the computer presentation. It is debatable whether the outcomes for the two 'paper' conditions (WA and HT) would have been different if presented via a computer screen. Previous research has controlled this in a direct comparison of on-screen WA and MM and obtained findings in line with those obtained here (Sheehy 2005). It is also important to consider the overall purpose of the research, which is to identify an effective teaching approach, which can be used in the classroom. The handle technique uses cards because pilot studies suggested that this was more 'teacher friendly' in terms of producing handled words (Sheehy 1995). So it would appear to be valid to compare the two approaches (HT and MM) as they stand, and as they would be used in the classroom.

The question is raised as to the extent to which this type of research constitutes enough evidence to inform, or recommend, a change in classroom practice. An obvious issue is that the samples in this and similar studies are very small, and run

for short periods. This style of research occurs in response to two main factors. Firstly, the number of children with severe learning difficulties, who are non-readers, is relatively, a very small group even within each school. Secondly, this group of children are typically, within the UK, educated in special schools. Here they receive a variety of support and activities in addition to that which might be seen as classroom teaching. A child's day may well contain speech therapy, occupational therapy, music therapy, physiotherapy and a range of other out-of-class activities. This puts their teacher contact time at a premium. Taking the children out of this situation to 'try out' new pedagogies is problematic. One option here is action research but, as in this research, sometimes experimental comparisons are needed. Therefore, this approach includes at least one teaching method that has evidence of effectiveness so loss of 'learning time' is minimised.

Because children with severe learning difficulties are not a homogenous group with regard to their learning interactions, it can be argued that within-participant designs are the best form of experimental design to use. Yet although this works well in controlling for individual variability, it creates new issues. Children are presented with more than one teaching approach in a short period. Whilst experimentally elegant, this can be seen as a pedagogically poor way of proceeding. This method reveals the relative effectiveness of the methods being compared, but does not show the potential of each approach if delivered by a skilled teacher in a more straightforward manner. It could be argued that the MM and WA methods might have improved their performance under more typical teaching circumstances. It is not necessarily good practice to teach this group of children for such a few short sessions and then expect development and recall of learning. That the children retained some word recognition in this event indicates that all the methods being tested are potentially useful ones, and longer term a different picture might have emerged regarding their relative effectiveness. With this caveat, the current research does add to a range of evidence that supports the use of the handle technique.

Using a within-participants design means that potential order effects, i.e. the presentation order of the teaching methods, need to be counterbalanced. This is particularly important for children with severe learning difficulties who may experience fatigue when presented with a series of learning tasks. Whilst counterbalancing the conditions deals with this effectively for the purposes of experimental design and statistical analysis, it creates an ethical issue in terms of the demands it imposes. Consequently, the scale of the current design has arisen through pilot studies but is also informed by experience as a class teacher and a judgement of what is 'reasonable'. For children who have experienced years of failure in beginning word recognition, being faced with a reading-related task can create anxiety. It is therefore essential that the children's ongoing assent is monitored carefully during the investigation.

Concerning sample size, the design itself imposes constraints. In order to consider three methods, six children, or additional groups of six, are required to ensure a balanced comparison. In the current research, suitable groups of 12 or 18 children did not exist within the school. However, the within-participants design allows non-parametric analysis to be undertaken on such a small sample and levels of significance to be reported (Leech and Onwuegbuzie 2002; Siegel and Castellan 1988). Furthermore, because the design controls for individual difference and order effects, it allows for some comparisons to be made with similarly designed studies (Sheehy 2002b). The approach developed in this line of research has therefore been

a series of small studies, which explicitly build on research that has gone before (Sheehy and Holliman 2009). This contrasts with a 'one-off' large-scale investigation, and presents an alternative way to help to develop understanding of pedagogical issues whilst being sensitive to the ethical issues of working with this group of learners. Although based on small samples, the use of non-parametric analysis effectively controls for accepting a 'false positive' in the results (Zimmerman 2001) and the effects noted in this study are likely to be seen if replicated in classrooms. The results of this study need to be replicated and in a design that has more pedagogical validity. This might be achieved by a design that incorporates longer-term action research in addition to a short-term controlled study and follow-up. This could reveal the extent and limits to which the cued approaches (HT and MM) develop word recognition. The argument has been developed that learning local feature recognition underpins the success of the HT and differentiates it from other approaches. However, the nature of how non-readers interact visually with words and cues, as children move from cued to unsupported word recognition, has not been explicitly explored in this context and needs to be investigated.

Slavin (2002, 15) argues that 'children deserve the best educational programs, based on the most rigorous evidence we can provide' and in these circumstances this research approach attempts to be both ethical in practice and rigorous in nature. There is a need to develop approaches for children for whom current teaching approaches appear to be failing (Lacey et al. 2007; Chadwick et al. 2005). When children with severe learning difficulties fail academically, it is easy to attribute this failure to factors within the learner. This attribution might act to reduce awareness that a change in pedagogy is needed and therefore it is important that research is designed that might reveal evidence capable of challenging this attribution and current teaching practices.

Conclusion

These findings add to a line of research that reveals insights into supporting the development of word recognition. In contrast to picture fading approaches, the handle technique is based on a local feature approach to word recognition. It assumes that children with severe learning difficulties learn to recognise words in the same way as all other children, but need a particular type of support to take an initial step in word recognition.

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