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Dynamic Assessment of children with language impairments. A pilot study.

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Abstract:

This paper describes the construction of a procedure for dynamic assessment of the expressive grammar of children already identified with language impairments. Few instruments exist for the dynamic assessment of language and those that have been developed, have been largely used to successfully differentiate language impaired from culturally different or typically developing populations. The emphasis in this study was on eliciting clinically useful information that may be used to inform intervention for children with SLI. The method was piloted on three children with specific language impairments. The test-train-retest format made use of standardized administration of the CELF-3 (UK) before and after a designated training protocol. The training procedure required the children to formulate sentences from randomly presented words, assisted by mediation from the assessor. Results showed that the task used was valuable and appropriate for use as a dynamic measure, and elicited differentiated amounts of change in the children in response to the mediated training phase. Pre-test-post test results were inconclusive, however, and the frameworks for summarizing information could benefit from revision.

Key words; dynamic assessment, grammar, mediation, SLI

~~Word count: 7763~~

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Introduction

Speech and Language therapists rely significantly on standardised, static test procedures to accurately pinpoint the areas of greatest difficulty for a child with Language Impairment (LI), yet several authors have noted that standardized tests in everyday use may be inadequate to accurately and comprehensively assess children. Law and Camilleri (2007) for example, note that performance variables such as shyness, lack of experience, cultural or linguistic differences and poor attention may interfere with the accuracy of test results, while Dockrell (2001) finds standardized tests lacking in specificity, and Botting (2005) recorded changes in test performance over time. It has been suggested that alternative, more creative and process based assessments may be useful, and that Speech and Language might gain insights from the procedures of Dynamic assessment being used by psychologists to assess intelligence.

Within the field of speech and language, it is only recently that research into dynamic methods of assessment has emerged (Hasson and Joffe 2007). Concepts and assessment materials are still being 'borrowed' from psychology and education, and few instruments accessing verbal skills are available. Other than the popularity of language sampling and profiling, advocated by David Crystal in the 1980s (Crystal, 1979, 1982; Crystal Garman and Fletcher, 1989) the dominant assessments have been a battery of standardized and norm referenced tests. Advocates of DA recommend the addition of dynamic methods to the battery, making further information about processing or learning potential available, not the replacement or abolition of

standardized tests. Furthermore, leaders in the field of DA (Feuerstein, Feuerstein, Falik and Rand 2002, Guthke 1993, Lidz 1991) emphasize its usefulness for clinical populations, such as those with learning disabilities and language problems (Haywood and Lidz 2007, p2)

Dynamic Assessment (DA), is an umbrella term that encompasses a range of methods of assessment, that aim to assess potential for learning, rather than a static level of achievement. It does this by prompting, cueing or mediating within the assessment, and evaluating the enhanced performance that results, ie an evaluation of Vygotsky's 'zone of proximal development'. In this way, DA enables the assessment of cognitive processes, ie 'ongoing tactics, strategies, habits and modes of thinking; of approaching, defining, and solving problems..' (Haywood and Lidz 2007 p27) These processes may be applied to any task that is presented, and assessment of the processes employed during a verbal task will yield insights into the way the individual understands and formulates language. Furthermore, Alony and Kozulin (2007) note that DA lends itself to assessment of 'fluid' abilities, ie those in a state of change, or varying in the way they are used and applied, rather than assessing 'crystallized' abilities, that represent an outcome of learning or acquisition.

Like static tests, dynamic procedures may be either standardized or non-standardized, although relatively few standardized tests of learning potential have been developed (Hessels et al 2008), and many DA procedures have been criticized for lack of reliability, validity and the use of anecdotal evidence.

The methods adopted in dynamic assessments are determined by the objectives of the assessment. (Resing 2001). Broadly, these objectives have been either for the purposes of identification and discrimination of populations, or with the intention of gaining more detailed information in order to inform management or intervention for individuals. The former requires the researcher to utilize a standardised and reliable test procedure establishing a method which elicits the greatest amount of difference, while the latter has resulted in less standardised and more clinical methodologies.

Like the two populations identified by Budoff (1987, cited by Grigorenko and Sternberg 1998) namely those who are at risk of inaccurate diagnosis as mentally retarded, when in fact their learning has been disadvantaged in some way, and, those who have been correctly diagnosed, but whose potential for improvement has not been gauged, individuals performing poorly on language tests, benefit from further exploration. Some of these will underachieve on account of linguistic or cultural differences, as distinct from those for whom language is a specific difficulty. Distinguishing cultural and linguistic difference as the source of language difficulty has been most widely addressed in research, and the potential for learning in this group ably differentiated by DA procedures. (Gutierrez-Clellan and Peña 2001; Peña and Gillam, 2000) These studies will not be further reviewed here.

The second population, those who have been appropriately identified as ‘language impaired’ (LI, SLI, or a range of other terms such as developmental disorder of language) manifest difficulties that lie specifically within domains of language without any other accompanying identifiable condition (Bishop 1997, Leonard 1998).

These children could benefit from further assessment to determine their potential for improvement and to inform programmes of intervention that would facilitate better outcomes from intervention. This objective would be consistent with the more clinical approaches to DA that have been associated with the work of Feuerstein.

In his earlier writings, Feuerstein (Feuerstein et al 1979) described his theory of 'structural cognitive modifiability', and linked his assessment methods to accessing this notion of cognitive modifiability. The assessment sets out to establish 'the extent to which a learner is able to solve a given problem and grasp the underlying principles governing its solution.' (Feuerstein et al 2002 P 422) The principle underlying testing, therefore, would be to pose a problem, identify the barriers the individual experiences in solving the problem, find out the preferred strategies for supporting the individual and how much investment is required to enable the individual to grasp the problem solving, and see how the testee can apply the learnt principles to new problems. The focus of assessment is on the use of strategies and metacognitive awareness, rather than on the content of items alone.

The application to language use becomes apparent. How easily can a given individual grasp a grammatical rule, and reflect on and express the rule? Can that individual who has learnt the grammatical principle or rule, then apply that construction when the example becomes more complex, for example contains, tenses, negatives or different verb argument structures? Or in the field of pragmatics, can acceptable norms of eye contact, turntaking and conversational cohesion be maintained in situations of greater conversational pressure?

It could be argued that much of this information become readily apparent to teachers and Speech and Language Therapists working with a child. The aim of a DA, however, is to elicit this information at the outset, at a stage when they are usually still engaged in formal testing, and to enable use of this knowledge to plan facilitations that will maximally benefit the individual. In order to achieve this goal, the methods that are employed within the DA itself, are crucial.

Peña and Gillam (2000) focussed on developing a methodology of DA, demonstrating its application to different aspects of language in children of different ages. They cited case studies looking at the word learning of a 4 year old bilingual child; the narrative of a 10 year old experiencing reading difficulties at school, and the explanatory discourse of an 8 year old with ADHD. In each instance the DA procedure utilised a test-mediate-retest format, and provided useful diagnostic information about the child to the speech-language pathologist, contributing to the planning of intervention. Kester, Peña and Gillam (2002), subsequently investigated the nature of the 'teach' phase of the test-teach-retest procedure used in the 2000 case studies, and found that the use of mediated learning experience (MLE) as described by Lidz (1991) best facilitated the test - retest improvement. Similarly, in an earlier study, Bransford et al (1987) found that the mediated DA procedure of Feuerstein produces more transfer in a child than the graduated prompting method of Campione and Brown (1987).

The more recent work of Peña and colleagues, (Peña, Gillam, Malek, Ruiz-Felter, Resendiz, Fiestas and Sabel 2006; Peña, Resendiz and Gillam 2007) has focused even

more on children with language impairments, and sought to identify which measures obtained during the mediated intervention, best differentiated these children from their typically developing peers. They showed that 'clinician modifiability ratings can be a powerful predictor of language impairment' (2007; P337) Ratings and judgements by clinicians, related to the amount of teaching required, and the child's responsiveness to the teaching, were useful, (Peña et al 2006) as were two measures of modifiability, namely metacognition and flexibility, also accessed via clinicians' ratings, using the Mediated Learning Observation (Peña et al 2007).

Predicting readiness for change will be most familiar to practising clinicians who frequently try to get a sense of a client's stimulability, typically in assessments of phonology. A more comprehensive approach to DA of phonology, the Scaffolding Scale of Stimulability, (SSS) has been developed by Glaspey and Stoel-Gammon (2007). The SSS comprises a hierarchy of supporting cues used by the clinician to facilitate phoneme production in a client. The SSS uses 'Graduated prompting', a more standardised method of DA, developed by Campione and Brown, where the 'teaching' component of the DA is incorporated into the procedure, and the number or level of prompts used as a measure of learning potential, rather than using a pre- and post-test. The procedure enables the measurement of progress towards a target over time, in contrast to a static assessment in which only a fully correct response is credited, thus obscuring small amounts of change. The authors highlight the importance of this incremental change for clinicians to measure treatment outcomes.

One of the aims of DA may be to utilize a procedure that highlights change, differentiating between individuals who are capable of progressing at different rates, or monitoring progress over time within an individual, with or without intervention. The current study attempted to use a DA procedure to investigate more closely the language abilities of a group of children with identified language impairments. At the present level of development of the procedure, a pilot study to trial the effectiveness of the procedure was required, and the results of that pilot are presented here. The effectiveness of DA to distinguish individuals with LI from other populations has been ably demonstrated, but the second identified objective, ie to elicit differentiated information useful for planning intervention, was the one addressed.

As few previous studies of DA in children with LI have addressed the area of syntax, and no published dynamic assessments investigating expressive syntax are known to the authors, a task probing the skills of sentence construction was devised. It was thought that the opportunity to observe the children manipulating components of a sentence would facilitate insights into the processes used to formulate language.

The test-teach-retest procedure was based on that described above, developed by Pena and Gillam (2000). In order to maximise the measurable change from pre-to post test, the ‘teach’ phase utilized intensive individualised mediation. Other than some permitted variation in the mediation, the practice items, sequence of items, nature of mediation, and measurement of mediational interventions were kept consistent, in order that the procedure could be replicated. The task was based on an existing subtest of the CELF-3 (UK) (Semel, Wiig, and Secord 2000), and the standarized version of the test was used as the pre- and post-test measure. In this way, the administration of

the pre and post measures was kept consistent, and the scoring, according to the criteria of the authors was consistent and therefore comparable. The change in scores would be attributable to the mediation used in the intervening 'teach' phase, in addition to any practice effects, which would themselves contribute information about the learning of the individual participants.

Aims:

The aims of the current pilot study were as follows:

1. To formulate a replicable procedure for the dynamic assessment of expressive grammar of children with language impairments.
2. To enable a measurable change in test scores to be elicited as a result of the mediation that was given as part of the assessment procedure.
3. To ascertain whether the method for measuring responsiveness to mediation differentiated between children identified as having language impairments.
4. To ascertain whether the method for measuring responsiveness to mediation could lead to the identification of useful intervention strategies for individual children.

Method

Design:

The study was conducted as a multiple case study. This was thought to be useful as no features common to the group were sought, but rather the procedure aimed to capture the extent and nature of individual differences.

Participants:

Ethical approval had been obtained from Ealing Local Research Ethics Committee, before the SLT at a Language Unit attached to a mainstream school, was approached to identify potential participants and obtain agreement from the parents for the researcher to contact them. Informed consent was obtained from the parents of all the participants. Three children, all boys, hereafter referred to as K, J, and M, aged 11-12 years old, were identified. Criterion for inclusion in the study was a Total Language Score less than 1.5 SD below the norm on the CELF-3 (UK) (Semel, Wiig and Secord 2000), also the test used for baseline measure for the dynamic procedure. This criterion, in addition to the placement in a language unit, signifying earlier identification of a significant language impairment by a Speech and Language Therapist, and the educational authorities, was considered to be sufficient evidence of a primary language impairment (Bishop 1997). The children were recruited from Year 6, as the task developed for the Dynamic Assessment required a degree of metalinguistic awareness, more likely to be present in older children (Nippold 2007).

It was considered that the additional detailed assessment and recommendations for intervention that were likely to result from the study may be useful to the SLT working with the boys, in her formulation of recommendations for secondary school placement and support.

Procedure:

The DA was constructed as a test-train-retest design, and was based on the method demonstrated by Peña and colleagues (2000; 2006; 2007) to be useful for eliciting diagnostic information from children referred for language problems. The following stages were included:

1. Assessment using the 6 required subtests of CELF-3 (UK) (Semel, Wiig and Secord 2000) These subtests were used to cover a range of receptive and expressive subskills, and obtain a standardised Total Language score, as recommended by the authors (Semel, Wiig and Secord 2000, CELF-3 (UK) Examiners manual P5)

2. Three sessions of mediation utilizing training materials and a protocol developed for the purpose, but individualized in administration for each child.

3. Post-testing using four subtests of the CELF-3 (UK), Concepts and Directions, Word Classes, Formulated Sentences and Sentence Assembly. In the interests of time saving, and because the overall Language scores would not be required as a stand alone standardised assessment, the final 2 subtests were not readministered.

The Training Phase of the Assessment

The training task was based on the Sentence Assembly subtest of the CELF-3 (UK)(Semel, Wiig and Secord 2000). This task was chosen as it enables sampling of a number of underlying componential skills and processes, thought to be accessible through probing of responses as permitted by a dynamic style of assessment. Kahn

and King (1997) similarly used the CELF Sentence Assembly task, giving no reason for its selection, but demonstrating its utility for accessing and assessing cognitive functions.

The training materials utilized the same format as the CELF-3 (UK), with words presented visually, printed on a card, in random order (see Appendix 1), requiring the child to formulate two possible sentences from the given words. The dynamic procedure ensured checking that the child was familiar with all the vocabulary items, or these could be explained if necessary. Reading difficulties were similarly compensated by checking and helping the child to read each word, which would not affect the procedure, but conversely would provide additional information about the individual's needs for support.

There were 48 items, completed over three sessions of 40 minutes each, one week apart. This enabled the examiner to see whether mediated strategies were retained by the participants from one session to the next. In addition, the grammatical structure of the possible sentences was controlled, requiring different linguistic constructions, and manipulations, and presenting items in order of increasing difficulty, and/or increasing length/number of items in the sentence, for each grammatical structure (see Appendix 2). This enabled the examiner to detect whether strategies could be applied to similar examples, and transferred to tasks of greater length or complexity, during the training procedure. The grammatical structures included for training included many, but not all, of those assessed in the standardized Sentence Assembly subtest of the CELF-3 (UK), and some additional or extended structures included to elucidate the child's knowledge of linguistic rules.

The protocol of training relied upon the systematically increasing level of difficulty and the linguistic structure, of the items to evaluate the child's learning and mastery of specific linguistic constructions. At the outset it was intended that all items be administered in sequence, although flexible administration, was permitted so the examiner could leave out some items for some children if it was considered appropriate, to alleviate fatigue or boredom, or if the item was thought to be too easy or too difficult for the child. The mediation consisted of prompts that were delivered systematically, as required by the child, starting with reflective, metalinguistic questions, and progressing to increasingly specific linguistic cues, direct modelling and requests for imitation, based on the RMI structure (see Analysis) until the target sentence was achieved and accurately produced, or imitated by the child.

The intervention was mediational in nature, incorporating the essential components of mediated intervention according to Lidz (1991), namely:

- mediation of intentionality – conveying to the child that you intend to help him improve
- mediation of meaning – sharing the purpose of the activity
- mediation of transcendence – linking the activity to other contexts in which the skill can be used,

and in addition

- mediation of a feeling of competence – targeting praise so that the child learns what he has done well, learns that the tester has confidence in him, and gains confidence in his own ability

The aims of the Mediated Intervention were further characterized as follows: **(**Feuerstein et al 2002 p.177)

- Regulation of behaviour – inhibition and control of impulsivity
- Improvement of deficient cognitive functions
- Enrichment of repertoire of cognitive operations
- Enrichment of task related content repertoire
- Creation of reflective, insightful, thought processes

The second aim specified 'Improvement of deficient cognitive functions' which relates specifically to Feuerstein's theory that inadequate mediational experience leads to poorly developed cognitive functions. These 'deficiencies' (Feuerstein's terminology) relate to peripheral ie input and output phases, or central, 'elaboration' processes. Whilst the entire framework for identification of cognitive functions was not employed in the current study, the functions that specifically related to the given task were addressed under the rubric of 'Improving cognitive functions' and addressed during the mediation to the three participants.

Analysis:

The entire series of sessions was videotaped, and transcribed verbatim. The following analyses were then carried out for each participant:

1. Pre-test – Post-test raw scores on four subtests of CELF-3 (UK). In addition to the test-retest change in the Sentence Assembly subtest that would be linked directly

to the training phase, post-testing of three additional subtests would identify instances of far transfer, in other words whether linguistic rules or strategies learnt or improved during the mediation, might contribute to improved performance in other linguistic tasks. In particular, performance on the other expressive task, 'Formulation of Sentences' (Semel, Wiig and Secord 2000) could be enhanced by a greater awareness of the sequence of words in a sentence, as mediated during the training phase. Far transfer to the receptive tasks of Concepts and Directions, and Word Classes was less likely, thus the post testing of these served also as control measures.

2. Responsiveness to Mediated Intervention, qualitative assessment of the response to mediation, recorded during the sessions, by means of a rating scale and structured observations. The framework adopted was Feuerstein's Required Mediational Intervention (RMI) (Feuerstein et al 2002). This consists of a 10-point rating scale, relating to the amount of help given by the examiner, and the converse response given by the examinee. On this scale, 0 represents the maximum mediation by the examiner, and the most passive response from the examinee, for example a direct imitation. Level 9 represents passive role of the examiner, while the examinee initiates an independent response (see Appendix 3).

RMI ratings were determined for each item in the training procedure (n = 48), one RMI rating being given for production of two sentences from the stimulus words. RMI was also linked to syntactic structure of stimulus items. The RMI ratings were awarded by the examiner who also carried out the mediated training. Reliability of this rating was checked by a second rater who watched the video recordings of a random sample of 6 items from each participant, and rated the level of mediation by

reference to the definitions (Feuerstein et al 2002 p533) which had been amended by the addition of a specific exemplar linking the to the current task (See Appendix 3). The second rater had no experience or training in mediation or the RMI, in order that the transparency and objectivity of the scale could be verified.

Correlations were calculated between the ratings obtained for the 18 items, from the two raters. Results of a two tailed Spearman's correlation revealed a value of r = 0.672, which is significant at p=0.01 level.

Sources of difference in the ratings were discussed between the raters who resolved their differences in interpretation, and concluded that additional particular mediational prompts could be included in the guidance sheet for future use.

3. Behavioural Observations related both to the knowledge or learning of linguistic structures, and to general responsiveness to the examiner's mediation..

Results

1. Pre– Post test scores

Pre-test and Post-test scores for each participant on four subtests of CELF-3 (UK)(Semel, Wiig and Secord 2000) are presented in Figure 1, along with the scores for the two subtests carried out at the time of the pre-test, but not re-tested after the mediation period (Recalling Sentences and Semantic Relationships). These two subtests were not repeated for reasons of time, and because change from pre- to post-testing was not expected, and thus additional assessment would not yield any useful clinical data.

[Figure 1 here]

Examination of Figure 1 reveals almost half of sub-test scores for all participants being a Standard score of 3, and few reaching the normal range standard score of 7. The profile for Child M is less flat than the others, reflecting standard scores within the normal range in two subtests pre-intervention, and two post-intervention, and illustrating consistent improvement in each post test score. In child J, no subtest standard score was above 6, and a poorer post-test score is apparent on two subtests.

Table 1 reflects the changes in Raw scores for each participant for each subtest. Inspection of the table reveals that K and M improved on all four subtests, although comparison with standard score data in figure 1 shows that on two subtests, K's improved raw score did not raise his standard score, whilst M's scores were significantly raised in all four subtests. J, however, performed less well in two subtests.

Comparison by subtests reveals that all 3 children achieved substantially higher raw scores in Formulated sentences, and slightly higher scores in Word classes. As J scored less well in the post test in the other 2 subtests, overall trends are mixed.

[Table 1 here]

The change in scores may be attributed to the training phase of the dynamic assessment procedure, or may be at least in part due to a generalized practice effect.

Unlike the standard interpretation from language tests, DA approaches would view this more qualitatively. Thus, far from confounding the results, the practice effect is a positive indicator of potential to learn from the assessment experience, and thus in DA terms contributes to the information gained about the participants from performance on repeated tests.

2. Responsiveness to Mediated Intervention

Required Mediational Intervention (RMI) (Feuerstein et al 2002)

The required mediational intervention score was determined for each item in the training procedure, and summarized by totalling the number of instances of each score, and the percentage of instances in which each RMI score was obtained.. Recall that this gives the researcher information about how much support the child needed to complete the task. These totals are presented in Table 2, in which it can be seen that for M, low levels of RMI predominate, with M completing 50% of items with little or no prompting, while for J, high levels predominate, with J requiring intensive mediation (RMI levels 1 or 2) for 47% of the items he completed. Child K's scores, however, show 15 items in which low levels of RMI were required, and a further 19 in which high levels (0-2) were required, but few items in the middle range. This suggests that when K was unable to solve a sentence independently, he was seldom able to make use of strategy prompts and inevitably needed intensive mediation. The RMI awarded for each item, reflecting the ease with which each child was able to manage each linguistic structure is contained in Appendix 4, but space does not permit the elaboration of this information here.

[Table 2 here]

Some items could not be scored as items were not administered, not completed, ie only one sentence was produced, or not achieved despite mediation. In child J, seven items were not attempted as J was not motivated by the task, found the sessions difficult, and required lengthy and intensive input by the examiner, so would not have been able to complete all the items in the time available.

The scores recorded on the table are bear further inspection. For each child, the total number of items should be reduced first by the number of items not completed, and then by the number of items for which the RMI was 9, suggesting that the child was able to arrange the sentences spontaneously, without help. Of the remaining items, the proportion for which an RMI of 0-2 was recorded, reflects the proportion of items for which the child required intensive scaffolding to achieve a correct response. The percentages of high RMI scores calculated in this manner were M - 52%, K - 67% and J - 83%. Thus it can be seen that for M, half of the items could be facilitated by prompting with strategies, reference to rules or previous examples, and half required the item to be broken down or modelled. For K and J, the proportion of intensive facilitation was correspondingly higher, and in very few instances (5 out of 30) was J able to make use of previously used or learnt strategies (RMI levels 5-7. See Appendix 3).

3. **Behavioural Observations**

Behavioural observations were used extensively in the study to capture the range and extent of qualitative data. Item by item rating of RMI informed the summary of linguistic and metalinguistic knowledge for each child, and transcription of sessions facilitated the characterization of mediation required for each participant, as well as his needs in terms of Feuerstein's cognitive functions, and his response to the mediation implemented. As this pilot study is being presented primarily to inform clinical practice and future studies, a sample of the detailed qualitative information obtained is now presented.

Child K.

Despite poor performance on static expressive syntax tasks, the dynamic procedure revealed that K knew a significant amount of linguistic and metalinguistic vocabulary, eg. Adjective, verb, question, sentence, describe, and was able to identify the role of words in a sentence, eg. Action, person and that the clue to a passive construction lay in the word "by". These items may be of use in an intervention making use of conscious, deliberate sentence construction strategies. His responses, while consisting of many trials and errors, contained correct grammatical fragments, and phrases. Furthermore, his output contained numerous self corrections and a consistent awareness of grammatical correctness. K always knew when he had formulated the correct sentence, and similarly, if his errors were repeated back to him, he was aware that they were not correct. Self regulation of output would be recommended as a target of therapy

K's performance was characterized by poorly controlled behaviour, high levels of activity, lack of inhibition, little planning, lack of accuracy, and a great deal of trial and error behaviour. Mediation addressed an increased need for regulation of behaviour of K, in order to enable him to focus on the task at hand and achieve accurate sentence construction. It was noted that there was behavioural variation within sessions as well as between sessions. Items presented early in sessions were achieved with less assistance than the last item in the session, which invariably required high levels of input and effort by the examiner to elicit a response. In session two, high levels of mediation were needed for almost all items, indicating that an external factor may have been affecting him on that occasion, rather than performance being due to the syntactic structure of the items presented. Despite several instances of mediation, K did not improve in his own behavioural control. Thus although self regulation of behaviour would be beneficial, the prognosis for improvement is limited, and would limit K's ability to regulate his linguistic output.

Nevertheless, there was also considerable mediation directed at improving cognitive functioning, and creating reflective thought processes, as well as attention to task content. K verbally signalled understanding and agreement with ideas presented and mediated by the examiner. He responded appropriately to questions pertaining to cognitive functions, and regurgitated concrete strategies spontaneously eg.Item 30 "I start with a word"; item 37 "Because I checked it ..and I know everything", but was less able to reflect insightfully on his performance.

Finally, it was noted that the intensive mediation frequently recorded was in many cases directed at getting K to produce the two precise and perfect sentences required.

Due to his impulsive nature and poor attention, K altered words and morphemes slightly from those given using, for example ‘picking up’ for ‘picking’ (the flowers), girl/girls, ‘by the bus’ / ‘by bus’. In fact, many of the phrases and sentences K produced were grammatically correct, and would have been acceptable in a differently constructed task. In relation to this, inspection of the responses elicited on the pre- and post-mediation assessments demonstrates that improvement was more marked in the Sentence Formulation subtest than the Sentence Assembly. K’s formulation of sentences improved by 11 raw score points, suggesting that mediation may have had an impact on the accuracy of his spontaneous expressive syntax, and self regulation may have been helpful. The statistical properties of the test, however, resulted in no change on the standard score, which remained subject to the floor effect.

Child M

M presented consistently throughout the sessions, as quiet and thoughtful, and his output was slow and hesitant, but well planned and accurate. A lack of engagement and responsiveness, and poor motivation were shown by M, whose non-verbal communication and pragmatic skills were particularly poor.

The majority of mediation was identified as ‘task related content’ and centred around the meanings of words, the roles of words in sentences, and sentence constructions, rather than mediating the solving of individual item problems. More intensive mediation was required for particular linguistic constructions, such as the concepts of inclusion/ exclusion, ‘X but not Y’ and ‘either X or Y’; and some prepositional phrases such as ‘at the beginning’ and ‘between’. M’s responses were not influenced

by sentence length, nor were they affected by the timing of presentation within and across sessions. No mediation was directed at behavioural control, and deficient cognitive strategies addressed were a few instances of lack of accuracy, and a reminder to follow the rules of the activity.

Problem solving behaviour appeared to improve over time. On several occasions reminders of rules and strategies were required. Whilst initially M signalled only passive agreement with the ideas presented, he used several of them spontaneously in later examples.

Eg Item 44

M: that's a sentence, that's not a question

Similarly, input aimed at mediating reflection about the processes being used was met with passive agreement, but some ideas were repeated back later,

eg. Item 13

T: Can you think of what made it difficult?

M: too much words

Item 14

T; Can you remember what we've talked about putting in order?

M: 'try to put the words in order…..all the words, to make sense'

Item 15

T: What did you do?

M: changed them around

The retention of learning was confirmed by the improvement in all 4 subtests on post test. This would suggest that M has an excellent prognosis for improvement through language therapy. This would not however be borne out by consideration of his history, with low standard scores in static standardized tests despite regular SLT intervention in a language unit. Progress may have been impeded by other factors identified through the DA, namely extreme difficulty in expressing reflections, and limited insight, and explanatory ability. Some evidence of self awareness was noted as on occasion M self corrected his sentences, and was also able to defend his responses saying the two sentences were not the same, that he'd said something different, or already given two sentences, but in general self awareness of interpersonal communication skills, engagement and motivation were poor.

Child J

Throughout the three sessions, J lacked motivation and engagement with the task. On 18 occasions he said he did not want to do any more, asked to be allowed to go out to play or back to the class, or tried to request fewer items. Furthermore, on 19 occasions he commented that the task was hard, or too hard, even when he had completed an item successfully, and been praised for his achievement. He was unable to elaborate on why he found the task hard, or which aspects were difficult for him. J further demonstrated a readiness to say 'I don't know', using this on more than 60 occasions, even part way through a correct response.

Focus on linguistic content revealed that J's spontaneous language contained numerous errors, (eg. 'I don't want to do no more').His self monitoring was poor and he was unable to make judgements of grammatical correctness, including failing to identify a correct sentence.

Eg: Item 2

J*: '*the cat saw the dog and the girl and the man'

T: Is that a good sentence?

J: No

T: Why not?

J: it sound not

T……..ok, try and rearrange them, put them in a different order and see

J: 'the dog saw the girl and the cat and the man'

T: better?

J: Yeah

Although J knew that a 'doing word' was a 'verb', and a 'describing word' was an 'adjective', he could not identify which word in a sentence was the verb, (or the 'doing word'). When J was unable to read a word, he was aware, and asked for help, using 'whats this?'or ' what is it?' (rather than 'what's this word', or 'what does this say?') Inaccurate grammar in output accounted for some of the higher levels of mediational intervention. eg Item 11 J produced 'the girl were teased by the boy', and required the individual error to be pointed out, resulting in an RMI of 1.

Little mediation was directed at regulation of J's behaviour, and almost all of the mediation was directed towards the content of the items. J seemed unable to retain and implement strategies, or initiate a planned response independently, so these strategies were used to scaffold his response repeatedly, applied to individual items, and accounted for the very high number of high RMI levels. J required substantial effort from the examiner in mediating and supporting him to achieve many of the items, and performance did not improve with time or transfer across items.

Mediation of reflection and insight into his own behaviour elicited particularly poor responses. J was unable to reflect on the processes of language, and his responses tended to be very literal. He frequently replied to questions with the specific example rather than the transcending principle being addressed

eg: Item 1

T; Was that correct? How do you know?

J: because the black dog saw the brown cat

Item 3

T: are you checking?

J: mum is eating....

End of session:

T; Can you tell me something you learnt today?

J: We did our assembly

It would appear that in addition to considerable language difficulties and very weak language learning strategies, J's performance was affected by poor confidence and avoidance. These features may have affected his performance on standardized tests, resulting in some of his post test scores being poorer than the pre-test. For a child such as this, the benefits of dynamic assessment are a more representative evaluation, as well as prognostic factors that suggest that a prolonged and intensive period of intervention may be necessary to achieve substantial progress.

Discussion

The aims of the current study were achieved in that the procedure enabled a great deal of differentiated and clinically useful information to be extracted. Although applied to a small sample of three participants, the method of grammatical assessment incorporating a mediational phase enabled insights into the learning styles and potential of the children, that is not available from static tests of language, and highlighted factors affecting the modifiability that were different in each child.

The procedure facilitated recognition, for example of one child's poor attention and inaccuracy in gathering the information for a task, as well as poorly planned, impulsive, trial and error output. Attention was similarly identified as a feature differentiating children with low language ability from typically developing children, in a dynamic study by Peña (2000).

The amount of change varied considerably both between subtests carried out by one child, and between children. Much of this change may be due to practice effects, but

the potential of an individual to benefit from practice on a test procedure suggests a good potential to learn. Alternatively, standard error of measurement may be accountable for the variation, but the consistent performance of a participant within the predicted confidence interval verifies the reliability of the child's performance as well as that of the test itself.

Furthermore, the statistical properties of the test obscure the amount of qualitative information that may be obtained. Close inspection of the raw scores obtained on subtests highlighted that the functioning of the participants on some subtests was so low in relation to their chronological age that improvement of 11 points in the item scoring was insufficient to raise the standard score. In addition, the 11 point difference was also uninformative with regard to the qualitative linguistic and behavioural data that could be obtained from the test items. Future research clearly needs to employ a comparison group and different outcome measures in order to give more robust information about the potential for change using a DA-based intervention. Furthermore, the instability in results, particularly from one child (J) suggests that for some children with LI, a more informal, observational and dynamic measure may be the only functional way to conduct an accurate assessment.

In the light of the comments above, it was felt that the pre-test - post-test standardized testing was less useful than the analysis of responsiveness and the behavioural observations. The implementation of the RMI elicited highly differentiated results again both within and between participants (see Table 2). Both child K and child M were able to make use of prompts requiring strategy formation, ie those with RMI 4-7, and similarly improvements were seen in post testing of

Formulated Sentences and Sentence Assembly. Child J, for whom intensive mediation was required in a greater proportion of items, was less able to retain learning and improve on post test. However, it is felt that the analysis of RMI alone, was informative, with lesser reliability attributable to post test CELF-3 scores.

Reflecting on the RMI findings, it can be seen that the general patterns of response emerged more clearly when the RMI scale was collapsed into broader categories. In the foregoing discussion, high RMI scores, indicating intensive input from the examiner were considered to be 0-2, and middle range scores 5-7 (see Appendix 3) grouped naturally into those employing strategies and previous examples to facilitate problem solving. Thus while the 10-point RMI scale adopted from Feuerstein et al (2002) was useful to extract specific, item related information, for informing intervention and gauging the nature and intensity of support required, it could have been more usefully collapsed into a 4-point scale for the purposes of summary statistics, which would also further increase the reliability of ratings by assessors.

It could be argued that behavioural issues and limited attention in a child are features that become readily apparent to teachers and Speech and Language Therapists working with a child. This is true, but elicitation of this information via a dynamic assessment enables it to become clear in the early stages of management of a child, when they are usually engaged in formal testing. Furthermore, the knowledge and learning that the child demonstrates independently of the attention or behavioural difficulties are elucidated, rather than the behaviour resulting in a low score on a standardized test. (Haywood and Lidz 2007)

The information recorded as ‘behavioural observation’ in this report is a summary of a vast amount of qualitative information gained during the assessment procedure and thought to be of substantial clinical relevance for the planning of ongoing intervention. Inspection of the transcriptions of sessions revealed details of linguistic strengths and weaknesses as well as the uptake of prompts and cues provided by the assessor, and behavioural features. Keeping in mind the aims and strategies of mediational interventions as well as the input, elaboration and output processes described by Feuerstein gave implicit structure to the sessions and to the analysis of data, but a more structured and rigorous means of capturing these aspects needs to be devised to facilitate clinical utility and outcome measurement.

The assessment of expressive grammar had not been previously addressed by a dynamic assessment procedure, and it was necessary to sample a range of linguistic structures of varying length and complexity in order to capture the extent of syntactic abilities or difficulties. Thus a large amount of data was generated that still represents a selective sample of each child’s knowledge of linguistic structures, that cannot be exhaustive. Nevertheless, the task of having to find two sentences from each group of words was thought to be one that exposed the use of strategies such as the formation of a question, or the interchanging of semantically reversible elements, as well as the child’s ability to transfer these strategies across items. In this respect the task used was valuable and appropriate for use as a dynamic measure aiming to elucidate the use of strategies and transfer. It could be improved, however, by a more structured framework for capturing and classifying the information, perhaps more usefully on a case by case basis than arranged according to linguistic structure. The latter would serve the purposes of research investigating the language knowledge of children with

SLI. However the current study was modelled on Feuerstein's work, and intended to inform intervention and guide further remediation. For these purposes, the information gained from the procedure would be a valuable addition to the body of data assembled from other tests.

Summary:

The current study set out to pilot a procedure for DA, and evaluate its clinical usefulness, the achievement of which may be usefully considered in relation to the four aims, previously specified.

1. To attempt to formulate a replicable procedure for the dynamic assessment of expressive grammar of children with language impairments.

The procedure used in the current study was useful to extract and elucidate clinically relevant information from the children with language impairments who participated in the study. The material was age appropriate and of a suitable level of detail and difficulty to enable differentiated responses to emerge. The method was sufficiently specified to be replicable, however the scoring could benefit from simplification and structure, as described above.

2. To enable a measurable change in test scores to be elicited as a result of the mediation that was given as part of the assessment procedure.

The change in achievement on the CELF-3 (UK) from pre- to post test was apparent on inspection of the raw scores, The overall procedure incorporating test-mediate-retest was therefore shown to have some sensitivity to change, in spite of the reliance on use of a static standardised measure. The inconsistency of responses of some children to formal tests of this nature is a variable reducing the reliability of the current procedure.

3. To ascertain whether the method for measuring responsiveness to mediation differentiated between children identified as having language impairments

The method for measuring responsiveness, the RMI, captured differences between children both quantitatively and qualitatively, in terms of overall need for prompting as well as the intensity of mediation required to master specific grammatical constructions. Furthermore, the analysis in terms of the Aims of Mediational Intervention, included in 'behavioural observations' enabled detailed qualitative differences between participants to be elucidated.

4. To ascertain whether the method for measuring responsiveness to mediation could lead to the identification of useful intervention strategies for individual children.

Although detailed recommendations for intervention were not described, the amount of information yielded by the procedure would make a substantial contribution to intervention planning and prognosis for improvement for individuals.

Barriers to implementation of dynamic assessments by practitioners are evident at the current stage when procedures for its use are in the experimental stage of development, and training in dynamic assessment is scarce, and not geared towards the needs of SLTs, but rather towards Educational Psychologists in whose field dynamic assessments of cognitive potential are available. Nevertheless, these need not be insurmountable barriers as the principles of DA are familiar to SLTs, though better recognized as assessment of 'stimulability', periods of 'trial therapy' or interventions such as 'scaffolding'.Indeed, DA need not rely on published assessments, but rather the principles can be adopted by practitioners to evaluate more fully the learning potentials and strategies used by their clients. Procedures in use are seemingly time

consuming and labour intensive, but are justified by the increased information available for intervention planning.

Future research might extend these findings with an intervention study to find out whether in fact the clinical recommendations emerging from Dynamic assessment does enable improved outcomes from intervention, and whether SLTs and teachers find the enhanced information of practical value.

Appendix 1

Sample of training materials:

Item 1.

dog the black cat saw the brown

the black cat saw the brown dog

the brown dog saw the black cat

the brown cat saw the black dog

the black dog saw the brown cat

Item 17.

he had he went a bath before to bed

He had a bath before he went to bed

He went to bed before he had a bath

Before he went to bed he had a bath

Item 35.

the pool was going Dad to

Dad was going to the pool

Was Dad going to the pool?

Appendix 2

Grammatical Structure of Items in Training procedure

	Syntactic Structure	**ICWs**	**Modification**	**Example**
1	Declarative with Reversible NP	4	NP:AdjN	The black cat saw the brown dog
2		4	NP:NcN	The man and the dog saw the girl and the cat
3	Declarative with coordination SVcSV	4	but	Mum is eating but dad is drinking
4		4	although	
5		4	however	
6	SVOcSVO	6		
7		6	Semantic constraint	Mum is picking the flowers and Dad is cutting the grass
8	Declarative with Direct and Indirect Object SVOdOi	4	NP:NcN	The girl gave the boy a drink and a biscuit
9		6	NP: NcN and AdjN	
10	Passive Declarative reversible content	2		The boy was chased by the dog
11		2		
12	Declarative, Reversible NP with inclusion/Exclusion	4	NP: NcN	The man and the girl wanted chocolate but not vanilla
13		4	0r/ but not	
14		3	Either-or	
15	Declarative- reversible with conditional conj	4	Either-or	Either play a game or read a book
16	Declarative, Reversible NP with inclusion/Exclusion	4	NP: NcN both	Jane and Mary wanted both sweets and ice cream
17	Declarative with (temporal) subordinate clause SVOsSVO	4	before	He had a bath before he went to bed
18		4	after	
19		4	while	
20		4	then	
21		4	At the same time as	
22		4	before	
23	Declarative with prep phr (sequence) and co-ord	4	At beginning/end	
24		6	First/second	
25	Declarative with prep phr (location)	4	Left/right	
26		4	Next to	
27		3	between	
28		2	amongst	
29	Declarative with copula verb SVC	2		The monkeys cage is broken
30		3	NP:Adj cAdj	The dog is small and brown

31		3	+neg V	The house isn’t large and dark
32	+ co-ord conj	4	SVCcSVC	
33	Declarative with Auxiliary Verb	3	+ modifier	Mum is still talking
34		3	Neg V + Adv	John isn’t coming for tea today
35		2	+past V + Adv	Dad was going to the pool
36		3	+ past +negV	The decorator wasn’t painting my room
37		2	+ future VP	Billy is going to score a goal
38		3		
39	- with Modal auxiliary	2	did	Mum did wash my jeans
40		3	Did + neg	
41		3	Did+ prep Phr	
42		3	Don’t	
43		3	+ future Will + prep Phr	
44		3	Won’t + Vpart	
45			Should	
46		3	Shouldn’t	
47		2	Can’t	
48		3	must	

Appendix 3
REQUIRED MEDIATIONAL INTERVENTION

Ref: Feuerstein R., Feuerstein R.S., Falik, L. and Rand Y. 2002 The Dynamic Assessment of Cognitive Modifiability. ICELP Press. Assessment of Cognitive Modifiability. ICELP Press.

Distance Level	**Examiner**	**Examinee**	**Example from current application**
0	Produces response via direct imposition on examinee	Passive, conforms to pressure of examiner to reproduce model	Direct imitation, Mouthing / pointing response alongside child
1	Models act to be copied, encourages imitation, withdraws as examinee starts to respond	Initiates partially successful representation of model	Direct model, little delay, **model of part of utterance**, or model within a choice giving first items for completion
2	Points out specific examples of rules, concepts, attributes of the problem, identifies constant and changing elements	Spontaneously responds to task, attends to mediation	Uses specific example to demonstrate how elements of sentence are related. **'You've left out a word'. 'Start with…'**
3	Identifies general class characteristics	Encouraged to apply response to new situation	Can you identify the verb? A noun?
4	Refers to previously identified strategies	Acts on previous mediation, applies and repeats, no rules formulated	'What do you do first/next?' 'What do we look for?' **Can you make a question? Start with something different**.
5	Selects/encourages strategies based on insight and rules	Chooses adequate strategies based on derived insight	'Look carefully at all of the words'. **Have you used all the words?**
6	Point out previously used strategies using transcending verbal and metalinguistic rules	Applies previously used strategies, reflects awareness of rules and operations	'We need to make a plan'
7	Focuses examinee attention on problem anticipatory, and pre-response mediation, to provide initial regulation of response	Formulates specific rules, strategies, attitudes, meanings. Self regulatory	Are you ready? You may have to remember what you used before
8	Alerts to metacognitive elements, directs mediation to structural change, challenges for resistance	Elements of structural change present	What have you learnt?
9	Passive presence in elicitation of responses	Mediation is internalized, self regulation	Sentences are produced without help.

Low levels of Distance / Higher levels of RMI

Appendix 4

RMI rating for each participant for each item of training procedure.

Session	Item No	Syntactic Structure	RMI Child K	RMI Child M	RMI Child J
1	1	Declarative with Reversible NP	9	9	9
	2		9	9	9
	3	Declarative with coordination SVcSV	9	5	9
	4		9	Incomplete	9
	5		9	9	7
	6	SVOcSVO	2	9	2
	7		7	5	2
	8	Declarative with Direct and Indirect Object SVOdOi	9	1	4
	9		7	1	Incomplete
	10	Passive Declarative reversible content	Incomplete	9	2
2	11		9	9	1
	12	Declarative, Reversible NP with inclusion/Exclusion	1	1	1
	13		1	1	3
	14		0	2	Incomplete
	15	Declarative- reversible with conditional conj	1	2	1
	16	Declarative, Reversible NP with inclusion/Exclusion	2	9	Incomplete
	17	Declarative with (temporal) subordinate clause SVOsSVO	1	2	2
	18		0	9	9
	19		Incomplete	5	incomplete
	20		1	4	1
3	21		4	Not done	Not done
	22		0	9	1
	23	Declarative with prep phrase (sequence) and co-ord	4	1	2
	24		1	8	1
	25	Declarative with prep phr (location)	1	2	2
	26		1	2	2
	27		9	1	1
	28		Not achieved	7	Not done
	29	Declarative with copula verb SVC	Not achieved	7	2
4	30		9	9	1
	31		9	9	1
	32	+ co-ord conj	9	9	9
	33	Declarative with Auxiliary Verb	5	9	4
	34		7	9	Not done
	35		9	8	2
	36		9	9	Not done
	37		2	4	9
	38		2	9	Not done
	39	- with Modal auxiliary	4	9	2
	40		5	9	Not done
	41		2	9	2
	42		9	9	1
	43		2	7	2
	44		2	9	2
	45		Not done	9	Not done
	46		9	5	5
	47		5	4	1
	48		1	9	1

References

[here]

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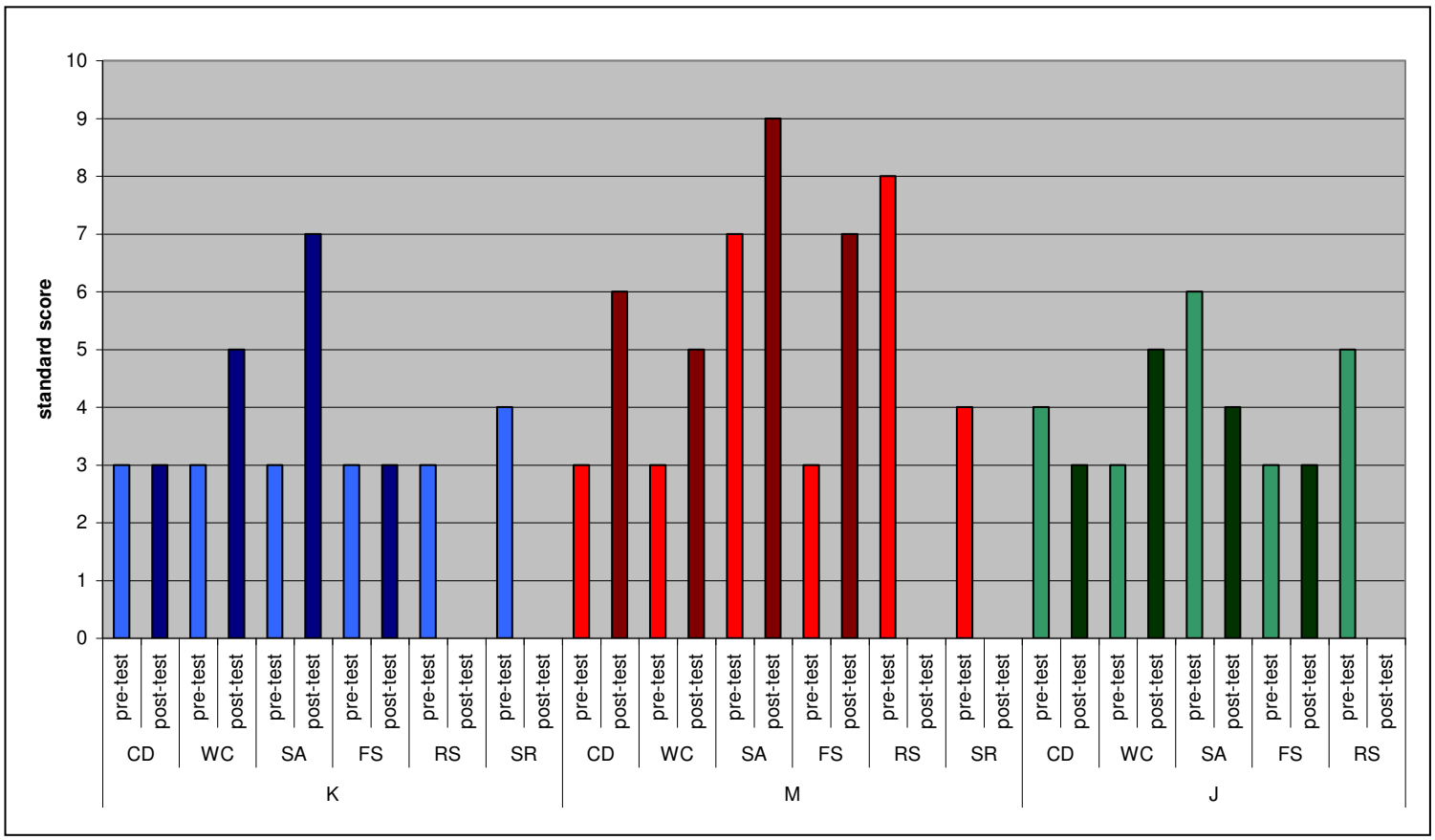
Figure 1. Pre-test and post-test scores for each participant on each subtest of CELF-3 (UK) (Semel, Wiig and Secord 2000)



Key: CD Concepts and Directions; WC Word Classes; SA Sentence Assembly; FS Formulated Sentences; RS recalling Sentences; SR Semantic Relationships.

Table 1. Pre-test and post-test Raw scores, for each participant on each subtest of CELF-3 (UK) (Semel, Wiig and Secord 2000)

			Concepts and Directions	Word Classes	Formulated sentences	Sentence Assembly
Child K	PRE-TEST	Raw Score	13	16	8	3
	POST TEST	Raw Score	15	18	19	10
		Change in Raw Score	**+2**	**+2**	**+11**	**+7**
Child M	PRE-TEST	Raw Score	14	17	15	9
	POST TEST	Raw Score	22	18	32	13
		Change in Raw Score	**+8**	**+1**	**+17**	**+4**
Child J	PRE-TEST	Raw Score	17	16	12	8
	POST TEST	Raw Score	13	19	18	5
		Change in Raw Score	**-4**	**+3**	**+6**	**-3**

Table 2. Required Mediational Intervention (RMI) scores (Feuerstein et al 2002) for each participant, represented as a percentage of the total number of instances completed.

		No of items completed (max 48)	RMI 0	1	2	3	4	5	6	7	8	9
K	No of instances	43	3	9	7		3	3		3		15
	%age of items completed		11	21	16		7	7		7		35
M		46		6	5		3	4		3	2	23
	%age of items completed			13	10		6.5	9		6.5	4	50
J		37		12	13	1	2	1		1		7
	%age of items completed			32	35	3	5	3		3		19

The use of mediation has been central to the intervention programmes advocated by Feuerstein. According to Haywood (1993) the principles of mediation are thought to be essential for adequate cognitive development in children. Mediated Learning Experience is defined by the presence of a number of mediating behaviours. The most essential of these, have been adapted from Feuerstein by Carol Lidz, (1991 and 2003 p63) and place emphasis on the child's active engagement with the process and purpose of his own learning. The mediation of meaning and transcendence imply explicit, metacognitive teaching, making sure at each stage that the child grasps the principle that he is learning, its importance and application to the task, and wider functional use. Haywood (1993) identified metacognitive skills as an important component of mediated intervention.

The method shifts the emphasis of therapy away from modelling and towards a more problem-solving approach. In this way, support is gradually increased as needed for the child to succeed in his learning, rather than gradually reduced from a complete model until the child produces a target unassisted. Facilitation is minimal, and introduced only if and when required to enable the child to formulate a strategy for problem solving. Metacognitive and reflective prompts such as 'Was that correct?' and 'How can you make it better?' are used in place of recasts that supply 'correct answers' for children. Highly didactic procedures such as 'cloze'tasks and imitation are used only when high levels of remedial intervention are shown to be necessary