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Dynamic assessment of children with language impairments: A pilot study

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Abstract
This article 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 specific language impairment (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.

Keywords
dynamic assessment, grammar, mediation, SLI

I Introduction

Speech and language therapists (SLTs) rely significantly on standardized, 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

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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 SLTs might gain insights from the procedures of dynamic assessment (DA) 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, Fletcher, and Garman, 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 (Lidz, 1991; Guthke, 1993; Feuerstein, Feuerstein, Falik, and Rand, 2002) emphasize its usefulness for clinical populations, such as those with learning disabilities and language problems (Haywood and Lidz, 2007: 2).

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 d oes this by prompting, cueing or mediating within the assessment, and evaluating the enhanced performance that results, i.e. an evaluation of Vygotsky's (1986) 'zone of proximal development' (ZPD). In this way, DA enables the assessment of cognitive processes, i.e. 'ongoing tactics, strategies, habits and modes of thinking; of approaching, defining, and solving problems' (Haywood and Lidz, 2007: 27). 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, i.e. 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, Berger, and Bosson, 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 standardized and reliable test procedure establishing a method that elicits the greatest amount of difference, while the latter has resulted in less standardized 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 'learning disabled', 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 individuals 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 (Peña and Gillam, 2000; Gutierrez-Clellan and Peña, 2001). 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, Rand, and Hoffman, 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: 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 when it contains, tenses, negatives or different verb argument structures? Or in the field of pragmatics, can acceptable norms of eye contact, turn-taking 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 SLTs 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) focused 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 attention-deficit hyperactivity disorder. In each instance the DA procedure utilized 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, Delclos, Vye, Burns, and Hasselbring (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, et al., 2006; Peña, Resendiz, and Gillam, 2007) has focused even more on children with language impairments, and has 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: 337). 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; these were 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 standardized 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, i.e. 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 Peña and Gillam (2000). In order to maximize the measurable change from pre- to post-test, the 'teach' phase utilized intensive individualized 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 standardized 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.

II 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.

III Method

1 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.

2 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 Child K, Child J and Child 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 et al., 2000); this is 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 SLT 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, which is 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.

3 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 et al., 2000). These subtests were used to cover a range of receptive and expressive subskills, and obtain a standardized Total Language score, as recommended by the authors (Semel et al., 2000, CELF-3 (UK), Examiners manual, p. 5).
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 standardized assessment, the final two subtests were not re-administered.

The training task was based on the Sentence Assembly subtest of the CELF-3 (UK) (Semel et al., 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; if there was lack of familiarity, these vocabulary items 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 contained many, but not all, of those assessed in the standardized Sentence Assembly subtest of the CELF-3 (UK). Some additional or extended structures were 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 that the examiner could leave out some items for some children if it was considered appropriate, in order 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 Required Mediational Intervention (RMI; Feuerstein et al., 2002) 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: 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 processes, i.e. 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.

4 Analysis

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

a Pre-test–post-test: 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 et al., 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 also served as control measures.

b Responsiveness to mediated intervention: 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 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: 533), which had been amended by the addition of a specific exemplar linking the definition 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.

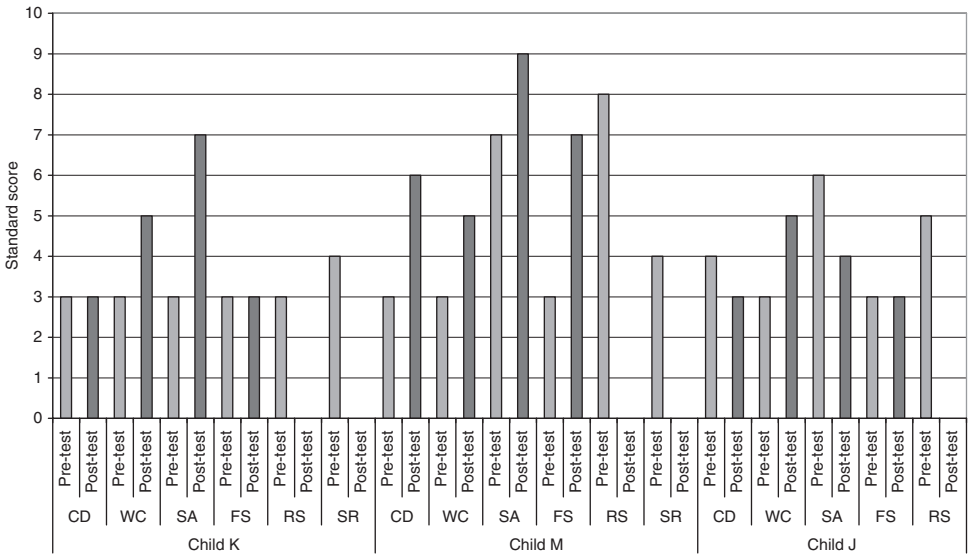

Figure 1 Pre-test and post-test scores for each participant on each subtest of CELF-3 (UK) (Semel et al., 2000)
Notes: CD = Concepts and Directions; WC = Word Classes; SA = Sentence Assembly; FS = Formulated Sentences; RS = Recalling Sentences; SR = Semantic Relationships

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.

c *Behavioural observations*: Behavioural observations related both to the knowledge or learning of linguistic structures, and to general responsiveness to the examiner's mediation.

IV Results

1 Pre-test–post-test scores

Pre-test and post-test scores for each participant on four subtests of CELF-3 (UK) (Semel et al., 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.

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-mediation, and two post-mediation, 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 Child K and Child M improved on all four subtests, although comparison with

Table 1 Pre-test and post-test raw scores for each participant on each subtest of CELF-3 (UK) (Semel et al., 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

standard score data in Figure 1 shows that on two subtests, Child K's improved raw score did not raise his standard score, whilst Child M's scores were substantially raised in all four subtests. Child J, however, performed less well in two subtests.

Comparison by subtests reveals that all three children achieved substantially higher raw scores in Formulated Sentences, and slightly higher scores in Word Classes. These differences were not found to be statistically significant. As Child J scored less well in the post-test in the other two subtests, overall trends are mixed.

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*

a 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 Child M low levels of RMI predominate, with Child M completing 50% of items with little or no prompting, while for Child J, high levels predominate, with Child 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; however, few of these items are in the middle range. This suggests that when Child 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. Space does not permit the elaboration of this information in this article.

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

	Number of items completed (maximum 48)	RMI									
		0	1	2	3	4	5	6	7	8	9
Child K:											
Number of instances	43	3	9	7		3	3		3		15
Percentage of completed items	100	7	21	16		7	7		7		35
Child M:											
Number of instances	46		6	5		3	4		3	2	23
Percentage of completed items	100		13	10		6.5	9		6.5	4	50
Child J:											
Number of instances	37		12	13	1	2	1		1		7
Percentage of completed items	100		32	35	3	5	3		3		19

Some items could not be scored as items were not administered or not completed, i.e. only one sentence was produced, or not achieved, despite mediation. In Child J, seven items were not attempted as Child 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 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 52% for Child M, 67% for Child K and 83% for Child J. Thus it can be seen that for Child 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 Child K and Child J the proportion of intensive facilitation was correspondingly higher, and in very few instances (5 out of 30) was Child J able to make use of previously used or learnt strategies (RMI levels 5–7; see Appendix 3).

b Behavioural observations: General: 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.

c Behavioural observations: Child K: Despite poor performance on static expressive syntax tasks, the dynamic procedure revealed that Child K knew a significant amount of linguistic and metalinguistic vocabulary – e.g. adjective, verb, question, sentence, describe – and was able to identify the role of words in a sentence, e.g. 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, also contained correct grammatical fragments and phrases. Furthermore, his output contained numerous self-corrections and a consistent awareness of grammatical correctness. Child 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.

Child 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 Child 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, Child 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 Child 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. Child 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, e.g. Item 30

K: I start with a word

and Item 37:

K: 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 Child K to produce the two precise and perfect sentences required. Due to his impulsive nature and poor attention, Child 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 that Child 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 subtest. Child 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.

d Behavioural observations: Child M: Child 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 Child 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'. Child 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 Child M signalled only passive agreement with the ideas presented, he used several of them spontaneously in later examples, e.g. 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, e.g.:

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 four subtests on post-test. This would suggest that Child 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, limited insight and explanatory ability. Some evidence of self-awareness was noted as on occasion Child 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.

e *Behavioural observations*: *Child J*: Throughout the three sessions, Child 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. Child 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 Child J's spontaneous language contained numerous errors, e.g.:

J: 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, e.g.:

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 Child 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 Child J was unable to read a word, he was aware, and asked for help, using 'what's 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, e.g. in Item 11 Child 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 Child J's behaviour, and almost all of the mediation was directed towards the content of the items. Child 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. Child 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. Child 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, e.g.:

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.

V 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. In a dynamic study by Peña (2000) attention was similarly identified as a feature differentiating children with low language ability from typically developing children.

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 (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, i.e. 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 SLTs 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, which 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.

VI 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 standardized measure. The inconsistency of responses of some children to formal tests of this nature is a variable that reduces 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, although 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 DA does enable improved outcomes from intervention, and whether SLTs and teachers find the enhanced information of practical value.

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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 co-ordination: 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	*or / but not*	
14		3	*either / or*	
15	Declarative: reversible with conditional conjunction	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 prepositional phrase (sequence) and co-ordinator	4	*at beginning / end*	

Appendix 2 (Continued)

	Syntactic structure	ICWs	Modification	Example
24		6	*first / second*	
25	Declarative with prepositional phrase (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-ordinating conjunction	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* + V part	
45			*should*	
46		3	*shouldn't*	
47		2	*can't*	
48		3	*must*	

Note: ICW = information-carrying words

Appendix 3 Required Mediational Intervention

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 produced without help

Source: Feuerstein et al., 2002

Appendix 4 RMI rating for each participant for each item of training procedure

Item number	Syntactic structure	RMI		
		Child K	Child M	Child J
Session 1:				
1	Declarative with Reversible NP	9	9	9
2		9	9	9
3	Declarative with co-ordination: 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
Session 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 conjunction	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
Session 3:				
21		4	not done	not done
22		0	9	1
23	Declarative with prep phrase (sequence) and co-ordinator	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

(Continued)

Appendix 4 (Continued)

Item number	Syntactic structure	RMI		
		Child K	Child M	Child J
Session 4:				
30		9	9	1
31		9	9	1
32	+ co-ordinating conjunction	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