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# Identifying High Academic Potential in Australian Aboriginal Children Using Dynamic Testing<sup>1</sup>

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## Abstract

The primary purpose of this study was to determine the effectiveness of dynamic testing as a method for identifying high academic potential in Australian Aboriginal children. The 79 participating Aboriginal children were drawn from Years 3–5 in rural schools in northern New South Wales. The dynamic testing method used in this study involved a test–intervention–retest format where the intervention was designed to address predicted causes of underachievement. The dynamic testing method used in the present study proved to be an effective identification tool, revealing high academic potential in similar proportions to those in the instrument normative population. The present study has implications for both gifted education and Aboriginal education generally. These implications arise from the findings of this study that many of the children were ‘invisible’ underachievers and that it is possible to identify this underachievement in the dynamic testing process.

## Introduction

The disproportionately low representation of Aboriginal children in Australian programs for the gifted (Braggett, 1985; Harslett, 1996; Taylor, 1998) suggests that the identification of academic giftedness in Aboriginal children is an issue in need of further investigation. The problem of under-representation of minority groups in programs for the gifted is not confined to Australia. In the USA, prior to 1980, minority groups were under-represented in programs for the gifted by 30% to 70% (Richert, 1985). Although in more recent times educational authorities in the USA appear more aware of the issues regarding appropriate identification strategies, minority students remain significantly under-represented in programs for the gifted (Frasier, 1997; Gallagher & Coleman, 1992). The issue of under-representation of minority groups in programs for the gifted is a challenging one. However, as Frasier (1997) stated:

There is no logical reason to expect that the number of minority students in gifted programs would not be proportional to their representation in the general population. (p. 498)

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The difficulties experienced in identifying academic giftedness in Australian Aboriginal children are not unique. Similar problems have been experienced with children from other cultural minorities and/or low socio-economic status (SES) groups (Borland & Wright, 1994; Braggett, 1985; Ford, 1996) and are the result of a number of interacting factors which include low expectations of academic performance linked to the deficit thinking paradigm and SES. The deficit thinking paradigm suggests that children from particular racial, social or cultural groups may be academically less able than members of the dominant culture, for reasons related to their group membership (Valencia & Solorzano, 1997). The deficit view has been used by some to explain why children from cultural minorities and/or low SES groups often score lower on IQ tests and perform at lower levels in the classroom. Furthermore, these deficit views have been a contributing factor in the establishment of expectations of lower-level test and school performance, resulting in self-fulfilling prophecies (Ford, 1996; Rosenthal & Jacobson, 1968), so that underachievement in the classroom and on tests seems inevitable and the outcome has often been a culture of 'blaming the victim' (Ryan, 1976). The deficit thinking paradigm has been strong with respect to Australian Aboriginal children (McConnochie, 1982).

The methods used to identify academic giftedness are prone to underestimate its presence in culturally different and/or low SES children. The most commonly used methods, IQ tests and teacher-centred processes (Davis & Rimm, 1998), are potentially flawed with respect to children from cultural minorities and/or low SES groups. Such children often score lower than the general population on IQ tests due to socio-emotional issues and inefficient metacognition rather than because their cognitive potential is lower (Tzuriel & Feuerstein, 1992). The ability of teachers to identify gifted students from these groups has been questioned (Braggett, 1985; Pendarvis, 1990), the suggestion being that teachers are likely to identify 'teacher pleasers' as gifted, often overlooking gifted students who display oppositional behaviours or are different in other ways (Davis & Rimm, 1998; Pendarvis, 1990). It is apparent that identifying academically gifted children from cultural minorities and/or low SES groups has been difficult and that a substantial source of the problem is the inadequacy of the methods chosen.

Overcoming the problems in identifying academically gifted children from cultural minorities and/or low SES groups has been hindered by the way three central constructs — giftedness, talent and underachievement — have been defined. Most conceptions of giftedness and talent do not give sufficient emphasis to the gifted underachiever, one exception being Gagné's (1995) differentiated model of giftedness and talent. If gifted underachievers are not meaningfully accounted for in conceptions of giftedness and talent it is highly unlikely that underachievers will be effectively sought. This is especially so for gifted underachievers from minority groups where giftedness is often heavily masked (Ford, 1996). The most commonly used definitions of underachievement require, to establish academic potential, performance on some measure or indicator of potential (Reis & McCoach, 2000), but the most commonly used methods to assess this are IQ tests and teacher nomination, the very assessment forms where minority students have been shown to underperform (Braggett, 1985).

The presence of gifted children in minority groups is acknowledged in every Australian state policy, but advice on suitable identification methods is limited. Underachievement is often mentioned but not defined. That children may underperform both in the classroom and on commonly used measures of aptitude or potential has long been recognised (Butler-Por, 1993; Reis & McCoach, 2000; Whitmore, 1987). However, a review of the literature has revealed the absence of a consistent term for this type of underachievement, which can only lead to lack of recognition in the classroom, with low expectations, deficit views and continued underperformance some of the consequences. The establishment of a consistent definition is a simple and necessary step if gifted children from cultural minority and/or low SES groups are to be included in programs for the gifted in equivalent numbers to the wider community. For the purpose of the study reported here the term 'invisible' underachievers is used and is defined as individuals whose assessed potential is less than their actual potential and who also underperform in the classroom.

Dynamic testing may, partially at least, solve the problem of providing a suitable assessed aptitude for achievement for Indigenous children (Grigorenko & Sternberg, 1998). Dynamic testing may be considered a subset of dynamic assessment which has been defined as:

approaches to the development of decision-specific information that most characteristically involve interaction between the examiner and examinee, focus on learner metacognitive processes and responsiveness to intervention, and follow a pretest-intervention-posttest administrative format. (Lidz, 1997, p. 281)

Dynamic testing is different from dynamic assessment in that it only seeks to determine the learning potential of an individual, rather than to establish long term cognitive change (Grigorenko & Sternberg, 1998). Dynamic testing follows the test-intervention-retest format of classic dynamic assessment but is characterised by a comparatively short intervention which is designed to establish learning potential by showing the extent to which the individual has the ability to benefit from the intervention experience. The intervention is designed to address issues that are perceived to contribute to the underperformance of an individual in the initial pretest, usually some measure of cognitive ability. A posttest given some time after the intervention determines the extent of improvement from the pretest and, thus, provides an indication of learning potential. Consequently, dynamic testing has the potential to identify giftedness in individuals who under-perform on one-off tests of cognitive ability.

The central purpose of this study was to determine the suitability and effectiveness of dynamic testing in identifying high academic potential in Australian Aboriginal children, its principal research question being: Can dynamic testing effectively identify high academic potential in a sample of Australian Aboriginal children?

## Method

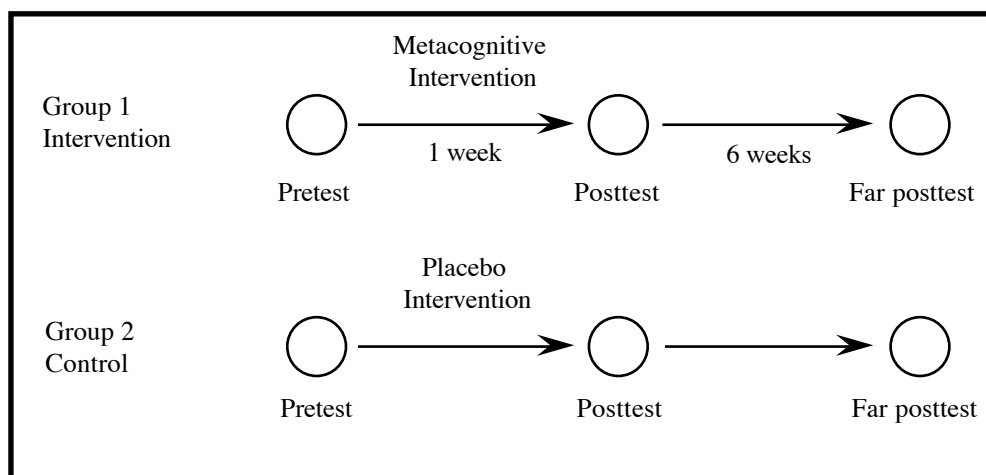
### Subjects

The dynamic testing method was administered to 79 Aboriginal children in Years 3 to 5 (ages 8 to 11) from schools in a rural district of northern New South Wales. The schools varied from small schools to larger ones in regional centres. All Aboriginal children within these grades in the participating schools were invited to take part in the assessment. Local Aboriginal communities were informed about the project and asked to contribute ideas on how to optimise the overall assessment. As a result of this consultation the group size for the intervention component was determined to be not more than four and not fewer than two, parents were given individual advice when requested and a respected Aboriginal adult was involved in each intervention. Acceptance of the research by the Aboriginal communities is reflected in the high participation rate of 90%.

### Experimental design

The experimental design (see Figure 1, below) involved two groups (Intervention and Control) matched on pretest Raven's Standard Progressive Matrices (RSPM) scores. The Intervention Group received a metacognitive intervention designed to probe each child's cognitive potential (Vygotsky, 1974). The RSPM-matched Control Group received a placebo intervention designed only to give the illusion of being the same as the metacognitive intervention. One week after the respective interventions the RSPM was re-administered to both groups, concluding the formal dynamic testing process. However, in order to investigate the persistence of the pretest to posttest gains, a far posttest was administered to both groups six weeks after the posttest.

Intervention and Control groups were used to determine the extent, if any, of practice effects resulting from the multiple application of the RSPM.



**Figure 1. Experimental design used to investigate the principal research question.**

### **The placebo intervention**

A placebo intervention was used with the Control Group to ensure that these children thought they were participating in the research program in exactly the same way as the children in the Intervention Group. Consequently, the placebo intervention was of the same duration, took place in the same room and had a trusted Aboriginal person present. The activities were delivered using an overhead projector, as in the metacognitive intervention. However, the placebo activities consisted of memory games and puzzle completion tasks, neither of which were considered to have any relationship to metacognitive training.

### **The metacognitive intervention**

In order to achieve the maximum from both the test taking effort of the children and the metacognitive intervention embedded in the dynamic testing, it was necessary to address socio-emotional and cultural factors that were perceived as possible inhibitors of these outcomes. These factors were the forced-choice dilemma (Gross, 1989), self-efficacy (Bandura, 1977), expectation issues (Lovaglia, Thompkins, Lucas & Thye, 2000; Rosenthal & Jacobson, 1968; Steele & Aronson, 1995), and cultural differences. It is necessary, therefore, to consider the intervention in two parts, the socio-emotional component giving access to the metacognitive component. If a child has the highest academic potential yet her/his test performance is inhibited by fear, self-doubt or the pressures of low expectation or alienation to education, then a true estimation of the child's academic potential will be difficult to obtain.

### **Strategies employed to overcome the socio-emotional inhibitors to optimal performance**

#### *The forced-choice dilemma*

Involuntary minority peoples, including Australian Aboriginal people, often experience a powerful forced-choice dilemma with respect to education. For academically able Indigenous students the dilemma is clear: should the students 'act white' and risk alienation from their cultural peers or retain peer acceptance and shun academic excellence (Colangelo, 2002; Ogbu, 1994)? In order to minimise any possible forced-choice dilemma the following strategies were adopted:

- 'Ice-breaker' sessions were designed to make the students comfortable with the assessor and with the data collection process. The activities were all designed to meet the children in an environment that they enjoyed.
- The dynamic testing procedures were presented in such a way that the RSPM was perceived as being very different from usual classwork. The nature of the RSPM itself helped in this regard as it requires neither literacy nor numeracy skills to complete. The 'test' nature of the RSPM was de-emphasised and replaced with the idea that it involved puzzles and games. Within this framework, the idea of 'pass' or 'fail', or 'good' or 'bad' performance, disappeared and was replaced with the terms 'having fun', 'doing your best' and 'helping me work out the puzzles'.
- A respected Aboriginal adult was present at every data collection and ice-breaker session. This person was well known to and respected by the children. During data collection and intervention sessions the Aboriginal

person generally assisted the tester and offered appropriate support to the children where required.

### *Self-efficacy*

A child's self-efficacy is of primary importance as it determines how much effort will be expended and how long that effort will be sustained in the face of difficulties. Self-efficacy has been identified as an important component in developing expertise (Sternberg, 2001) and the test performance of involuntary minority students (Lovaglia, Lucas, Houser, Thye & Markovsky, 1998). Bandura (1977) identified personal accomplishments as the most powerful of the factors that positively influence self-efficacy. It was assumed that many of the students in this study were academic underachievers and would be likely to have a low self-efficacy with respect to school tasks. If this were so then these students would be unlikely to engage fully in or persevere with the cognitive tasks presented. With this in mind, all components of the metacognitive intervention were designed to result in successful outcomes for all students. The expected outcome was improved self-efficacy. This was especially so in the first hour of the intervention as the intervention items were graded in difficulty, with the more difficult items presented in the second hour of the two-hour intervention.

### *Expectation*

The literature reviewed with respect to expectation revealed three separate issues that could potentially act as blocks to optimal performance in the dynamic testing. Firstly, the effect of negative teacher expectations (Rosenthal & Jacobson, 1968) was addressed by putting forward low key, but constantly positive views about the students' performance. It was expected that the children would try to the best of their ability and would succeed. There was a fine line here that needed to be addressed by ensuring that trust was established early in the ice-breaking and data collection processes. Secondly, as a non-Indigenous person it is possible that the tester may have triggered a stereotype threat response (Steele & Aronson, 1995) from the children if too demanding of them before trust was established. Lastly, the 'shadow of the future' effect (Lovaglia et al., 2000) was addressed by developing the notion that the dynamic testing process was not a test at all and outcomes would be anonymous, thus reducing fears that might arise if a student did too well. This issue is strongly linked to the forced-choice dilemma.

### *Cultural Factors*

The forced-choice dilemma and expectation issues are linked to Aboriginal culture through the concept of involuntary minority status (Ogbu, 1994). Specific cultural issues that were addressed were as follows:

- Not only did the assessment instrument used in the dynamic testing require no reading or writing skills but also there are no specific cultural knowledge requirements in the RSPM. These factors have resulted in the RSPM being described as a relatively culture-fair test of cognitive ability (Matthews, 1988).
- Although the optimal condition for scaffolding would be one-to-one, the metacognitive intervention (Intervention Group) was done in groups of four in order to minimise the effects of shyness.

- As previously mentioned, all data collection sessions were completed with a respected Aboriginal adult present and positively participating in the process.

Once the socio-emotional and cultural inhibitors to focused participation were addressed, the metacognitive intervention component of the dynamic testing could proceed.

## **The metacognitive intervention**

The dynamic testing metacognitive intervention was based on Vygotsky's (1974) notion that an individual's Zone of Proximal Development (ZPD) can be explored by an intervention that guides the individual's cognitive and metacognitive endeavours to give indications of what cognitive potential may exist (Lidz, 1987). Vygotsky (Reiber & Carton, 1987) stated that "What collaboration contributes to the child's performance is restricted to limits which are determined by the state of development and his (sic) intellectual potential" (p. 209).

### **Guiding principles and strategies employed in the metacognitive intervention**

The metacognitive intervention used in the present study was developed in a number of ways. Firstly, the literature relating to dynamic testing was reviewed and appropriate strategies and methods adapted to meet the needs of the present research. Secondly, the proposed metacognitive intervention was tested and refined in two pilot studies.

Guiding principles were as follows:

1. None of the training items was from the RSPM but analogues only were used (Tzuriel & Feuerstein, 1992).
2. While a standard, and thus reproducible, presentation of intervention material occurred, all efforts were made to ensure that all students understood the demands required to complete successfully the tasks presented (Bandura, 1977; Budoff, 1987).
3. The child was asked to draw the final solutions as a means of moving the elements of the solution into the concrete. In double classified problems Budoff (1987, p. 177) noted that many students were able to derive one attribute at a time but had difficulty holding this first attribute in working memory while the second was derived. His solution was to have the students draw the first attribute before deriving the second attribute of the double classified problem.
4. After each problem was solved one of the children was asked to indicate orally how he or she had arrived at the solution (Carlson & Wiedl, 1979). No child was asked to explain a solution unless the correct answer had been given first. Each child was asked to contribute in turn, so that no individual dominated or missed out. The group size in the intervention was never more than four, so

every child received at least four opportunities to give an explanation. Any child who showed reluctance in this regard was not pushed to explain her/his solution.

5. Excessive speed and impulsive behaviour were discouraged (Budoff, 1987). Curbing impulsivity was achieved primarily by using strategies 3 and 4, above.
6. During the interactive components of the intervention, positive performance-based feedback was constantly given (Bandura, 1977; Craven, Marsh & Debus, 1991).
7. At no time were the students pressured to perform at a given achievement level. The students were simply encouraged to do their best. When difficulties were encountered positive, encouraging help was immediately forthcoming.
8. A mutually respectful environment was established during the course of the ice-breaker sessions. The working environment necessary to produce optimum interaction between the students and the mediator was highly dependent on this mutual respect.
9. The event was kept as enjoyable as possible.

### **Self-efficacy and the metacognitive intervention**

The need to encourage the self-efficacy of the students with respect to the dynamic testing was seen as pivotal to the procedure's ultimate success. Constant success in reaching the correct solutions to the RSPM cognitive analogues was the central strategy for developing and encouraging the students' self-efficacy (Bandura, 1977). The gradual change from easier to harder cognitive tasks in the cognitive analogues and constant scaffolding ensured that all children reached the desired solutions.

Feedback was constantly given to the children to support metacognitive knowledge, metacognitive control and self-efficacy development. Schunk (1991) notes the positive effects of praise for effort (attributional feedback) in developing self-efficacy while Craven et al. (1991) note positive effects of performance and attributional feedback on self-concept. Brophy (1981) suggests twelve strategies for delivering praise. Of these, the following were consistently used during the metacognitive intervention:

- The accomplishment was specifically identified.
- Information was conveyed to the student regarding the particular student competence that led to success.
- It was ensured that the students understood that their achievements were the result of their effort and ability.
- Praise was delivered only when it was deserved and had a clear focus.

### **The intervention items (Cognitive analogues of the RSPM)**

The metacognitive intervention items were selected from the Learning Potential Assessment Device (LPAD) Set Variations I and II and Variations B.8–B.12 (Feuerstein, Rand, & Hoffman, 1979). All items are cognitive analogues of the RSPM.



These items are presented in a similar form to the RSPM in order to establish familiarity with the format while the matrices contained similar cognitive processes to the RSPM but using dissimilar presentations. In all, 24 items were selected for use in the intervention, representing the major cognitive processes used in the RSPM.

### Case studies

Case studies were developed for eight children who were identified as having high academic potential following the dynamic testing. Semi structured interviews were conducted with the child, their teacher and parent(s).

### The instrument

The RSPM is designed to measure Spearman's *g* (de Lemos, 1989) and is considered to be one of its purest measures (Jensen, 1981; Matthews, 1988). In the present study the RSPM was used to measure the children's potential to learn. The RSPM is considered to be a relatively culture-fair instrument (Matthews, 1988) and to be motivating to students (Budoff, 1987).

### Data Analysis

#### Raw scores

The RSPM was given to all students, both Intervention and Control Groups, at the pretest, posttest and far posttest stages of the data collection process, producing a total of 237 sets of RSPM data. The raw score means, standard deviations and the RSPM Australian norms were used to compare the students in this study to the population as a whole in relation to general learning potential.

#### ANOVA

In order to determine the significance of any differences in RSPM performance of the Intervention and Control Groups a repeated measures form of ANOVA was used.

## Results

The data presented as raw scores allow comparisons of gain scores (from pretest to posttest) and changes in the percentile band placement as indicated by the RSPM Australian norms. In order to help determine the merit of the dynamic testing method used in the present study to identify academic giftedness, individual scores of those who reach gifted status (>85th percentile band) are presented (see Tables 1 and 2).

**Table 1. RSPM Pretest, Posttest and Far Posttest Mean Raw Scores and Standard Deviations for Intervention, Control and Total Groups**

Dynamic Testing	Intervention Group		Control Group		Total Group	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Pretest	27.85	8.95	26.2	8.82	27.09	8.87
Posttest	36.24	8.21	29.05	10.24	32.78	9.87
Far Posttest	35.44	7.86	30.0	10.14	32.82	9.38

**Table 2. RSPM Norm Percentile Bands of Intervention, Control and Total Group at Pretest, Posttest and Far Posttest**

Dynamic Testing	Intervention Mean Percentile Band $\bar{X}$	Control Mean Percentile Band $\bar{X}$	Total Group Mean Percentile Band $\bar{X}$
Pretest	29.98	24.63	27.41
Posttest	54.49	32.71	44.01
Far Posttest	50.93	34.61	43.08

**Gifted group**

Any student who scored at or above the 85th percentile band in any of the three administrations of the RSPM has been included in the 'Gifted Group'. As most categorisations of giftedness centre around percentile band rankings on standard tests (Gagné, 1998), it is useful to present the raw scores and percentile bands for this group at pretest, posttest and far posttest. These results are presented in Table 3.

**Table 3. RSPM Raw Scores and Percentile Bands for the Total Gifted Group at Pretest, Posttest and Far Posttest**

Case	RSPM Pretest Raw Score	RSPM Norm Percentile Band	RSPM Posttest Raw Score	RSPM Norm Percentile Band	RSPM Far Posttest Raw Score	RSPM Norm Percentile Band
s02*	23	26	45	96	43	91
s13*	21	18	44	91	36	58
s14*	26	26	43	88	36	58
s26*	35	58	43	91	45	96
s27*	43	88	39	73	41	81
s29	35	37	47	93	46	90
s45*	35	58	39	75	42	88
s48*	36	42	43	80	44	85
s49	38	71	41	85	45	94
s52*	45	86	50	97	47	93
s57	48	85	42	54	46	77
s62*	36	42	42	75	46	91
s67*	41	81	45	93	43	88
s69	40	63	41	69	44	85
s72*	35	41	42	72	45	86
Mean	35.80	54.80%ile	43.07	82.13%ile	43.27	84.07%ile

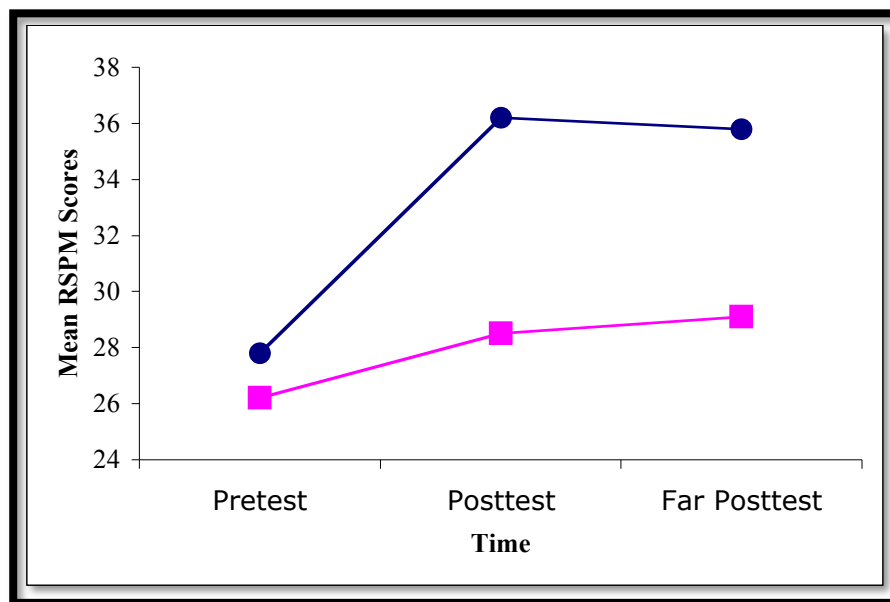
\* Intervention students

### Comparing the dynamic testing performance of control and intervention groups

In order to determine the significance of any differences in the dynamic testing performance between the Control and Intervention Groups the RSPM data were examined using the repeated measures form of ANOVA, the summary is presented in Table 4.

**Table 4. ANOVA Summary**

Source	Procedure	Sum of Squares	df	Mean Square	F Ratio	P Value
TIME	Sphericity Assumed	1664.49	2	832.24	54.31	0.001
	Greenhouse-Geisser	1664.49	1.71	972.16	54.31	0.001
	Huynh-Feldt	1664.49	1.77	940.38	54.31	0.001
	Lower-bound	1664.49	1	1664.49	54.31	0.001
TIME * GROUP	Sphericity Assumed	323.76	2	161.88	10.56	0.001
	Greenhouse-Geisser	323.76	1.71	189.10	10.56	0.001
	Huynh-Feldt	323.76	1.77	182.92	10.56	0.001
	Lower-bound	323.76	1	323.76	10.56	0.002
Error(TIME)	Sphericity Assumed	2359.91	154	15.32		
	Greenhouse-Geisser	2359.91	132	17.90		
	Huynh-Feldt	2359.91	136	17.32		
	Lower-bound	2359.91	77	30.65		



□ = Control Group

○ = Intervention Group

**Figure 2. RSPM mean scores at pretest, posttest and far posttest for Control and Intervention Groups.**

It is evident from Table 4 that the interaction effect of interest — Factor 1\*Group — is significant ( $F=10.56$ ,  $df=2$ ,  $p<.001$ ). The plot of RSPM means in both Intervention and Control Groups on pretest, posttest and far posttest is given in Figure 2, above. A subsequent, protected comparison of means revealed that:

- there was no significant ( $p=.05$ ) difference between the groups at pretest ( $F=0.632$ ;  $df=1$ ;  $p=.429$ );
- there was a significant ( $p=.05$ ) difference between the groups on posttest ( $F=11.95$ ;  $df=1,77$ ;  $p=.001$ );
- there was a significant ( $p=.05$ ) difference between the groups on the far posttest ( $F=7.158$ ;  $df=1,77$ ;  $p=.009$ ).

## Discussion

The dynamic testing procedure resulted in significant improvements in performance in the cognitive variable as measured by the RSPM. A significance level of  $p<.05$  for the differences between pretest and posttest scores was sought, whereas a significance level of  $p<.001$  resulted from analysis using the repeated measures form of ANOVA. This finding strongly supports the hypothesis that dynamic testing would successfully improve the Intervention Group's performance in the cognitive variable as measured by the RSPM.

The significant changes from pretest to posttest were associated with using two approaches aimed at addressing 'deficient learning habits, and motivational patterns that are responsible for the poor performance' (Tzuriel & Feuerstein, 1992, pp. 187–188). Firstly, an overarching socio-emotional strategy was employed with the Total Group (Control and Intervention) to help counter perceived inhibitors to test performance and motivation. The second, and major strategy, used with the Intervention Group was the metacognitive intervention aimed at addressing deficit learning habits. The metacognitive intervention was the independent variable in this study. The significant difference ( $p<.001$ ) between the mean posttest scores of the Intervention and Control Groups strongly supports the notion that the score change was the result of the independent variable alone as both groups were immersed in the socio-emotional intervention.

The claim that the Intervention Group RSPM pretest to posttest score gain is largely the result of the metacognitive intervention supports the theoretical foundations of dynamic testing, that is, the interlocked concepts of the Zone of Proximal Development (Vygotsky, 1974) and Cognitive Modifiability (Tzuriel & Feuerstein, 1992). The significant increase in scores following intervention offered strong support for the conclusion that the participating children were performing below their potential at pretest. That is, they were underachieving and their Zone of Proximal Development contained a substantial number of immature cognitive functions. The cognitive modifiability of the Intervention Group is supported by the posttest and far posttest outcomes. The one-week period between intervention and posttest chosen for the present study may not have been long enough to sustain a claim that the cognitive changes, as indicated by actual RSPM performance, were more-or-less stable (Tzuriel & Feuerstein, 1992). However, the mean gains made at

posttest (8.4 raw score points) were largely maintained at the far posttest (7.6 raw score points) six weeks later and this does indicate relative stability and integrity of the cognitive changes made. The six-week time frame ensured that the cognitive changes were not affected by experimental artefacts immediately after the intervention or by spontaneous temporal changes (Tzuriel & Feuerstein, 1992).

### **Dynamic testing outcomes reveal underachievement on the RSPM pretest**

In the present study the mean pretest score on the RSPM for the Total Group was 27.09 raw score points, which represented a mean 27.41 percentile band on the instrument norms. The well below average RSPM pretest score for the study group suggested substantial underachievement when compared with the norm population. That the low pretest score represented a substantial underachievement by the study children was supported by the significant improvements of the Intervention Group following intervention. These data supported the notion that one-off applications of relatively culture-fair tests such as the RSPM do not produce a true indication of the academic potential of children from culturally different and/or low SES populations. Underachievement on relatively culture-fair tests has been linked to sociocultural factors (Skuy, Kaniel & Tzuriel, 2001), 'cognitive impairments, deficient learning habits and motivational patterns' (Tzuriel & Feuerstein, 1992, p. 185) and socio-emotional factors such as expectation, status, and self-efficacy (Lovaglia et al., 1998). It can be concluded that any one-off RSPM assessment of Aboriginal children should be treated in such a way as to recognise high scores only, because low or even average scores are likely to represent a degree of underachievement.

Following the metacognitive intervention the mean RSPM raw scores for the Intervention Group increased from 27.85 to 36.24, a gain of 8.39 raw score points. In terms of the RSPM instrument norms the Intervention Group moved from the mean 29.98 percentile band at pretest to the 54.49 percentile band at posttest. The stability of the score increase from pretest to posttest was established when the far posttest group mean percentile band remained at 50.93 after a six-week period. The total Intervention Group score changes on the RSPM from pretest to posttest indicate that the pretest scores of the study children represent a substantial underachievement. This suggests that dynamic testing may be a better way of using the RSPM to determine academic potential than a one-off application for the participating children. However, the identification of giftedness is essentially an individual process.

### **Individual dynamic testing outcomes**

#### *Interpreting individual dynamic testing outcomes*

At the individual level a descriptive approach, using percentile bands and raw score changes, was necessary in order to make dynamic testing score changes easier to understand and consequently to facilitate their use in the field. In order to achieve this outcome the RSPM dynamic testing data were discussed in two ways. Firstly, the raw score changes were used in a purely descriptive way to demonstrate the general magnitude of changes observed. Secondly, the percentile bands that the different test scores represented when compared with the norm population were used to enhance further the descriptive power of the dynamic testing outcomes. Further, since raw scores change with the age cohorts, percentile bands can give a view of test performance that is consistent across age groups. It is fully recognised that the

posttest and far posttest percentile bands should not be interpreted in a strictly psychometric sense, as on these testing occasions intervention strategies were employed that were not used when the instrument norm samples were collected. This, however, did not apply to the pretest as these data were collected in strict accordance with the RSPM manual. Percentile bands at posttest and far posttest can provide an indication of potential that was brought to life by a comparison to the norm population. For example, student s13 recorded a pretest score of 21 raw score points and improved to 44 raw score points at posttest, clearly a large improvement. In terms of percentile bands this meant a shift from the 18th to the 91st bands, which highlights the dramatic nature of that change.

The use of the RSPM norms to make descriptive comparisons with the dynamic testing outcomes was limited by one major factor. If the norm population used for the RSPM was given the benefit of a similar metacognitive intervention used in the present study it is highly likely that some upward shift in test performance would result due to the undoubted presence of some underachievers in the norm population. However, in a review of research related to coaching and testing, Lidz (1987) noted that while test scores did improve they were relatively minor for populations with superior educational opportunities, a view supported by Anastasi (1988). This notion is supported by the relatively small gain scores on the RSPM dynamic testing reported by Tzuriel and Feuerstein (1992) when the study population consisted of a mix of disadvantaged and regular schools. Consequently, when making descriptive comparisons of the dynamic testing outcomes with the RSPM norms it should be considered that the dynamic testing outcomes may be slightly elevated relative to the RSPM norms. Despite this complication, descriptive comparisons of the dynamic testing outcomes of the students in the present study with the normative population gave a much better indication of the children's academic potential than the one-off first application of the RSPM.

#### *Individual dynamic testing*

The dynamic testing scores at both pretest and posttest can be used for the identification of giftedness. The pretest scores can be used in the same way as one-off standardised tests with a score benchmark applied to determine gifted status. In the present study three of the 79 study children scored at or above the 85th percentile band at pretest and could be considered as gifted applying Gagné's (1995) broad conception of giftedness and talent. However, the three children identified as gifted by the pretest represented only 3.8% of the study children and this would inevitably lead to an under-representation of Aboriginal children in nominations of giftedness. Individual posttest scores in the dynamic testing process may better reflect the academic potential of an individual student than the pretest scores. Students who have the potential to benefit from the socio-emotional strategies and metacognitive intervention are most likely to show the greatest gains at posttest. That is, if pretest scores are negatively affected by socio-emotional inhibitors, low self-efficacy and inefficient metacognition it is highly likely that successful intervention at each of these levels will lead to improved posttest scores. The greater the initial underachievement the greater the potential gain at posttest. If a child is not negatively affected by performance inhibiting factors little gain can be expected following intervention as the child is likely to score close to potential at pretest.

It is highly unlikely that in the present study all Intervention Group students performed to their potential at posttest despite the strategies employed, as this would mean that all students were successfully and fully reached during intervention. However, the posttest scores of a number of individuals are most relevant for support for the use of dynamic testing as a tool in the identification of high academic potential in Aboriginal children.

The RSPM results of the study children who scored at or above the 85th percentile band on any of the three test occasions are presented in Table 3. Fifteen of the 79 study children scored at or above the 85th percentile band on at least one testing occasion. Of the 15 children identified as gifted 11 were from the Intervention Group. The test occasion that identified the child is shown below, in Table 5.

**Table 5. RSPM Test Occasion on which the Child was Identified as Gifted**

Student	Intervention Group			Control Group		
	Pretest	Posttest	Far Posttest	Pretest	Posttest	Far Posttest
S02 *		X	X			
S13 *		X				
S14 *		X				
S26 *		X				
S27 *	X					
S29					X	X
S45 *			X			
S48 *			X			
S49					X	X
S52 *	X	X	X			
S57				X		
S62 *			X		X	
S67 *		X	X			
S69						X
S72 *			X			

\* Intervention students

Two (4.9%) of the 41 Intervention Group children were identified as gifted by the pretest, with a further five identified at the posttest following the metacognitive intervention. These seven students (17.1% of the Intervention Group), identified as gifted as a result of the dynamic testing test-intervention-retest protocol, showed a mean raw score gain of 10.71, substantially higher than the total Intervention Group mean raw score gain of 8.39. This represents a mean shift from the 54.71 percentile band to the 89.96 percentile band. These data suggest that the intervention children identified as gifted following intervention were underachieving to a greater extent

than the already underachieving total Intervention Group. Furthermore, the 17.1% of the Intervention Group who reached the gifted 85th percentile band benchmark following the dynamic testing was very close to the 15% expected from the norm population.

Four children from the Intervention Group scored in the gifted range only in the far posttest. These students gained, on average, 6.0 raw score points from pretest to posttest but gained a further 2.75 raw score points from posttest to far posttest, these latter gains moving them into the gifted range. It is reasonable to assume that the additional gains made by these children at far posttest were not just practice effects but also due to the result of the continuing impact of the socio-emotional strategies. This notion is supported by fact that two (s49 and s69) of the four children from the Control Group and one (s26) of the Intervention Group children who reached the gifted benchmark improved substantially from posttest to far posttest. In total, seven of the fifteen study children who reached the gifted 85th percentile band benchmark improved from posttest to far posttest.

Individual gain scores from pretest to posttest can be used to give an indication of the level of underachievement of a child. The individual score changes from pretest to posttest that occurred in the Intervention Group during the dynamic testing process were extremely variable, raw score changes ranging from plus 31 to minus 6. It is important to note that many of the study children improved little while others improved dramatically, suggesting variable levels of underachievement, while others regressed. For example, student s40 (Intervention) scored in the 61st percentile band on all three testing occasions and was described by her teacher as a conscientious student who seemed to be working to her potential. Further, this child has parents who are keenly involved in education and are strongly supportive of her educational efforts. In contrast student s43 (Intervention) moved from the 2nd percentile band to the 80th percentile band at the posttest. The large posttest gain was probably the result of her noted impulsive answering habits which were remediated in the intervention. Twelve of the study students regressed in the posttest, suggesting that some students were not reached by the metacognitive and socio-emotional strategies or were negatively affected. Only three of the regressed posttest scores came from the Intervention Group and it is likely that the metacognitive intervention was effective in reducing the number of score regressions in the Intervention Group.

## **Conclusion**

The research presented in this paper has shown that the dynamic testing method used was effective in identifying high academic potential in an encouraging proportion of the study children. Furthermore, as most of these children were previously unidentified as having high academic potential, many were also newly revealed as underachievers. Hence, dynamic testing holds the hope of positively influencing Aboriginal education by better identifying academic potential in Aboriginal children and by improving the school performance expectations of teachers, the children themselves and members of the Aboriginal communities. Nevertheless, with this optimism a warning must be given: dynamic testing must be conducted with trained personnel as misuse carries the risk of invalid outcomes, a



result that can only serve to reinforce deficit views. Social-emotional and cultural considerations must be fully understood and sensitively implemented, as must the technical aspects of the intervention process.

The underachievement on the RSPM pretest by the children in this study supports the finding by Lidz and Macrine (2001), Lovaglia et al. (1998), Skuy et al. (1988), Skuy et al. (2001) and Tzuriel and Feuerstein (1992) that even relatively culture fair nonverbal standardised tests may not reveal the true academic potential of culturally different and low SES children. Indeed, their 'invisible' underachievement on such tests continues to reinforce deficit views and culturally stereotypes. On the other hand, the success in this study of dynamic testing in revealing some of this hidden potential offers the hope of a more realistic, constructive and equitable approach to the challenge of identifying giftedness in all sectors of our society.

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