

Critical Review: Possible Intervention Programs for Remediation of Word-Finding Difficulties in School-Age Children

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This critical review examines the possible interventions available for remediation of word-finding difficulties in school-age children. Study designs include: single subject, non-randomized clinical trials, case control and expert opinion. Overall, research supports a number of intervention methods including elaboration and/or retrieval training as well as new discourse and computer based programs.

Introduction

The term word-finding difficulties when used to describe children who have a naming or a word retrieval problem refers to a difficulty severe enough to cause concern (Messer, 2006). This concern is a result of dissociation between comprehension and production of words in these children (Messer, 2006) and will likely influence their oral communication and academic learning (German, 2002).

In order to attempt to understand this difficulty a clear consideration of what defines this problem is essential (Best, 2005). There is no agreement in the literature on the cause of word-finding problems in children and it's important to be aware that children may have word-finding difficulties that result from different causes (Best, 2005). Therefore, the approach to remediation of word-finding difficulties may also differ across children.

There are few research studies investigating word-finding therapy in the literature. Some approaches employ a phonological approach which utilizes phonological properties such as initial sounds or rhyming words as a means to aid retrieval (McGregor, 1994; Wright, 1993). Other approaches employ a semantic approach which utilizes word meanings through categorization or definitions to elaborate on or increase an individual's representation of that item within memory (Wright, 1993). Some studies refer to these approaches as elaboration or retrieval strategies. Elaboration activities aim to provide the individual with new information about words to improve lexical representations and retrieval activities encourage the individual to use already known information to guide word finding (McGregor & Leonard, 1989).

Objectives

The primary objective of this paper is to critically evaluate the existing literature regarding the possible intervention techniques for children with word-finding difficulties.

Methods

Search Strategy

Computerized databases, including CINAHL and PubMed, were searched using the following search strategy:

(word-finding) AND (children)

(word-finding) AND (children) AND (therapy)

(lexical retrieval) AND (children)

A reverse references search from the papers pulled out of the computerized databases was also performed. The search was limited to articles written in English.

Selection Criteria

Studies selected for inclusion in this critical review paper were required to investigate the outcomes of a therapy program designed to remediate word-finding difficulties in children. No limits were set on the outcome measures or demographics of research participants other than including elementary school age children.

Data Collection

Results of the literature search yielded the following types of articles congruent with the aforementioned selection criteria: single-subject (6), non-randomized clinical trials including case control studies (4), and expert opinion (1).

Results

Single Subject Design

A single-subject design allows for objective measurement of an individual's behavior (Backman, 1997). This is appropriate for heterogeneous and rare populations such as individuals with word finding difficulties. The strengths of this design include its use of repeated measures and functional application within rehabilitation settings because it can support collection of empirical data in clinical practice (Backman, 1997). Furthermore, a multiple baseline design controls for threats to internal validity making it more powerful than other single-subject designs (Backman, 1997). One limitation of this design includes inability to generalize. However, single subject studies with multiple individuals can counter this limitation to some extent (Backman, 1997). Finally, this design is limited in

statistical techniques as they are often analyzed visually rather than applying both visual and statistical methods (Backman, 1997).

Phonologically Based Approaches

German (2002) conducted a single-subject multiple-baseline design study to investigate the effectiveness of a three-pronged phonologically based strategy to reduce word finding errors. Two third-grade boys were included in the study. Their metalinguistic knowledge of target words (number of syllables) was paired with a phonemic neighbour cue (words that shared sounds with the target word) followed by rehearsal. Results showed a reduction in naming errors in single-words that generalized to sentences and were maintained at follow-up.

The rationale and intervention protocol employed in this study was well described and appropriate. The selection criterion and background information for both participants was also described and both subjects fit the 'typical' criteria that define word finding difficulties. The stimuli were listed and well balanced for frequency of occurrence, semantic category, phonological complexity and appropriateness for age of the participants. Study outcomes were described in terms of number of errors compared from baseline to treatment and maintenance. While the figures provided show treatment effect, no direct statistical methods were employed. Therefore, while the procedure lends itself to clinical application due to its teaching rather than testing format and participants were well chosen, the lack of direct statistical analyses and small number of participants were considerable weaknesses in this study. Overall, this study provides some suggestive evidence that phonologically based treatment improves word finding.

McGregor (1994) conducted a study in which two five year old boys participated in a single-subject multiple baseline design. Treatment involved activities to elaborate storage of phonological output, and to practice cueing and retrieval of trained items. The phonological information introduced resulted in a reduction in semantic and phonological substitution errors on trained words leading to the conclusion that phonological information alone in treatment was useful.

The intervention protocol employed in this study was guided by sufficient rationale and is described in detail. Although selection criterion for participants was not well described, patient history and current status was provided. Both participants shared similar communication histories and current word-finding profiles. The procedure was described with sufficient detail for replication and although more restrictive than spontaneous discourse, McGregor acknowledges the confrontation naming approach was chosen to allow for

a more controlled and simplified study of word finding errors and the multiple baseline across subjects approach provided additional control in the case where generalization across experimental word lists occurred. Caution was taken with reliability of observer ratings calculated and reaching 98% to 100% accuracy. Study outcomes were described in terms of number of errors and reduction of phonological and semantic substitutions therefore no direct statistical methods were employed. McGregor's procedure lends itself to clinical practice however, the lack of direct statistical analyses and restrictive confrontation naming protocol are weaknesses. Overall, this study provides some suggestive evidence that a phonological approach can decrease phonological and semantic substitutions in word finding.

Best (2004) investigated five children participating in a new intervention approach using a computerized aid that converts letters into sound cues. All children showed improvement in naming intervention items despite different profiles.

A plausible rationale was provided to justify the therapy method of converting letters into sound cues. Criterion for inclusion and background history were provided. All children presented with unique profiles with the exception of word finding difficulties. This variability could be problematic to compare group results however, does demonstrate the heterogeneous nature of the target population. The procedure was described and sufficient for replication, however it was problematic that all assessment measures used before and after treatment were standardized tests. Standardized tests may not be sufficiently sensitive to treatment changes and were therefore not appropriate to measure progress. It was also problematic that only nine letters were available on the computerized aid and therefore intervention items were limited. The inclusion of personally relevant functional items chosen by the child, parents or teachers was a nice addition. A test for homogeneity was reported and *t*-tests were completed which was appropriate for testing differences between treatment and control items. Visual analyses relating to performance across therapy sessions were also appropriate. Overall, the study provided some evidence that the computerized aid and linking letters and sound cues can become part of the pool of techniques described to help remediate word finding difficulties. However, its lack of generalization and limited intervention items make it inappropriate as the sole intervention task.

Semantically Based Approaches

Casbey (1992) conducted a single subject study investigating the effect of an intervention protocol designed to elaborate on word knowledge by deeply

processing paradigmatic and syntagmatic characteristics of words to improve naming abilities. A single school aged boy participated and results indicated a decreased naming response time and naming error rate.

The procedure and rationale for this study was described clearly and in sufficient detail for replication with clinical reasoning behind each step provided. Intra and interjudge reliability were also calculated resulting in correlations of .998 and .975. Visual analysis was provided on graphed outcomes for both treatment sets and demonstrated treatment effect for both measures of naming time and naming errors. Experimental control was also demonstrated with an extended baseline for the second treatment set however, Casbey acknowledges a practice or rehearsal effect within this set between sessions one and four. Unfortunately no direct statistical methods were applied and the child included in this study was considered atypical due to the early neurological damage that resulted in speech and language difficulties. Although a detailed history was provided, the reason for inclusion of this child in the study was unclear. Overall, this limitation allows for a narrow application of the results despite some evidentiary support for the semantic treatment design.

Combined Phonological and Semantic Approach

Easton, Sheach and Easton (1997) investigated a combined semantic and phonemic elaboration approach to teaching vocabulary with four 10 year old children with word finding difficulties. The single subject design revealed an improved ability following intervention that was sustained at follow up for all children.

The premise driving this study focuses on the difficulty identifying a clear cause of word finding deficits in practice therefore the authors suggested a combined approach to target both aspects. Eligibility criteria were not reported, however, detailed descriptions of the four participants and the procedure were clearly described. The stimuli words were chosen based on appropriate criteria and assigned randomly to treatment and control groups. However, the participant's comprehension of the stimuli was not evaluated prior to their use. Standardized assessments were also carried out at two of the three assessment phases which could be problematic as these assessments may not be sufficiently sensitive to change in order to measure progress. These assessments were repeated after treatment if allowed within the appropriate testing intervals as specified by test guidelines therefore minimizing this problem to some extent. Furthermore, the group format and AB design didn't allow for experimental control of potential sources of internal validity such as history or maturation. Visual analyses were provided for each participant as well as an average of the four subjects for overall evaluation. These clearly

indicated a treatment effect for treatment words over controls however no direct statistical methods were employed. Overall, the outcome of the study provides some support for the use of this teaching approach for vocabulary learning as it is clinically applicable, however the lack of generalization to control words does not indicate a lasting impact and the extent to which success was a direct result of a combined semantic and phonological approach was unclear.

Discourse Based Approach

In a study by Stiegler and Hoffman (2001) three nine year old boys participated in a discourse-based, contextual intervention designed to increase word finding proficiency. Results revealed each child had a decrease in the average number of problematic word finding behaviours following intervention.

An extensive rationale is provided for the purpose of this study and it is believed that a discourse-based intervention provides a supportive context that is naturalistic and interactive. The single subject multiple baseline approach was appropriate for this purpose because it accounted for participant variability and allowed for the use of natural discourse tasks. Subject selection was clearly described along with background information for each participant. The materials and procedures were also described in sufficient detail for replication including rationale and detailed examples. Each participant's percentage of word finding behaviours were visually demonstrated and comparisons were discussed. A sign test was used appropriately to determine the significance of a higher percentage of word finding difficulties on longer segments of discourse. Task complexity differed across conditions, a weakness acknowledged by Stiegler and Hoffman but not addressed in their analysis. Overall, improvements were seen suggesting some evidence for a discourse based approach. However, further research is necessary to determine if it is an appropriate alternative to traditional word finding therapies.

Non-Randomized Clinical Trials

Non-randomized clinical trials are appropriate for small sample sizes to control for factors such as age and by assigning matched controls the outcomes can be better attributed to the treatment. Case control studies in particular, are appropriate for use with rare and heterogeneous populations such as children with word finding difficulties, however the design is inherently subject to biases and generalization of results is poor.

Comparing Semantic and Phonological Approaches

McGregor and Leonard (1989) conducted a study with four language impaired children in which two children were assigned to the treatment group and two acted as controls. Treatment involved elaboration

and/or retrieval activities in which the treatment group showed improvement compared to the controls who received therapy without a word finding focus. Results also indicated that activities focusing on both elaboration and retrieval resulted in greater improvement than elaboration or retrieval training alone.

The study purpose was well described and rationale was provided. Inclusion criteria were clearly stated with each treatment participant matched with a control participant for age and word finding ability. The design and procedure of the study were well described and sufficient for replication. Great care was also taken to eliminate extraneous variables. For example, task presentation was counterbalanced across children. Training effects were measured in number of errors and visual analysis demonstrated improvement. Unfortunately, no direct statistical analyses were conducted. This would have provided greater power to their finding of elaboration and retrieval training being more effective compared to elaboration or retrieval training alone. A larger sample size would also have provided increased support for this claim. Overall, McGregor and Leonard provided early evidence that remediation of word finding difficulties is effective; however the extent to which method is most effective requires more statistical power to be conclusive.

Hyde Wright, Gorrie, Haynes and Shipman (1993) conducted a case control study involving thirty severely language impaired children between eight and 14 years old, divided into two different treatment groups. One group received semantic based therapy and the other phonologically based therapy. Only the semantic therapy group showed improvement.

Hyde Wright et al. aimed to compare the two therapy methods as was stated in the well formed study question. All subjects were selected from a special school for individuals with speech and language difficulties and participant criteria, while broad, were reported and matching for age across treatment and control groups was described. Unfortunately, due to drop outs the treatment group numbers were not balanced. The procedure was outlined and the protocol for treatment groups was sufficient for replication, however the control group procedure was not described. A particular strength of the method was the care taken in training Speech Language Therapist's and conducting a pilot study to evaluate the method prior to use with the intended population. However, the three sessions over five weeks would be difficult to achieve in a typical rehabilitation setting and the semantic therapy took longer to administer. The Mann Whitney U and 2-tailed *t*-tests conducted are appropriate for the small sample size, although specific rationale was not provided for use of these statistical measures. Overall, some evidence

favouring a semantic approach is seen, however weaknesses in the method and clinical applicability limit its power.

Wing (1990) divided 10 children into two equal groups in a non-randomized clinical trial. One group received semantic treatment and the other phonological and perceptual treatment. The phonological group made significant improvement in untrained items and the semantic group did not.

The treatment procedure was described and provides sufficient rationale to support the research question. Eligibility criteria and division of children into groups were also provided. However, the phonological and imagery activities were better described than the semantic activities, and specific stimuli were not provided. The standardized Test of Word Finding acted as part of the eligibility criteria as well as the pre and post test measure which could be problematic as standardized tests are often not sensitive to change. However, the use of raw scores instead of standard scores to reflect improvement does lessen the complications. To test significance of treatment gain, *t*-tests were performed appropriately. Limits of this study included no control condition and use of a standardized test as the sole pre and post treatment measurement. However, there is some evidence to suggest a phonological and perceptual treatment can be useful and provide generalization to untrained words.

Combined Semantic and Phonological Approach

Wright (1993) conducted a case control study in which four pairs of children with specific language impairment (SLI) were assigned to two treatment groups and two control groups. Intervention sessions focused on combined elaboration and retrieval techniques. The intervention was considered successful if naming accuracy increased from pre to post test in the treatment group but not the control group. This was supported and word finding accuracy was maintained at follow-up.

As a follow up to the study by McGregor & Leonard (1989), Wright investigated a dual approach with a similar case control design. Therefore, plausible rationale was provided. Inclusion criteria and participant profiles were also described and materials and procedures were described in detail sufficient for replication. Statistical analyses included two-tailed *t*-tests appropriate for comparing pre, post and maintenance testing. However, these results were reported only for the treatment groups. Results for the control group were simply reported to be similar from pre to post. Overall, this study provided some suggestive evidence for a clinically applicable program that can be utilized with school vocabulary in a short

four week period despite knowing which training segments were the most helpful.

Expert Opinion

German (1992) described a three-pronged model of intervention that considers word finding remediation, self advocacy instruction and compensatory programming. The program was well laid out with empirical support behind the described intervention principles and remediation components. An emphasis on identifying the source of the problem allows clinicians to separate individuals with word finding difficulties into three groups each with a specific focus area. Specific retrieval strategies and remedial techniques were presented and a sample lesson plan provided information to guide clinical application. Although empirical support is provided as rationale for inclusion of aspects of the intervention protocol, a study that employs this procedure with a sample of the population would further support its use.

Discussion

Through a collection of the literature it has been demonstrated that, in general, a focus on word finding within the therapy setting can be beneficial. However, the approach to treatment is arguable. There is support for a focus on elaboration or semantic training alone demonstrated by two of the above studies, retrieval or phonological training alone by four studies and a dual focus by three studies. With varying populations and varying strength in procedure and statistical analyses a definite conclusion cannot be made. The definition of activities pertaining to these groups also varies across some authors. For instance, rhyming techniques are referred to as elaboration training by McGregor & Leonard (1989) but as phonological training by Wing (1990). In short, the question remains whether both approaches are necessary to employ for improvement to be seen in a large majority of the population.

The question of single word confrontational naming procedures versus discourse based training also remains. While one of the reviewed articles utilized a discourse based approach the resulting evidence was guarded, raising questions as to whether a more naturalistic learning environment is appropriate. More research is needed on the success of discourse based procedures and comparisons with a traditional single word naming approach.

Treatment of word finding difficulties in children with language impairment is a relatively unstudied area within the literature and despite models demonstrating word finding processes within the brain, the results presented here demonstrate how difficult it is to identify the relative influence of semantic and phonological information presented in an elaboration or

retrieval setting. Future research should continue to consider the contribution of semantic versus phonological activities as well as modifying the intervention environment to be clinically applicable. The benefit of an individual focus (elaboration alone, retrieval alone) versus a combined approach should also continue to be investigated. Research considering subgroups of individuals with word finding could also help narrow the approaches that would benefit individuals who present with certain difficult word-finding behaviours, similar to the subgroups described in German (1992).

Conclusion

The evidence presented supports a number of remediation techniques with no one program superior to the rest. Therefore, treatment in general is effective in improving word finding difficulties but further research is required for support of specific treatment techniques.

Clinical Implications

The bottom line is therapy designed to target word finding in children should not be overlooked. Not only is improved word finding important to the child's quality of life in social and academic settings but the evidence strongly suggests it is possible to see improvement in this ability. While there is no 'cookie cutter' therapy recipe for remediation of word finding difficulties in children, German (1992) provides a good starting point for clinicians and a means through which to think about planning treatment. The full body of literature reported here also provides well described therapy activities and procedures that can be adapted to individual clients. It is the heterogeneity of this population that makes it difficult to say whether one procedure is better than another. It is therefore, the clinician's responsibility to apply research practices within their treatment to determine whether a chosen approach is appropriate for that individual.

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