1

Introducing Dynamic Assessment and Intelligence

Introduction

This book is written for advanced students of assessment and assumes an already existing postgraduate knowledge base in the domains of assessment, intelligence and measurement, as well as a working familiarity with dynamic assessment. Readers who are not well versed in these areas may find some sections challenging. A comprehensive reference list will guide the reader to both less and more advanced texts. This book is about the relationship that dynamic assessment has with intelligence and measurement. All three areas are assessed simultaneously. This is not a book about dynamic assessment only or about intelligence only, nor is it a book solely about measurement theory. It is a treatise which seeks to pave a way for the ‘movement’ of dynamic assessment in order to allow for gradual development of this unique approach to assessment of potential while remaining firmly embedded within a scientific approach to the study of psychology. You will find information on dynamic assessment, intelligence and measurement theory, but these sections will always be informed by concerns of the necessary intertwine-ment of all three areas.

The arguments put forward seek to enlighten the future development of dynamic assessment as a novel approach in the world of psycho-educational assessment. There is much that can be said about dynamic assessment and its lack of momentum in an increasingly objective scientific world, but were it not for its intuitive appeal and laudable investment in people, no such treatise would have been considered. A cautionary note needs to be added: dynamic assessment, intelligence and measurement are not concepts that can be considered interchangeable in terms of being at the same conceptual level. They are areas of concern which work together and not in isolation. They are not competitive areas within psychology. Dynamic assessment is an approach to understanding and conceiving an individual in the assessment process. Intelligence is a field dealing with matters concerning various descriptors of what is considered intelligent and measurement theory offers tools for dynamic assessors and intelligence researchers. It so happens that dynamic assessors will need to assess for intelligence, but this is not the sole concern of the approach. Historically, assessing for intelligence has usually meant that a mode of static assessment as a tool has been deployed. Dynamic assessment is a tool as well as an approach and is process-based. Measurement theory assists dynamic assessment theory in terms of allowing the fluid concept of potential to be measured as one would normally expect a static-based concept such as intelligence to be measured.

Chapter Guide

This chapter introduces the idea behind assessment administered in a dynamic manner and how this
approach differs from mainstream assessment. It surveys the fundamentals of this approach in psychological assessment and presents an historical perspective on its development throughout the twentieth century. The reader will also find an overview of the field of intelligence. Thanks to the plethora of many exceptional books on intelligence, this chapter does not seek to be comprehensive in its coverage but, unlike other intelligence texts, integrates the ideas of dynamic assessment with core issues within the domain of intelligence.

**Contextualization**

Dynamic assessment is a manner of assessing individuals in a fluid, process-oriented and flexible way and has much to offer the field of intellectual assessment due to its unique stance on measurement. The origins of dynamic assessment are in areas of research in which practitioners were originally given mandates to assess prospective learners within specific cultural contexts. Concepts, ideals and notions associated with this type of assessment were often translated into quantifiable measurements in order to satisfy the reigning paradigm of testing. More often than not, dynamic assessment ideals did not filter through to later versions and modifications of tests, and the goal of many early intelligence tests was to categorize individuals based on their performance within the testing situation. Partly owing to industrialization and expansion, testing groups of individuals was deemed more expedient than individual assessment, thus allowing more people to be tested within a shorter timespan.

Unfair discrimination and the biased use of many intelligence tests gradually led to dissatisfaction with these static and product-bound instruments and, in an attempt to find a suitable form of assessment, dynamic assessment has offered partial solutions to the problem-riddled field of intelligence assessment. The origins of dynamic assessment are widespread geographically, disparate in terms of initial reasons for its use and culturally diverse in the contexts within which it works. How have the origin and development of dynamic assessment compared to mainstream intelligence research in terms of theoretical contribution, practical enhancement of current tests, reduction of bias and generalizability? Does dynamic assessment lack a coherent and sound theoretical base? As with most theories in the realm of science as it is practised in the social and natural milieus, tenuous foundations and fuzzy concepts hamper the progress of ideas and theories. What are the theory and framework behind dynamic assessment? Ironically, one aspect of dynamic assessment research for which consensus has been reached is that there is as yet no single framework in which this form of assessment can be adequately placed.

Diverse as the field of dynamic assessment may appear at first glance, it may be possible to link various trends and researchers within this field by investigating the historical influences, basic premises on which theories are based and contemporaneous personalities within intelligence assessment. In attempting to link, compare and integrate these various trends a profounder understanding of what dynamic assessment is, how it evolved and the nature of its future course can be sought. Seeking coherence and consistency in a field as disparate as dynamic assessment may well prove fruitful in its future endeavours in the intelligence arena and its subsequent acceptance within larger academic circles in psychology. In order to advance within the field of dynamic assessment basic issues have to be readdressed. The very notion of what it means to measure is confounded by institutionalized acceptance of what is considered measurable and what is not. Of course, it is not only dynamic assessment that labours against these notions, but also traditionally accepted forms of assessment which, without critical thought for the philosophy of measurement, have taken ever greater strides in theory and model development without first addressing basic issues. If fundamental and core issues can be addressed, then perhaps a sounder foothold can be established in which all forms of assessment can take root, in particular, dynamic assessment. This book attempts to disentangle current preoccupations with certain issues in the field and to objectify, explore and understand more fully why it is that this field is experiencing problems of greater acceptance within the broader assessment profession.

The author has leaned very heavily on the concepts, ideas and models used by a Danish researcher, K. B. Madsen, who has been influenced by a host of Scandinavian researchers and who, among others, co-founded the fundamentals of a theoretically attuned psychology (Baker, Hyland, Van Rappard & Staats, 1985). He was most notably influenced by Sigmund Koch who pioneered comparative studies of scientific theories within psychology (Koch, 1959; Madsen, 1987a). It seems almost fitting that the foundations on which this book rests emanate from geographically and philosophically disparate areas, much akin to the very
disparities which make up the history and progress of dynamic assessment. Mainstream psychological theory and practice offers much by way of origins and development, but it is noteworthy that Western ways of practiseing what is considered a psychology has helped fuel the coalescence of non-Western practices. Much in the same vein as Joseph Royce (1973; 1987), perhaps it is more felicitous to build ‘mini-theories’ or micro-theories (Brand, 1998), which represents a tentative start to a longer process. Madsen’s methodology and choice of locating theory within the grander culmination of multitudinous strata offer a guide to systematizing the outpouring of data and methods.

**History of Dynamic Assessment**

*Lev Vygotsky*

The history of dynamic assessment has disparate origins depending on how it is viewed, but can be said to have a long past and short history (Haywood & Tzuriel, 1992; Lidz & Elliott, 2000b; Wiedl, 2002). Some laud Vygotsky as the founding father due to his unique concept of the zone of proximal development (ZPD) within socio-cultural theory (Elliott, 2003; Hamers, Hessels & Pennings, 1996; Hegarty, 1988), which states that cognitive performance, when aid is provided, will result in the best measure of ability (Hamers & Sijtsma, 1993; Meijer, 1993; Shamir & Tzuriel, 2002), thus leading to the learning test (Guthke, 1982). Reality as such is never met face to face, but is engaged with via tools of mediation (Netchine-Grynberg, 1995). Depending on the level of support a child receives on a task, different outcomes can be expected; performance at the functional level is expected with minimal or no support as opposed to optimal performance with support (Suizzo, 2000) and clearly distinguishes between ‘performance’ and ‘competence’ (Gelman, 2000). His approach was later expanded by other Soviet educationalists and formulated more extensively regarding its educational implications (Haenen, 2000).

*Alfred Binet*

Others view Alfred Binet as the originator due to his notion of investigating ability during a test and his idea of a continuously developing latent trait. Binet understood correct responses as indicative of ability, whereas Jean Piaget was interested in errors. This was a novel notion at the time but is routinely accepted within current dynamic assessment today; however, Piaget was not really concerned with remediation (Anastasi, 1998; Chalmers & McGonigle, 2000; Lidz & Thomas, 1987; Sternberg, 1997a; Styles, 1999; Ukrainetz, Harpell, Walsh & Coyle, 2000). He also offered interesting ideas on remediation but due to its generality the idea receded into the background (Brown, Campione, Webber & McGilly, 1993).

*Reuven Feuerstein*

Others stake a claim for Reuven Feuerstein as the founding figure (Feuerstein is sometimes also credited with Vygotsky as equal co-contributors to the field) (Haywood & Tzuriel, 1992). Feuerstein also emphasized what individuals did incorrectly in an attempt to come to a better understanding of their functioning and did so within a mediated learning experiential environment (Büchel & Scharnhorst, 1993; Shamir & Tzuriel, 2002). Feuerstein may be cited as the founding figure due to the development of his test battery within this domain (Skuy, 1989) and his published and widely recognized work on the subject (Lidz, 1992b). It is due largely to Feuerstein and his followers that dynamic assessment has flourished, especially its gradual development in the West (Sternberg & Grigorenko, 2002). His emphasis on a bio-ecological model of human functioning emphasizes distal and proximal factors and thus takes cognizance of indirectly impinging variables, such as genetic heritage and early childhood experiences as well as cultural and socio-economic factors in the developing child.

*Ceci’s Bio-Ecological Model*

The above models are in line with developmental theories of intelligence such as evidenced by Ceci’s bio-ecological theory (Ceci & Bruck, 1994; Ceci, Rosenblum, De Bruyn & Lee, 1997; Lohman, 2005; Miller, 1997). Some of the early literature dating from the 1920s and regarding educability and pedagogy in general is quite prescient in its treatment of measuring the learning process (Brown, Campione, Webber & McGilly, 1993). Although not making up the majority of the work, a fair section of the material is pleasingly modern in its outlook, which leads one to wonder why some ideas have taken so long to gain a stronghold within mainstream pedagogy, education and assessment. DeWeerdt (1927), for instance, begins her article with a statement
echoing sentiments similar to the ones heard today: ‘the whole scheme of formal education is based upon the fundamental concept of improvability’ (p. 547; emphasis added), and goes on to state: ‘the educator has always been interested in this capacity of the individual and has measured it in a more or less direct way through class achievement … we have relatively little material on the learning or improvability of children under classroom conditions’ (p. 547; emphasis added). Socio-economic factors as well as cultural mediatory factors and their influences are felt as early as the third grade in school (Portes & Vadeboncoeur, 2003).

It would make sense to intervene as early as possible even if only from a neuronal development point of view as synapses in the frontal and occipital cortex areas, for instance, undergo growth until the age of 20 (Neville, 1994). This is in addition to the fact that remediation in general becomes successively more difficult as age increases (Humphreys, 1988), though it is not necessarily impossible. Intellec
tive factors are only a part of the spectrum of aspects influencing development, and mediated learning experience places cognitive, emotional and cultural dimensions on a par with intellec
tive factors in the model (Skuy, 2002). Bio-ecological theory supports this as it has been shown that environmental influence has differential effectual outcomes on heritability ($h$), where $h$ represents populations and not individuals (Ceci & Bruck, 1994; Conway, 2005; Gordon & Lemons, 1997), in particular the degree of phenotypical (observed) differences within a population – that is, results from genetic differences within the population (Grigorenko, 2004). ‘Heritability is the ratio of genetic variation to total variation in an attribute within a population’ (Sternberg, Grigorenko & Kidd, 2005, p. 53; emphasis in original) and explains percentage variation accounted for, not the construct attested to. Feuerstein’s emphasis on the modifiability of cognitive processes can be traced back to the time he was studying under Piaget, whose models of child cognition are synonymous with the developmental tradition, but he later left Piaget to study under André Rey (Burgess, 2000).

Various Strands of Origin

Together with mediated learning experience in which the environmental challenges are filtered and attenuated for the child and which also outweigh the distal factors in the strength of its influence, the governing model of human development is all-encompassing and indeed very modern for the time in which it was being proffered as a viable alternative to mainstream testing (Kozulin, 2002a). Vygotsky’s socio-cultural approach and Feuerstein’s mediated learning approach both reject the dichotomous appraisal of cognition as a naturally occurring phenomenon and learning or instruction as a cultural tool. Vygotsky viewed learning, culture and development as inseparable (Mastergeorge, 2001) as any instructional interaction reflects a social interaction (Perret-Clermont & Bell, 1987). Human beings, unlike other species, interact with intentional agents, engage in cultural learning from as early as nine months and acquire the linguistic and other symbols necessary for communication within their cultural grouping (Tomasetto, 2001). Culture and development integrate seamlessly within the learning and processing situation (Kozulin, 2002b). However, Miller (1997) warns that although cultural aspects of psychometric intelligence often result in revisiting specific theories of intelligence, it is not always the case that the nature of intelligence itself is revisited. Cognition is framed within culture as ‘cultural ontogeny affects biology in a very direct way’ (Feuerstein, Feuerstein, Falik & Rand, 2002, p. 73), although cogent arguments are made for other sides to the debate of where and how intelligence arises. Culture cannot account for measurable variables and so there is no way of tracing their effects within a causal model (Hunt, 1997).

There are many other individual researchers as well as research groups who can claim to have developed a unique method of dynamic assessment (Guthke, 1993b; Hamers & Resing, 1993; Laughon, 1990; Lidz, 1981, 2003; Resing, 1993), but most of these schools have their origin in one or more of those mentioned, while some groups prefer to blend contributions from various originators to fit their needs (Shamir & Tzuriel, 2002). The literature is often divided on the history of dynamic assessment with some statements asserting that it is relatively new and others stressing its venerable heritage and longevity (Hamers, Hessels & Tissink, 1995). What is most likely being hinted at is that, philosophically, the method can be traced back to the early nineteenth century while acknowledging the early Greeks’ writings on potential. The method is simultaneously young in terms of its being generally known and widely practised and not well known even today (Freeman & Miller, 2001; Haywood & Tzuriel, 1992).

Early Progenitors

Many schools of thought since the days of Binet, Vygotsky and Feuerstein have developed within a
framework that can be considered ‘neo-’ – neo-Piagetian, neo-Vygotskian, and so on. However, a number of isolated researchers had, in the early decades of the twentieth century, already experimented with the concept of a malleable intelligence (Lidz, 1992a), including Otto Selz (1935, in Klauer, 2002); G. R. Ortar (1959), E. Haeussermann (1958) considered the mother of dynamic assessment (Lidz & Elliott, 2000b), H. Schucman (1960, in Lidz, 2001), with South Africa reporting the results of a dynamic type of assessment as early as 1961 (Lloyd & Pidgeon, 1961). A pupil of Wundt, Meumann (1922), the psychometrician Kern (1930) and DeWeerdt (1927) are others in the early decades of the twentieth century to whom the idea of a learning test concept can be traced (Guthke, 1992; Guthke, Beckmann & Dobat, 1997). European pioneers within this tradition trace the origins to the works of, among others, the Belgian researcher Quetelet (1835) and his contemporary Esquirol (1838), a French psychiatrist, who argued for a differentiation to be made between performance and prognoses. Binet and Simon (1908), Stern (1928), a German psychologist who studied the relation between environmental influences and intellectual abilities, Vygotsky (along with his students Luria and Leontiev, who modified his theory of ZPD) (Hamers, Hessels & Pennings, 1996), Kern (1930), who was concerned with improving intellectual performance via training and using trainability as a diagnostic indicator of aptitude, Selz (1935), who concentrated on modifiability of intelligence, Piaget, Rey (Feuerstein’s mentor), who researched mental plasticity, and Volle (1957), who pioneered the testing-the-limits approach outside the domain of Rorschach testing where it had previously been utilized and concluded that the manner in which testing was conducted influenced the outcome, especially in low-performing individuals. Boesch (1952, 1964), was infl uenced by Piaget and concentrated on patterns and variations of results rather than considering only correct responses on a test. Hurtig (1962), a French psychologist who made strides in differentiating children who had suffered environmental backlogs and those who were truly retarded, and Schmidt, (1969, 1971), who drew heavily on the work of Boesch and utilized his theory but further refined the testing-the-limits approach integrating empirical and theoretical data (in Wiedl, Guthke & Wingenfeld, 1995). Continental European contributions to the historical development of dynamic assessment, on the surface, do seem to have a richer history as opposed to development in the United States and the United Kingdom, which may partly explain why dynamic assessment has been more eagerly followed and accepted there. This may explain the greater resistance to this method from mainstream assessors currently more at ease with standard intelligence tests.

Through the Twentieth Century

Research in the early 1920s and 1930s emphasized the ability to learn as paramount and was considered, at times, more informative than the static measures hitherto used (Lidz, 1987). It was during the 1930s–1950s that the neuropsychologist André Rey formulated tests which were utilized by his student Feuerstein in the 1950s, but these decades were periods of relative quiet in the field of dynamic assessment, mostly due to a variety of social, political and scientifi c reasons (Kozulin & Garb, 2002; Pascual-Leone, Johnson, Baskind, Dworsky & Severtson, 2000). The 1940s evidenced the insight garnered to detail the relation between intellectual achievement and intellectual potential, noting the lack of co-variation between the two measures (Lidz, 1987). Practice effects had been studied in the 1920s, but coaching studies came into their own in the 1950s. Original attempts to document the effects of coaching on performance were mainly conducted in the United Kingdom, although the emphasis was not on the improvement of capacity as such (Lidz, 1987).

Process-oriented means of assessing intelligence as well as emphasis on testing the limits to which individuals could aspire were also characteristic of the 1950s and this process nature of intelligence assessment is sometimes considered quite modern in approach where there is a turn towards assessing what individuals can and cannot do within their own limits (Baltes, 1998). Sporadic attempts at assessing educability took centre stage during the 1960s and, interestingly, it was A. R. Jensen who very early on stated his views concerning the biased nature of mainstream intellectual assessment batteries, deferring to more dynamic alternatives for various minority groups (Lidz, 1987). It should be noted that eco-cultural factors also need to be factored into the readiness to limit bias even within similar cultural settings (Church & Katigbak, 1987). Learning potential measures in the United States were also becoming increasingly evident during this decade (Budoff, 1987a) largely due to increasing dissatisfaction with psychometric testing (Kozulin, 2005).

The 1970s witnessed an explosion of sorts in comparison to the previous decades and saw the deployment of dynamic assessment methods of mental abilities (Carlson, 1994). This decade bore witness to
the filtering in of cognitive science principles into the
arena of intelligence – hence the hybridized field one
sees today (Das, Naglieri & Kirby, 1994). During this
phase, various research groups came into prominence
under the umbrella term ‘dynamic assessment’. Howev-er, their various points of emphases partly explain
why this manner of assessment is so varied in
its definitions and practical implementations. Included
among others are the works of Feuerstein who prepared
the groundwork decades earlier, as well as Budoff,
Campione, Brown and finally Haywood, who was
instrumental in bringing the work of Feuerstein to the
United States (Lidz, 1987). Carlson and Wiedl had
started their work on the testing-the-limits approach in
the 1970s and on into the 1980s and provided evidence
for the validity of dynamic assessment as an alternative
approach, working specifically within the information-
processing paradigm (Lidz, 1987).

The 1990s and first decade of the twenty-first century
can be characterized by a more sedate and sceptical
attitude to this approach but simultaneously the
approach was only starting to take off in countries like
South Africa (Murphy, 2002; Murphy & Maree, 2006).
It was also expanding its field of research application to
novel populations, among others mature students, the
elderly, gifted (culturally diverse and usually undetec-
ted), at-risk foreign language learners, psychiatric
prison inmates, early brain-damaged individuals, and
blind, deaf and speech-impaired populations, and is
applicable to both domain-general and domain-specific
contexts (language, arithmetic, writing competence,
science and biology, for instance) (Alfassi, 2002; Bolig
& Day, 1993; Chan, Ashman & Van Kraayenoord, 2000;
Glaspey & Stoel-Gammon, 2005; Guthke, 1992; Kaniel
& Tzuriel, 1992; Keane, 1987; Keane, Tannenbaum &
Krapf, 1992; Kester, Pena & Gillam, 2001; Kirschenbaum,
1998; Kozulin, 2000; Kozulin & Garb, 2002; Lidz, 2004;
Lidz & Elliott, 2000b; Samuels, 2000; Schur, Skuy,
Zietsman & Fridjhon, 2002; Silverman & Waksman,
1992; Schneider & Ganschow, 2000; Stanley, Siegel,
Cooper & Marshall, 1995; Tzuriel, 2000a, 2001;
Ukrainetz, Harpell, Walsh & Coyle, 2000; Wiedl, 2002;
Wiedl, Guthke & Wingenfeld, 1995; Wiedl & Schöttke,
1995).

These are populations which have until recently been
sidelined from mainstream assessment and interven-
tions and for whom targeted mediatory intervention
programmes are deemed more suitable due to their
unique life contexts. Dynamic assessment is also moving
into areas concerned with neurological disorders where
both individual and group administration of assess-
ment is being researched (Haywood & Miller, 2003).
There is some conceptual overlap, namely, the approach
to understanding what is maximally possible after sus-
tained injury as opposed to what is typical functioning
and the effect of actual intervention with the injured
patient as opposed to merely assessing it (Haywood &
Miller, 2003). This is perhaps the most valuable asset
within the dynamic assessment arsenal. Issues such as
psychometric aspects, costs and time are major factors
continually cited as constraints within this method of
assessment. However, since the 1990s a number of pros-
pects have become available in order to afford this
manner of assessment a more profitable existence. New
models within item-response theory are currently being
developed that provide enhanced technology for the
generation of items and assembly of tests but is as yet
unable to provide deeper insight into the process of
intelligent functioning and all the more reason to look
towards biological models of intelligence (Schmiedek,
2005). The ideas of measuring change are not new, but
it has only been within the last two decades that dynamic
assessment has come to prominence in the literature
(Guthke, Beckmann & Dobat, 1997; Lauchlan & Elliott,
2001).

Geographic Spread

Although by no means exclusively, a sizeable research
output within dynamic assessment is conducted in the
following countries: the Netherlands, Israel, Germany,
the United States, Canada, Belgium, Europe in general,
the United Kingdom and South Africa. Research output
from South America, Australia and elsewhere is also
evident, but the mainstay emanates from the first four
countries. Dynamic assessment is often greeted with
enthusiasm by practitioners and school psychologists
for its theoretical underpinnings and has received attention
from many eminent scholars within the intelligence
assessment field. The most often cited aspect
which it is assumed will aid in the theoretical and meth-
ological growth of dynamic assessment is the advent
and development of various item-response models
(Pennings & Verhelst, 1993; Resing, 1993; Schöttke,
Bartram & Wiedl, 1993; Sijtsma, 1993a; 1993b), which
will go some way in making dynamic assessment more
psychometrically sound, which is perhaps the most
criticized aspect of this approach (Minnaert, 2002).
These models are based on newer conceptualizations of
what it means to validate a construct as well as a move
away from the more traditional concept of construct validity as is currently endorsed in some dynamic assessment literature (Carlson & Wiedl, 2000). Nevertheless, the current trend within psychological assessment is to view dynamic assessment methods as complementary to mainstream assessment (Büchel & Scharnhorst, 1993; Minnaert, 2002; Resing & Roth-Van der Werf, 2002). In some instances dynamic assessment is utilized incidentally, such as serving informal functions within a more traditional criterion- and norm-referenced manner (Freeman & Miller, 2001).

**Socio-Cultural Impingements**

The common thread specific to dynamic assessment is its role within cultural assessment scenarios (Van de Vijver, 1993), and although not limited to assessments of culturally diverse groups, finds its niche in this context specifically due to the method’s manner of assessing for a largely ‘untouched’ construct of ability (i.e. pure ability devoid of cultural influences) (Van de Vijver & Jongmans, 2002). Vygotsky’s task was one of assessing intellect in a sociopolitical sphere which denied that intellectual differences existed (Gindis, 1995; Guthke, 1993b; Guthke, Beckmann & Dobat, 1997) and where ignoring social class and the reduction of the psychological to the physiological was frowned on (Gilgen, 2000; Van der Veer, 2000). Yet, ironically, this was a period in Soviet history when support for educational psychology, both moral and financial, was substantial (Haenen, 2000). This prompted the furtherance of his approach in treating handicapped children by advocating the need to redress the influence of the socio-cultural environment, particularly the adult environment in which the child grew up and in which the disabled person functioned (Gindis, 1995; Kerr, 1997). His socio-cultural research programme, however, began to disintegrate during the 1930s and was replaced by the burgeoning of activity theory, which was considered a branch of Vygotsky’s cultural-historical approach and which bespoke of the activities humans were involved in as crucial to the development and emergence of the mind (Toomela, 2000). Likewise, Binet’s task – to assess for and define different levels of ability within different economic groupings in France – prompted his style of assessment. Poor socio-economic factors play a negative role when assessing for intelligence, especially in societies which base such assessments on the prevailing schooling (Cassimjee & Murphy, 2010; Murphy, Cassimjee & Shur, 2010; Tellegen & Laros, 1993). Poorer individuals are less likely to be able to afford a good education and so the cycle continues but the need to identify gifted students within economically and culturally varied populations exists and the utilization of dynamic assessment as an intervention technique is uniquely placed to assist in the assessment of such populations (Lidz, 2001).

Feuerstein’s need to assess immigrants seeking asylum in Israel, a largely immigrant country from as far afield as Ethiopia and Morocco, also resulted in a manner of testing now known as learning potential assessment (Deutsch, 2003; Feuerstein & Feuerstein, 2001; Goldberg, 1991; Gutiérrez-Clellen & Pena, 2001; Kozulin, 2002b; Tzuriel & Haywood, 1992; Zeidner, Matthews & Roberts, 2004). Mass disruption within Europe during and after the Second World War resulted in the displacement of countless children and adults seeking residence elsewhere. Assessments available at the time were inadequate in terms of assessing different cultural groups as well dealing with the effects of war (Morphet, 1986; Tzuriel, 2001). Learning within traditional and rural Ethiopian culture was propagated largely by means of imitation and observation and was therefore not verbally based (Katz, Kizony & Parush, 2002). Moroccan, Turkish and Surinamese immigrants in The Netherlands have also benefited from dynamic assessments (Hessels & Hamers, 1993) and the pressing need to continue with dynamic assessment research in the Netherlands can be supported by the ever-increasing number of minority groups there (Hessels, 2000). Kozulin and Presseisen (1995) differentiate between types of individuals whose higher-order cognitive development and mediated learning experiences can effectively be categorized in one of four areas. The typical categorization for displaced persons’ lack of mediated learning experience is due to displacement of some sort and the associated lack of developed higher-order thinking processes results in the lack of adequate education. It is not difficult, then, to understand why dynamic assessment has gained wider acceptance in these countries as opposed to countries which continue to practise mainstream assessment.

There is a need to assess minority groups (Ruijssenaars, Castelijns & Hamers, 1993) who often present with substantially lower cognitive functioning when assessed within mainstream testing situations (Hessels & Hessels-Schlatter, 2002). These attempts can be categorized as culturally sensitive assessments or as ecologically more inclusive (Guthke, 1993a; Lidz, 1981), and are sensitive not only to the culture but also to deviations within the
specific culture. In other words, one must prise apart cultural difference among those not in need of intervention but who may be in need of a culturally sensitive tool and those suffering from cultural deprivation and who are in need of cognitive deficit intervention (Jensen, Feuerstein, Rand, Kaniel & Tzuriel, 1988; Rosas, 2004; Tzuriel, 2000b). Cultural deprivation occurs in any culture and conformance to one culture as evidenced in typical behaviour can be vastly different from another culture’s normative behaviour (Helms, 1997). Cultural diversity is seen in many contexts as an asset within any intervention (Robinson-Zanartu & Aganza, 2000) and should be capitalized upon, not dismantled and set aside.

Emanating from a different culture and having been the recipient of poor mediational learning experience are very different aetiologies of poor performance (Feuerstein, Rand, Hoffman & Miller, 1980). The child who has received poor mediation will evidence blurred perception of reality, be apathetic and withdrawn and their subsequent isolation results in their fragmented perception of reality, be apathetic and withdrawn and their subsequent isolation results in their fragmented experience of the world (Klein, 2000). However, there is also a sub-group of low performers who evidence neurological deficits (Swanson, 2000) and so the landscape of poor performance does not represent an even or smooth terrain. Cultural deficit typically occurs within a culture where delayed development is specific to that culture using cultural norms against which to determine deficits. This definition of cultural deficit is different from ‘other culture’ deficit according to which one culture is subverted by another. Culture as utilized within dynamic assessment is thus not tinged with biologically inherited differences between cultures but deficits within cultures (Helms, 1992). This is of particular importance within the dynamic assessment approach to understanding intellectual functioning and deviates from mainstream intelligence work in this regard.

Regarding the more traditional notion of therapy within psychological science, Haywood (2000) has made important and insightful strides in combining cognitive education into psychotherapeutic interventions where many wrongly diagnosed aspects of behaviour can be seen to emanate from errors in cognitive thinking as opposed to traditionally accepted pathologies of behaviour. Such an interdisciplinary tool can and has proved to be useful in approaching sub-optimal performance in culturally different populations. This is clearly not the picture presented by those who merely originate from another culture. The latter are deemed very important as it assumes a fully functioning cultural society without the subsequent need to test these cultures via mainstream and largely Western intelligence batteries, which more often than not results in some bias (Hessels & Hamers, 1993). The notion that in order to assess non-Westerners one needs to treat them as educably mentally retarded (Sternberg, Grigorenko, Ngorosho, Tantufuye, Mbise, Nokes, Jukes & Bundy, 2002) says more about the test scenario and the reigning concept of intelligence than it does about the various test populations. The need, for instance, to differentiate between children with language differences and those with language impairment is of concern and is an area specifically attuned to dynamic assessment approaches (Gillam, Pena & Miller, 1999; Gutiérrez-Clellen & Pena, 2001; Pena & Gillam, 2000). Developing expertise is not favoured by an exclusive reliance on Western concepts of what it means to be ‘intelligent’ or well equipped.

Developing expertise is a culture-wide phenomenon and is difficult to assess with Western testing methods only (Sternberg & Grigorenko, 2002; Sternberg & Grigorenko, 2001c). Language proficiency bias has also posed serious problems especially for immigrant populations, the majority of whom are children, resulting in confusing learning disabled populations with culturally diverse ones (Cole, 1996b). This critical aspect reflects dynamic assessment’s concern with distinguishing between cultural difference and cultural deprivation (Tzuriel, 2002) and can be closely interwoven with both Feuerstein’s and Vygotsky’s conceptualization of mediated learning experience and higher-order thinking processes (Kozulin & Presseisen, 1995). Research has also shown the efficacy of utilizing dynamic assessment within environments catering for mental retardation as opposed to the more classically aligned mainstream assessments (Hessels-Schlatter, 2002a; 2002b). Metaphorical conceptions of intelligence are the preferred analogies within dynamic assessment where the sociological and anthropological contexts are of deep and persistent concern (Campbell & Carlson, 1995). Change directedness occurs in a second-order manner where change is effected from within the individual and is not imposed from without, such as pouring information into a system vs. the deeper understanding of material from within the system.

**Dynamic Assessment: Fundamentals**

Dynamic assessment is a way to assess individuals’ at times hidden potential or reserve capacity in a fluid,
process-oriented, diagnostic, engaged and flexible manner in which aiding or guidance via instruction and feedback of cognitive skill acquisition is of prime importance (Campbell & Carlson, 1995; Elliott, 2003; Gillam & McFadden, 1994; Grigorenko & Sternberg, 1998; Kirkwood, Weiler, Bernstein, Forbes & Waber, 2001; Kirschenbaum, 1998; Kliegl, Smith & Baltes, 1989; Lidz, 1997; Meyers, 1987; Minick, 1987; Sternberg & Grigorenko, 2002). It stands in stark contrast to the more product-bound approaches of mainstream psychometric and edumetric assessment (Craig, 1991; Gupta & Coxhead, 1988b; Resing, 1993; Slenders & Resing, 1997) by emphasizing the change in performance rate and remedial strategies necessary to make progress (Bejar, 1984; Brown & French, 1979; Campione, 1989; Wiedl, 2003). Rate of learning, amount of improvement typified by Feuersteinian and neo-Vygotskian views, as well as amount of help needed (more modern views of gauging potential) are all methods of assessing for growth of learning or potential (Ferrara, Brown & Campione, 1986).

The relationship between tester and testee as a characteristic of strict neutrality is the hallmark of conventional testing, which, if violated, would render the objectivity null and void (Greenfield, 1997). This is not the case with dynamic assessment (Lidz, 1992b). It represents greater all-round diversity in assessment and the method's results extrapolate to a far wider field of application than mainstream assessment (Gupta & Coxhead, 1988a), leading at times to fairer and greater predictive diagnostic validity (Ferrara, Brown & Campione, 1986; Gredler, 1988; Resing, 1997) for below-average performers among both majority and minority groupings on conventional IQ tests (Babad & Budoff, 1974; Budoff & Hamilton, 1976; Hessels, 1996). Movements are afoot within static-based modes of testing which seek to make such tests more functional, at least for special education populations in terms of prescribing treatment in respect of test results yielding another type of validity: treatment validity (Flanagan, Andrews & Genshaft, 1997).

The nature of instruction and feedback is not one of repetitious aid but of engaged understanding of the unique attributes of the individual being assessed, although this can vary dramatically depending on prevailing circumstances (Goikoetxea & Gondra, 1995). The learner is a participant and not a subject in the active learning process (Svinicki, 1998). The relationship can even be said to be one of personal understanding (Feuerstein, 1972). Synonymous terms with very similar philosophical backgrounds resonate with this method of assessing learning potential and include learning tests (in German, Lerntest), interactive assessment, trainability testing, testing-the-limits (via graduated prompting) and mediated learning (Brown, Campione, Webber & McGilly, 1993; Fernandez-Ballesteros & Calero, 2000; Swanson, 1995; Von Hirschfeld & Downs, 1992). It can be viewed as a strategy within the cognitive education approach where educability is understood to be synonymous with the modification of intelligence (Chartier, 1996). The rationale behind the method of assessment is that if a student can improve on initial performance when aided, potential exists with which much can be achieved (Ukrainetz, Harpell, Walsh & Coyle, 2000). Testing-the-limits allows for the pre-establishment of an age-appropriate level of achievement according to which children are assessed via a step-by-step process of approximating the maximum level of performance (Kliegl, Smith & Baltes, 1989). Depending on the level achieved by any one group, individual differences within the group can be assessed, thus allowing for more accurate assessments of development level (De Ribaupierre, 1993).

Learning As a Tool and Measurement

Contradictions pervade the mainstream assessment field especially within educational contexts where dynamic assessment sits at ease (Daniel, 1997). In such circumstances, current functioning is utilized as an indicator of future success (Kozulin & Garb, 2002) where the learning process itself should be utilized; it is after all the goal of education to monitor the learning process. By observing change and by directly interfering with development one is better able to understand this process (Paour & Soavi, 1992). Learning and instruction, as well as assessment and teaching, are examples of dyadic approaches utilized in models encompassing Feuerstein's original notion of instrumental enrichment where there is a dual process carried out by teacher and student as well as the processes of information-gathering. One need only think, for instance, of Ashman's process-based instruction (PBI) model (Ashman, 1992).

Feuerstein's product is an applied instance of dynamic assessment more than a separate theory of dynamic assessment (Feuerstein, 1994) where intellectual potential is 'activated' via instrumental enrichment, which is an instance or interrelation of his theory of cognitive modifiability (Lidz, 1992b; Messerer, Hunt, Meyers &
The acceleration of maturation through learning is a Vygotskian notion (Das, Parilla & Papadopoulos, 2000), which seems to be rediscovered periodically in one guise or another. The emphasis in core dynamic assessment interventions is placed simultaneously on learning potential as evidenced through cognitive skill, which is in turn founded on psychological-cognitive theory (Guthke & Beckmann, 2000a). Here the link between dynamic assessment, cognition and intelligence comes to the fore. Common characteristics include (Carlson, 1994):

- the notion of inherent modifiability;
- competence and performance, which are two divergent concepts;
- test performance as enhanced via interactive intervention;
- process which is paramount to product; and
- development of abilities which are better or at least complementary to developed abilities.

Some researchers who do rely heavily on static-based conceptions of intelligence but render this dynamic prefer to refer to intelligence as ‘cognitive activities’ in order to refl ect the process-based nature of intelligence (Carlson & Wiedl, 2000). The teacher or tester is a refl ective person who not only monitors the individual being tested but also engages in a process of self-refl ection, judgement and control (Reichenberg & Rand, 2000). Four general aspects which can be considered as characteristic of this approach include the tester–testee relationship, which is newly defi ned as one of collaboration and sharing (S. Feuerstein, 2000); the process vs. product manner of assessment; the nature of the test and the various tests utilized; and the manner in which the results are interpreted (Tzuriel & Klein, 1987).

Teacher perceptions have been shown to change after dynamic assessment interventions are conducted, resulting in changed expectations of performer and performance (Benjamin & Lymofsky, 2002; Bransford, Delclos, Vye, Burns & Hasselbring, 1987; Delclos, Burns & Kulewicz, 1997). The link between assessment and intervention, as well as that between assessment and environment and the nature of the process and product of behaviour, are noteworthy characteristics (Meyers, 1987). The learning process is at the core of this type of assessment and can be observed in the actual learning situation through analysis of learning curves as well as via the presentation of a learning or training phase during the pre-testing phase of a pre-/post-test set-up (Hamers & Sijtsma, 1995). Both pre-testing and the monitoring of the learning process itself are necessary if adequate intervention strategies are to be planned as advocated over 70 years ago by Vygotsky (Day, Engelhardt, Maxwell & Bolig, 1997). This is consistent with his notion of ZPD. Losardo and Notari-Syverson (2001) offer a generic ‘theoretical framework’, the use of which some may question, and state that dynamic assessment encompasses six theoretical assumptions:

1. a Piagetian constructivist perspective;
2. Vygotsky’s social-interactionist view;
3. Vygotsky’s ZPD notion – for long a paradigm more so than methodology (Kozulin, 2005);
4. scaffolding;
5. Feuersteinian mediated learning experience;
6. self-regulation, which encompasses some form of non-linear growth trajectory.

Such a framework is characteristic of general practice from several theoretical positions but perhaps is yet to be seen in use as one model. Dynamic assessment straddles curriculum-based assessment along with general adaptability within life, making it expressly useful over a larger domain (i.e. low-achieving individuals may well score higher on intelligence estimates) (Elliott, 2003). Cognitive training and dynamic assessment have been equated as methods of inducing change, thus further elaborating the methodological spectrum of alternatives for learning potential assessment (Scharnhorst & Büchel, 1995; Schneider & Ganschow, 2000). It places the individual (usually but not exclusively young children) (Kahn, 2000; Klein, 1992a; Lidz, 2000; Mearig, 1987; Samuels, Lamb & Oberholtzer, 1992; Tzuriel, 2000c, 2000d; Tzuriel & Haywood, 1992) at the centre of the assessment process and regards change within the child as the criterion (Burns, Delclos, Vye & Sloan, 1996). Although dynamic assessment is also amenable to group assessment, practical problems inhibit its wider use (Luther & Wyatt, 1996; Rand & Kaniel, 1987; Tzuriel & Feuerstein, 1992; Ukrainetz, Harpell, Walsh & Coyle, 2000). The individual becomes a reciprocal respondent responsible for the self-monitoring of strategies, whilst the assessor engages the situation as facilitator (Schneider & Ganschow, 2000).

The notion of a critical age for development of certain skills akin to Piaget’s stage-like model of human development informs the more clinical approach to dynamic assessment as younger children are perceived to be
more malleable to interventions of various sorts. Moreover, children under the age of 5 evidence inconsistent results on traditional measures of learning ability (Vye, Burns, Delclos & Bransford, 1987) due largely to the fact that evidence attests to many critical periods of development where neuronal overproduction is followed by selective tailoring, and so on, through progressive development (Dehaene-Lambertz & Dehaene, 1997). Socio-ecological variables within the child’s environment during critical stages of intellectual development impinge on development trajectories and result in rapid development of these intellectual skills (Blair, 2006; Haywood & Switzky, 1992). Piaget acknowledged the role of parents in providing opportunities for children to develop, but Feuerstein and others have placed even greater emphasis on the roles of parents as active and influential modifiers of children’s development (Tzuriel, 2000b). External influences are more influential than previously understood by Piaget and development occurs within domain-specific tasks as well as context-specific areas and is not bound by general development across domains (Case, Okamoto, Henderson & McKeough, 1993).

**Transfer of Skill**

The mechanisms in place during the learning process co-occur in a contextualized situation where development is directed by the individual as well as by social forces such as peers, teachers and parents, who render the symbols meaningful to the child or peers via culturally evolved cognitive tools and do so in a co-constructed process (Arievitch & Stetsenko, 2000; Jensen, 1992; Portes & Vadeboncoeur, 2003; Schwebel, 1992). This makes the entire programme one of socially embedded learning as opposed to mainstream isolated learning (Brown, Campione, Webber & McGilly, 1993). Collaborative mediation may result in emergent functions which have yet to express themselves internally, that is, external manifestations of cognitive functions may become internalized over time, but only after active collaboration (Kozulin & Garb, 2002) as well as the internalization of activity via language and thought (Das & Conway, 1992). There is a particularly strong blend of constructivism inherent in understanding the developing child as well as teacher–student interaction where learning theory and teaching practice needs to be bridged (Meyer, Cliff & Dunne, 1994; Schur, Skuy, Zietsman & Fridjhon, 2002). The intuitive appeal of dynamic assessment’s fundamental aims and attraction is readily apparent and forms part of current test models (Guthke & Beckmann, 2000a; Jensen, 2000). Construction of experience is both an individual and environmental phenomenon that can be studied scientifically and is consistent with the views expressed by Vygotsky and Piaget in which progress towards higher cognitive functioning is achieved via mechanisms of construction of information and not merely progressive transferral (Lloyd, 1995; Mynhardt, 1995). This is, of course, the hypothetical best-case scenario which we know is often not the case in reality especially, it has been argued, in school settings, where collaboration between teachers and students is anything but mediatory and any such efforts purported to manifest such mediatory characteristics are disguised (Beveridge, 2000).

The niche for dynamically assessed, computer-mediated approaches is manifest in situations where human contact with each individual is not feasible (Gerber, 2000) and offers mediated experiences which do not necessarily detract from the philosophy informing Vygotskian and Feuersteinian mediation techniques. Psychology has focused more on the individual within society than on society within the individual and as such the influence of the ‘social’ is often vague in its meanings (intrapersonal, interpersonal and intergroup) (Finn, 2000). In fact, depending on one’s philosophical affiliation or, at the very least, the emphasis placed on various aspects within the broader contextualized approaches of understanding development such as mediated learning experience, socio-cultural approaches and/or skill transfer, these approaches can sit comfortably within a larger nested approach known as cultural theory, of which there are numerous models with varying degrees of emphasis on different aspects (Mastergeorge, 2001).

As with many concepts within dynamic assessment, mediated learning experience, the pivotal aspect within Feuersteinian theory as a definition, is often conceptually blurred (Miller & Yager, 2001). Mediation is thus a fluid concept with changing emphases in terms of its meaning and utilization in different contexts (Miller, 2003). Mediation within the Feuersteinian model depicts the notion of cultural transmission of knowledge and the development of individual cognition within the broader culture (Deutsch, 2003), going beyond Piaget’s decontextualized theory of growth and development by placing the developing individual within a particular context. Vygotskian mediation follows the ideal of making available requisite tools, such as language and thought, in assisting the developing child progress into
a zone of near development, without which this zone may not be crossed. The emphasis in this type of mediation is placed on the development of higher mental processes, first with the help of an adult or peer after which the mediation of this effort is via the child him- or herself. Once the transference from adult guidance to child-initiated guidance has occurred one can state that mediation has been successfully implemented (Karpov, 2003). The Feuersteinian notion of transcendence or transfer of mediated skill and the transfer of mediation from adult or child within the Vygotskian system is evident. Feuersteinian mediation emphasizes cognition-in-culture and Vygotskian mediation emphasizes tools towards higher mental processes, but both take cognizance of the fact that development does not and cannot take place within a decontextualized environment and both account for the internalization of information as originally taught by or copied from another.

The bio-ecological model of development and its close ties with epigenetic models of growth allow for a link to be made between dynamic assessment and intelligence, the latter emphasizing innate structures more or less in keeping with Piagetian development within an abstract system where the individual’s development is almost played out by the unravelling of its predetermined code (Karpov, 2003). The adult mediator in this instance is not given as much regard for his or her role in aiding development to newer levels (Haywood, 2003). Neo-Piagetian considerations of mediation look again at the role of external mediators as tools from which the developing child needs to remove himself in order to move on to new levels of growth, in other words, revisiting self-mediation, which is similar to the sentiments echoed by Vygotskian notions of the mediatory cycle (Haywood, 2003). Conceptual, procedural and metacognitive knowledge is mediated within the neo-Piagetian set-up via a process of questions and not via a process of hinting as is done in other set-ups favouring alternative dynamic assessment origins (Haywood, 2003). Children discover the rules for themselves and provide their rendition of a rule as opposed to applying a rule that is taught to them (Haywood, 2003), which raises the question of how rule identification is understood during both types of processes, for there is both an opportunity for and a need to provide a rule to be applied and allowing for a rule to be discovered. Either way, a more experienced person is placed within the assessment situation – a commonality running throughout the broader working of dynamic assessment.

Varying Definitions

Dynamic assessment’s definition is built from myriad other definitions and, as is the case with a definition for intelligence, a definition for learning potential or dynamic assessment is similarly vague and diverse or loosely structured (Ghesquière, 2002; Hamers, Hessels & Pennings, 1996; Lidz, 2001; Reschly, 1997). It often refers to a host of approaches (Feuerstein, Rand, Jensen, Kaniel & Tzuriel, 1987), evidencing a healthy diversity of approaches (Bransford, Delclos, Vye, Burns & Hasselbring, 1987), but it does emphasize trainability of thinking and reasoning abilities which mainstream assessment does not in general do (Resing & Roth-Van der Werf, 2002). Dynamic assessment, like its intelligence counterpart, also lacks a unified theoretical framework (Campbell & Carlson, 1995). Linking diagnoses with treatment is the essence of this approach to assessment, which seeks to modify through active intervention and remediation (Campione & Brown, 1987; Lidz, 1987). Modifying the content as well as the structure of thinking, dynamic assessment aims to bridge gaps in cognitive skills and seeks to manoeuvre away from placement of individuals in categories towards inclusive understanding of malleable change where ‘true ability’ as a concept is meaningless (Gamlin, 1996). Moving away from product-based approaches towards the assessment of individuals, which in the past has been dealt with by simply ignoring the responsiveness of the testee to the test situation, as well as ignoring strategies for interventions, dynamic assessment aligns itself to an attitude of holism (Bransford et al., 1987).

It has much to offer the field of intellectual assessment due to its unique stance on measurement and modification of skills within a remedatory framework (Budoff, 1987b; Das & Conway, 1992; Feuerstein, Rand, Jensen, Kaniel & Tzuriel, 1987). It seeks to mediate and remediate errors in thinking as opposed to simply ignoring them (Laughon, 1990; Luther, Wylie & Rosenthal, 1996; Van der Aalstvoort, Resing & Ruijssenaars, 2002). Transfer of task-related information is the goal of remediation, but the difference between transfer and actual learning is often blurred and indistinct (Butterfield, Slocum & Nelson, 1992), with transfer estimates being notoriously difficult to achieve (Campione, 1989; Crawford & Das, 1992).
Indeed, lack of transfer was the major reason why early intelligence research into the relation between IQ and learning proficiency was not supported and eventually abandoned (Brown, Campione, Webber & McGilly, 1993). Transfer, maintenance or even adaptability and the eliciting of change through tasks that 'provoke cognitive adaptation' (Craig, 2000, p. 7) has been linked to intelligence measures evidencing higher intelligence levels concomitantly with greater ease of transferral (Brown & French, 1979; Day, Engelhardt, Maxwell & Bolig; 1997; Ferrara, Brown & Campione, 1986).

Better use of metacognitive functioning eases transfer of cognitive skill and increases the duration of transfer (Hamers, Hessels & Pennings, 1996) between domains. This is one of the many examples or instances where the interchangeable nature of static and dynamic constructs come to the fore. The notions of each are difficult to define, and the situation is compounded by continuous tautologous referral to definitions within and between the approaches: hence, dynamic assessment's entanglement. It is wedged in a seemingly unbridgeable gulf (see figure 1) as intelligence and learning though related manifest as separate constructs (Kanevsky & Geake, 2004). A possible retort to the argument encapsulated in the figure may be that learning potential and IQ are not problematic for some studies. The scenario provided below may be of no consequence in any event as most studies assessing for learning potential validation are focused on below-average performers for whom learning potential is a better indicator of future success than IQ or school results (Miller, 1998), not to mention the group of low-learning potential scorers for whom nothing is usually recommended. But dynamic assessment is not only utilized within these populations, which is why one is saddled with the issue. The literature is replete with efforts to link learning potential to intelligence, whether openly or covertly. Nevertheless, ultimately, the goal of any intervention is to achieve a far-reaching transfer of skills that can be utilized in disparate contexts with similar underlying principles.

Dynamic assessment assumes continual change throughout life and this is reflected in similar assumptions concerning changes within the assessment process (Sternberg & Grigorenko, 2002). Contextual and inherent characteristics are deemed equally important, allowing this method of assessment to be utilized in various cultural contexts (Cole, 1996a; Das, 1987; Guthke, 1993a; Haywood, Tzuriel & Vaught, 1992; Hessels & Hamers, 1993; Jensen, 1992; Schardt, Whitten & Gamlin, 1996; Van de Vijver, 1993). Other contexts include the learning disabled, mentally handicapped and socially and economically disadvantaged contexts (Khani & Gamlin, 1996), which is usually related to children (Missiuna, 1996; Tzuriel, 1996). Incidentally, through the intervention strategies of dynamic assessment, misdiagnosed individuals can at times be correctly diagnosed or at least diagnosed more accurately (Popoff-Walker, 1982), which parallels the phenomenon of fewer diagnoses of mentally retarded individuals with a concomitant increase in the number of learning disabled individuals seen in the United States, for instance (Budoff & Friedman, 1964; Folman & Budoff, 1971; Shepherd, 2001). It must be noted that such labels can themselves be considered as socially constructed conveniences for those doing the labelling and this in turn helps to perpetuate a situation already riddled with contradiction and myth (Valencia & Suzuki, 2001).

Mediation

Mediation is directed at children with the aim of assisting them in making sense of their environments which, if not provided, can lead to severe backlogs in emotional and intellectual development (Klein, 1992b). Here it is immediately apparent that the 'social' plays a very important part in dynamic assessment, ranging from clinical interventions to the more standardized approaches. Mediation need not only be social; it can also take the form of symbolic agent which, according to Vygotskian thinking, is revealed to the child through symbols via cultural transmission, which is easier to learn, towards higher cognitive functioning symbols, which are more abstract (Kozulin, 2002b). Clinical mediation vs. the more standardized approaches is particularly pertinent in societies such as South Africa, where disadvantages in education, and lack of educational services and parental mediation are rife (Bedell, Van Eeden & Van Staden, 1999; Engelbrecht, 1996; Shochet, 1992; Skuy & Mentis, 1992), which in the past approached poor performance from a child-deficit point of view largely inspired from a medical diagnostic model based on identifying weaknesses (Archer & Green, 1996; Bejar, 1984; Kriegler & Skuy, 1996; Robinson-Zanartu & Aganza, 2000).

It has been noted that the discredited notion of deficit model thinking or the genetic pathology model has resurfaced in the recent past with texts reminiscent of
Figure 1 The inseparability of IQ and learning potential and the ironclad grip of IQ on dynamic constructs

1. Maintenance and adaptability is a product or manifestation of the construct learning potential

2. HENCE Learning potential is linked to IQ

3. OR
   1. High IQ linked to high transfer
   2. Low IQ not necessarily indicative of learning potential
   3. Low IQ linked to low transfer
   4. Low IQ but higher learning potential often the case
   5. Higher learning potential still linked to low transfer (in keeping with low IQ already evidenced)
   6. **Learning potential linked and not linked to IQ**
   7. Therefore, break away entirely from static conceptions or become more fully enmeshed as just another predictor of more accurate intelligence assessment

Problematic definition of what is considered near or far transfer and indefinite concerns surrounding when learned cognitive mechanisms have indeed been transferred

Realm of dynamic assessment’s construct of learning potential

Realm of static assessment’s construct of learning potential

As defined by the

- Amount of instruction needed
- Number of errors made
- Amount of improvement made

Ultimately evidenced by

- Transfer / maintenance / adaptability

Learning Potential

Critical point

Amount of instruction needed

Number of errors made

Amount of improvement made

? Problematic definition of what is considered near or far transfer and indefinite concerns surrounding when learned cognitive mechanisms have indeed been transferred

? Realm of dynamic assessment’s construct of learning potential

? Realm of static assessment’s construct of learning potential

1. Maintenance and adaptability -> IQ

2. BUT

3. Maintenance and adaptability is a product or manifestation of the construct learning potential

4. HENCE Learning potential is linked to IQ

5. OR
   1. High IQ linked to high transfer
   2. Low IQ not necessarily indicative of learning potential
   3. Low IQ linked to low transfer
   4. Low IQ but higher learning potential often the case
   5. Higher learning potential still linked to low transfer (in keeping with low IQ already evidenced)
   6. **Learning potential linked and not linked to IQ**
   7. Therefore, break away entirely from static conceptions or become more fully enmeshed as just another predictor of more accurate intelligence assessment
eugenist thinking (Valencia, 1997a; Foley, 1997), although one has to exercise caution with statements for or against such texts. Not all statistical delineations of various intelligence assessment results are tinged with bias. Nevertheless, there is a progressive trend towards understanding the processes involved in developmental assessment which vie for the attention of the intelligence researcher and emphasize the reversal of the effects of substandard environmental influences as opposed to unthinking acceptance of irreparable ‘damage’ (Pearl, 1997). In the past prescriptions for deficit model thinking could be said to have applied (Valencia, 1997b). During various times, a counter-resurgence of alternative assessments in stark contradiction to these trends surfaced, the most visible being dynamic assessment. Feuerstein’s mediated learning has proved exceptionally applicable in cross-cultural societies, the very population for whom it was intended.

**Assumptions**

The typical mode of a dynamic assessment intervention closely follows a test–retest design, punctuated by varying levels of mediation (Budoff, 1987a; Campione, 1996; Elkonin, Foxcroft, Roodt & Astbury, 2001; Hamers & Resing, 1993; Klein, 1992a; Lidz, 1987; Lidz & Pena, 1996; Taylor, 1987; Tissink, Hamers & Van Luit, 1993). However, this approach is usually used when measurement is sought for research purposes. Mediation via observation as well as participation results in lower common variance accounted for as opposed to the utilization of two tests, for instance (Haywood & Tzuriel, 1992). Along with decreased explainable variance newer, change-based item-response theory (IRT) methods can more successfully accommodate change as a construct. Depending on the nature and underlying philosophy of measurement, the intervention can take place via clinical and intensive mediation through to a structured, progressive hinting and a somewhat more standardized approach (Burns, Delclos, Vye & Sloan, 1996). This assessment format allows for better prediction of school results and yields more information than mainstream testing on both the strong and weak cognitive points during performance, and the information gathered is relevant to the instruction being given (Meijer, Oostdam & Van der Sluis, 2002; Tissink, Hamers & Van Luit, 1993).

Depending on the amount of control exercised within this structure, it can be loosely classified as a classical quasi-experimental design (Klauer, 1993). It is, however, considered undesirable within standardized assessment (Klauer, 2002). This is counterintuitive for at least one reason – construct validity (Hamers & Sijtsma, 1995; Lidz, 2003) – for how much closer can one come to assessing learning than in the actual process of learning (Lidz & Gindis, 2003)? It is envisaged that the future of intelligence assessment will focus on content and construct validity, thus enabling better extrapolations of test results to other aspects of learning and intelligence (Kamphaus, Petoskey & Morgan, 1997). Feuerstein’s Learning Propensity Assessment Device (LPAD) is in fact both a product and informer of the theory that underlies it, namely, structural cognitive modifiability (SCM) (Feuerstein, Feuerstein & Gross, 1997) and has been in use since the 1950s (R. S. Feuerstein, 2000). This process manner of considering human functioning within the broader environment is reminiscent of the thinking of Piaget and Vygotsky, although the latter two do not cohere entirely on various points within educational theory (DeVries, 2000). Aspects considered as errors within static assessment, such as fatigue, stress and lack of attention, are what make for diagnostic decision-making within dynamic assessment (Lidz, 1997). The rationale underlying static and dynamic types of assessment are radically different philosophically and fundamentally, but as Guthke and Beckmann (2000a) so aptly point out, static components are included within dynamic assessments but not necessarily the other way round. Due to the unique nature of the interaction (Missiuna, 1996) between the testee and tester in dynamic assessment however, validating variable constructs can become problematic, especially when the interaction between the testee and assessor also varies between test situations (Burns, 1996) where specific target group interventions are necessitated and thus change from one context to the next (Guthke, Beckmann & Dobat, 1997). Reliability and validity issues from psychometric theory start asserting their presence in this regard. Over and above the preoccupation with prediction, dynamic assessment aims to explain in addition to predicting scores in school tests, thus making it a more instruction-based approach (Ruijssenaars, Castelijns & Hamers, 1993). It creates a profile of the learner’s behaviour by adapting and attenuating intervention programmes to more readily suit the individual and so compiles a personalized account of the testee within the assessment (Greenberg & Williams, 2002). The process-based approach allows for explanation of cognitive deficits usually far in excess of anything offered by most
mainstream assessments. Three main attempts at modifying traditional psychometrics include a re-interpretation of test score results to reflect a more culturally attuned approach; the modification of test items which evidence contextualized individual functioning; and an attempt to modify functioning beyond that which is recognizable as manifest (Feuerstein, Rand, Jensen, Kaniel & Tzuriel, 1987).

Mediation effectively spans purely qualitative interventions in which intensity and duration are emphasized in a clinical set-up such as those offered by Feuerstein and Jensen, for instance (Elliott, 2003), where domain-specific tasks are avoided due to their similarity to school-related tasks (Greenberg, 2000; Lidz, 1997). It also spans standardized quantitative testing within a more psychometric approach, as offered by Budoff, Campione and Brown, as well as the adaptation of certain psychometric tests, such as Swanson’s cognitive processing test which is based on information-processing theory, to reflect a more dynamic approach (Budoff, 1987a; Campione & Brown, 1987; Feuerstein, Feuerstein, Falik & Rand, 2002; Jensen, 2000; Lauchlan & Elliott, 2001; Minick, 1987; Sternberg, 2000; Swanson, 2000; Wiedl, 2002; Wiedl, Guthke & Wingenfeld, 1995). The emphasis in dynamic assessment education and clinical set-ups is on people not scores (Wiedl, 2002) and normative functioning (Das & Naglieri, 1992), unlike the emphasis in mainstream assessment in a number-conscious society (Tzuriel & Haywood, 1992). There is increasing awareness and acceptance of developmentally and criterion- or curriculum-referenced tests which facilitate the integration of instruction and assessment (Kahn, 2000; Lidz, 2000). Dynamic assessments are concerned with understanding and aiding individuals in their development and many models do not emphasize normative profiling or classification to categories of achievement (Jensen, 2000), but such stratified norming does indicate the degree of loss of performance in certain cognitive areas, which will then need to be dealt with in terms of understanding why performance is so low (Jepsen, 2000). Assessing for higher education potential is a particularly thorny issue, where assessment of general thinking skills may allow for greater numbers to access higher education, but without the requisite domain-specific skills many may well struggle. Moreover, it is well evidenced in the literature that domain-general dynamic assessment interventions do not transfer well to other domains; hence the need to dynamically assess domain-specific skills (Samuels, Killip, MacKenzie & Fagan, 1992). Both types are needed, depending on the circumstances. A balance between general thinking and domain specificity is needed. It is well known that knowledge structures already in place aid in the generation and accumulation of yet more knowledge in a snowball-type effect (Minnaert & Janssen, 1996).

Static measures can be utilized and extended dynamically (Lidz & Thomas, 1987). The role of assessors is an emphasized concern within dynamic assessment as they do not play a passive role but rather seek to engage the individual in such a way as to encourage development and change within the transactional process (Ghesquière, 2002; Grigorenko & Sternberg, 1998; Lidz, 1997; Minick, 1987). They can be considered as filters for children, aiding in the expansion of their cognitive repertoire as well as guiding them in their cognitive choice of strategies (Jensen & Feuerstein, 1987). The assessment procedure can quite rightly be referred to as a consultation (Lidz, 1981). Cultural minorities often experience language difficulties and this is typically the situation in the West where there is limited English language proficiency in some instances; but this is not necessarily indicative of language deficiency (Lidz, 1997; Losardo & Notari-Syverson, 2001). There is a vast difference between the two but this is often ignored. Hence dynamic assessment interventions and alternative assessments are more often than not non-verbal (Lidz, 2001; McCallum & Bracken, 1997) and rely heavily on pictorial test material (Schur, Skuy, Zietsman & Fridjhon, 2002) very similar to cross-cultural modes of assessment (Cortada De Kohan, 1972). The main goals of dynamic assessment within a clinical set-up are characterized by concern with:

- the initial level of performance used within conventional testing, but here it informs the mediator how best to handle the particular individual;
- the nature and amount of mediation;
- the nature of the deficient cognitive functions;
- non-intellective factors, currently perhaps the most under-emphasized aspect within assessment in general;
- maintenance and transfer of learning;
- the type of modality used to channel the test;
- the effects of various mediatory strategies.

(Tzuriel, 2001, pp. 47–8).

By now it should be evident that the approach is one of assessment combined with teaching most often within the framework of Vygotsky’s ZPD or a similar model
Introducing Dynamic Assessment and Intelligence

Introducing Dynamic Assessment and Intelligence

Table 1 Playing devil’s advocate: some not so sinister aspects of static assessment and some problematic issues within dynamic assessment

<table>
<thead>
<tr>
<th>Problematic issues within dynamic assessment</th>
<th>Positive aspects within static assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>● As currently practised and envisaged by older models of change assessment, the gain score issue remains problematic although recommendations as to its renewed manipulation within IRT change-based models are offered.</td>
<td>● Has a long history of research attesting to its credibility on a number of issues.</td>
</tr>
<tr>
<td>● The time taken to administer clinical versions of dynamic assessment interventions are prohibitive within school settings as well as universal testing of potential tertiary education students.</td>
<td>● Although obviously tainted with nefarious motives throughout its historical development, the field of intelligence was punctuated by steady maturation within modelling of its characteristic traits that cannot be swept aside.</td>
</tr>
<tr>
<td>● The costs involved are greater due to the length of time needed to administer the assessment</td>
<td>● Thoughtful and humane approaches to the assessment of masses of individuals did not always leave much room for intelligence assessment to veer off in directions, warranting greater concern for the individual.</td>
</tr>
<tr>
<td>● The need to extensively train moderators and mediators within a dynamic assessment set-up is cost- and time-intensive.</td>
<td>● Dissatisfaction with mainstream assessment has at times appeared fashionable which can be unduly harsh and unscientific in rhetoric.</td>
</tr>
<tr>
<td>● Can at this stage only be utilized for underachieving populations who have for any number of reasons not been allowed to explore their fuller potential and has not really entered into assessment of average to above-average performing students from normal backgrounds.</td>
<td>● There is much to be said for the physiological basis of intelligence and decrying or dismissing reductionist approaches of biological views on intelligence is also not scientific.</td>
</tr>
<tr>
<td>● Perpetuates the misguided notion that dynamic assessment is useful only for sub-performing populations and does not successfully market itself as a packaged product for an all-inclusive manner of assessment</td>
<td>● Contextual, bio-ecological, systemic, environmental and many such development-framed inclusive models of intelligence are intuitively appealing and most likely the more correct explanation of what and how intelligence is and functions. But such models are inherently complicated and are further complicated by the sparse methods currently available to fit them into models evidencing intelligence and potential.</td>
</tr>
<tr>
<td>● Is not yet effectively linked with biological and neurological psychology, thus falling behind in a potentially and manifestly rich area of research where funding would most likely be easier to procure.</td>
<td>● The necessary theoretical backing is sometimes vague.</td>
</tr>
<tr>
<td>● The necessary theoretical backing is sometimes vague.</td>
<td>● Thoughtful and humane approaches to the assessment of masses of individuals did not always leave much room for intelligence assessment to veer off in directions, warranting greater concern for the individual.</td>
</tr>
</tbody>
</table>

(Snow, 1990). Table 1 presents a comparison between the two approaches but from an alternative viewpoint, depicting the reality of the situation regarding the utility of both methods. Although fundamentally in support of dynamic assessment, one cannot ignore or put aside the many positive aspects encountered within traditional forms of intelligence assessment and in so doing the author seeks to objectify arguments within the discipline of psychology which after all prides itself on its scientific status. Figure 2 illustrates the author’s understanding of dynamic assessment’s take on development as emanating from specific research agendas.

Intelligence

This term is either accurate in its varied semantic interpretations or falls woefully short of any apt description to date. Some view it with awe and others with suspicion; frequent attempts are made to deny its importance and no fewer are attempts made to elevate its status as scientific. It appears at once scientific and pseudoscientific, a misnomer waiting for reclassification into a system more worthy of study or an area already substantially endowed with copious literature attesting to its stature as a recognized domain of interest and research. The innate need, it seems, to classify, judge, compartmentalize and determine a sense of hierarchy can perhaps be said to issue from our evolutionary heritage as mammals where the establishment of some sort of controlling system was necessitated in order to live more harmoniously than that which is frequently reflected in nature. The study of intelligence is a continuous activity carried out by most people every day; our jobs as researchers is merely to systematize this knowledge and information into one system known as science.
Internalization of mediated external world via tools and signs. Immature cognitive functions find expression within play and similar situations where the genesis of potential functioning can be evidenced.

Zone of proximal development: development yet to occur, development occurring within guided context. No boundaries, undetermined in size and length. Can vary depending on nature of task and maturation already in place as well as nature of the individual.

Proximal factors recognized by Feuerstein (non-Western, psychologist) Vygotsky (Soviet educationalist, not considered mainstream even within his own country) and Piaget (Swiss trained biologist turned psychologist). Dynamic assessment, it seems, was from the outset geared towards acknowledgement and research within reductionist programmes, hence the call for a move towards neuropsychological dynamic assessment.

Distal factors recognized by Feuerstein and Vygotsky. Occurring primarily due to displacement of refugees, war and the subsequent ravaged socio-economic status of those robbed of opportunities to perform adequately. Feuerstein sought to accommodate as best as possible large numbers of cultural minorities and Vygotsky had to work within a context which did not allow for differences to exist in the first place.

Difficult circumstances in which to work indeed. Dynamic assessment rose to the challenge and subsequently proved intuitively appealing and has since evidenced much success. It has yet to rise to its last challenge:

- By fully integrating within mainstream assessment or
- By forging ahead on its course and making way for a new trajectory within psychology
- It could attempt to do both but such an exercise is cautioned against.

The external world

ZPD

Figure 2 Dynamic assessment and the understanding of development
Desperately Seeking a Definition

There is no definitive definition of intelligence and no one knows what it is (Neisworth & Bagnato, 1992; Newell, 1990; Sternberg, 1997c; Undheim, 1987). Moreover, it is a tedious exercise to try to define it (Jensen, 1982) as there are seemingly unlimited manifestations, psychometrically and neurologically, of what it supposedly is (Fuster, 2005) and how it is methodologically represented (Henry, Sternberg & Grigorenko, 2005). It is at once a workhorse and a diva because ‘the construct is extremely useful, but we do not have a proper definition of what it is and what it is not’ (Wilhelm & Engle, 2005, p. 7). The word ‘intelligence’ was first utilized in Spencer’s 1855 evolutionary-oriented text on psychological principles. To understand that the concept was couched in evolutionary terms upon initial use and to witness the definition come full circle some 150 years later is simultaneously surprising and unsurprising depending on one’s point of view and frame of reference. Two sets of theorists within the field have this to say about intelligence and it is necessary to quote verbatim for decisive and emphatic clarity:


There are many views in between. There is no agreed definition of intelligence, primarily because there is no agreed construct and, when a construct is defined, it is presumed to be measurable when that is not necessarily the case. So within this contrived situation psychologists are left without a construct, definition or manner of research. Dynamic assessment is leveraged on this. Intelligence can be seen as the ability to adapt. This definition comes very close to a definition of learning potential as cited by Van der Aalsvoort and Lidz (2002), who state that learning potential overcomes what a definition of intelligence seems to have evaded, namely, how environmental demands influence the adaptive capability of the individual. This concurs with Hamers, Hessels and Pennings’ (1996) definition of learning potential as the capacity to adapt to new situations by drawing on past experiences. Sternberg (1996) also draws attention to the difference between intelligence as measured by conventional IQ tests which do fairly represent future academic achievement and later success in life and successful intelligence, which he regards as the ability to profit from past experience. Adaptability is key in Sternberg’s (1997b) understanding of intelligence and successful functioning and intelligence as the ability to learn (Ones, Viswesvaran & Dilchert, 2005) is hardly different from the defining criterion for dynamic assessment which is simply more process-oriented in this regard. In this vein, then, successful intelligence as a theoretical construct comes closer to learning potential as theoretical construct.

One could perhaps envisage a continuum with IQ bridging far left and far right constructs as depicted in figure 3. The author, however, disagrees with Greenspan and Driscoll (1997). They state that adaptive functioning is sometimes utilized to counterbalance IQ, referring to aspects of personal competence other than what is traditionally understood to be IQ. It is emphasized, therefore, that adaptive functioning too has clear variance; some are better able to adapt than others in certain situations, by creating and shaping their own environments (Sternberg, 1997c), and so on, and this is evidenced in developed countries where adaptive increases in cognitive ability are promoted by environmental factors which are not as prevalent in developing countries (Barber, 2005). Adaptive functioning in our evolved past had resulted in a plastic brain which, some say, is suited to an environment quite dissimilar from the one we currently inhabit (Strauss, 2005). The counterargument is that the very uniqueness of human brain plasticity makes our adaptations so much the better. Trainability, which is a key point within dynamic assessment, is yet another link that can be fostered in bridging the gap to intelligence, as is evidenced in the literature: those with higher IQs are more receptive to training and are hence more ‘trainable’ (Lynn & Vanhanen, 2002).

g Is Everywhere, It Seems

g has also been proposed to have evolved as a domain-specific adaptation to a narrow sphere of ‘evolutionary novelty’ which has since proved its worth due to the novel-rich world in which humans currently find themselves resulting in g’s now ‘general’ status (Kanazawa, 2004). This ties in with the statement regarding developed countries which indeed have more novelty impinging on individuals’ brains. Kanazawa’s (2004) theory does, however, fly in the face of the generally accepted understanding of g as a general underlying mechanism as it proposes g as merely one module in the evolved brain’s repertoire of modularized functioning and does
Dynamic Assessment, Intelligence and Measurement

resembles Feuerstein’s definition of modifiability of the individual (Schur, Skuy, Zietsman & Fridjhon, 2002) and buffers the notion of cultural adaptation and deprivation as paramount to intelligence functioning as opposed to a strict and narrow construal of intelligence per se as utilized within Euro-American psychology (Berry, 1998; Gardner, 1998) or as perceived by society in general (Carroll, 1998). Via the meaning of adaptability, learning as a process-oriented concept also veers away from constraining itself in reified terms as the static definition of intelligence is often viewed (Feuerstein & Kozulin, 1995).

Assessment of adaptive functioning within various contexts other than those assessed within schooling contexts reveals holistic pictures of general functioning which can easily shed light on functioning within specified narrow contexts (Oakland, 1980). There are many research traditions within the intelligence field emanating from across the world with numerous ‘mini’ traditions in each. There are remarkable similarities between some traditions evidencing convergence of thought and thus indicating that there are indeed universal concepts and criteria of ‘intelligence’ (Sternberg, 2004). Although lay definitions of intelligence also form part of many cultural systems and appear very different from one another (Baral & Das, 2004, Mpofu, 2004), far more testing continues informally than within controlled testing situations (Weinberg, 1989).

**Adaptability As Process**

Adaptability can mean many things to many researchers and in keeping with Hansen’s (2003) link between intelligence and learning ability a case can be made for linking the broad definition of dynamic assessment: ‘[they] become better learners in other words, they become more intelligent’ (p. 60). Donald (1997) views adaptability at the neuronal level, noting how neural plasticity has allowed for cultural development of language and writing which, he states, is not a module housed within the brain but reflects the brain’s adaptability to its environment. Moreover, he argues that cognitive ‘fundamentals’ are not necessarily biologically universal but unique to specific cultures. Berry’s (1998) opinion on intelligence also pivots on the notion of adaptability, but in this instance it is the adaptability to culture which is essential in determining group survival. Different cultures vary in their responses to different test items, thus ‘phenotypic intelligence varies from culture to culture’ (Greenfield, 1998, p. 81). It also resembles Feuerstein’s definition of modifiability of the individual (Schur, Skuy, Zietsman & Fridjhon, 2002) and buffers the notion of cultural adaptation and deprivation as paramount to intelligence functioning as opposed to a strict and narrow construal of intelligence per se as utilized within Euro-American psychology (Berry, 1998; Gardner, 1998) or as perceived by society in general (Carroll, 1998). Via the meaning of adaptability, learning as a process-oriented concept also veers away from constraining itself in reified terms as the static definition of intelligence is often viewed (Feuerstein & Kozulin, 1995).

Assessment of adaptive functioning within various contexts other than those assessed within schooling contexts reveals holistic pictures of general functioning which can easily shed light on functioning within specified narrow contexts (Oakland, 1980). There are many research traditions within the intelligence field emanating from across the world with numerous ‘mini’ traditions in each. There are remarkable similarities between some traditions evidencing convergence of thought and thus indicating that there are indeed universal concepts and criteria of ‘intelligence’ (Sternberg, 2004). Although lay definitions of intelligence also form part of many cultural systems and appear very different from one another (Baral & Das, 2004, Mpofu, 2004), far more testing continues informally than within controlled testing situations (Weinberg, 1989).

**Lay and Expert Understandings of Intelligence**

Natural intelligence and artifactual intelligence, as described by Glaser (1998), resemble Vygotsky’s lower-and higher-order thinking where performance within a given cultural setting is normal but skills need to be taught for higher-order processes as required by schooling. It is the latter which is problematic within culturally diverse and deprived individuals and usually not the former. This implies that the latter test for only school-like subjects, which is true, more often than not. Colvin
(1921) stated that he was, in principle, in agreement with this definition but considered it too broad as it encompasses instinctive as well as learned behavioural adaptation to the environment. This is true, but evolutionary adaptation to the environment is no less an indicator of intelligence than anything else, yet once again criticisms are lodged at this broad notion of defined intelligence (Cowan, 2005). Intelligence research is perhaps problematic because we might well be asking the wrong questions (Estes, 1998) and it must be noted that definitions are only as good as their utility in explaining aspects pertinent to the intelligence debate (Zigler, 1998). Utility value is perhaps the most obvious in naturalistic or everyday settings where intelligence is valued according to a number of 'lay' criteria that, when studied closely, reveal its similarity to expert definitions of intelligence (Kail & Pellegrino, 1985). Yet, Derr (1989) and Sternberg (1979) caution against the mix of lay and informed views of intelligence definitions as this is a matter for science and not for ordinary discourse. Derr (1989) also posits that some conceptual confusion could well dissipate if such considerations were given their due. Unfortunately, common understandings of intelligence have not yet filtered through to informed conceptualizations as once envisaged (Turnbull, 1979).

Approaches to the Study of Intelligence

Utility and parsimony are hallmarks of good theories, and intelligence theorizing is an area of investigation which needs severe delimiting or theoretical excision in order to prove successful (Snow, 1998). All theoretical programmes (e.g. information-processing, learning, factor-analytic and cognitive developmental) are by their nature limited to and by their areas of investigation and points of departure (Li, 1996). Intelligence theories explain different things about the same phenomenon, with some theories tending to seek structure, others seeking causes of such structure, whilst yet others emphasize function and thus come to different conclusions (Carroll, 1994). In accordance with these definitions is the embedded notion of intelligence as a problem-solving ability as one has to solve various problems in order to adapt (Wenke, French & Funke, 2005). Along with the assessments of problem-solving, myriad other aspects tie in with intelligence assessment (e.g. cognitive speed, perception, attention and memory), hence the diverse array of intelligence sub-componential research areas. The concepts of ‘intellect’ and ‘intelligence’ have followed different historical paths and can be separated within the mainstream intelligence arena, at least within the dominant traditions. Russian concepts of intelligence have fused the two, rendering a definition of intelligence without recourse to the definition espoused within Western traditions.

Traditions of Explanations

Factor analytic explanations of intellectual structure can inform and be informed by other manners of viewing intellect, so no one view can be said to represent all there is to intelligence. Behavioural genetics can at least attempt a partial explanation of how and why factor analytic structures form in the way they do via intelligence assessment and general modelling of cognitive growth (Cherny, Fulk & Hewitt, 1997), the father of which is Francis Galton (Jensen, 1997) who also introduced twin and adoption method studies (Bouchard, 1997). Given the time and context during much of early intelligence research historical development, it is not really surprising that statistical envisaging of intelligence predominated. Psychometrics aims to measure and quantify, whereas more biologically attuned models of intelligence seek to provide explanation about developmental change, while behavioural genetics attempts to account for heritability changes throughout life and how this impacts on, or is impacted by, g (Ceci & Bruck, 1994). The plea for a subsequent melding of approaches can only benefit the discipline, although Sternberg’s (1997a) warning that the biological approach to intelligence has yet to offer lucid approaches to the integration of biological models of learning and how learning occurs within practical settings should not be ignored. However, Brody’s (1992) assertion that intelligence is a heritable trait also cannot be disregarded. Note, however, that dynamic assessment translates ‘trait’ into ‘state’ and hence moves away from the concept of immutability to one of modifiability (Feuerstein & Feuerstein, 2001). This implies that there are biological correlates of intelligence with findings from inspection time studies to event-related potential studies informing different aspects of information-processing (Fernández-Ballesteros & Colom, 2005; Li & Kunzmann, 2004). ‘It is relatively easy to discover the biological correlates of intelligence but it is relatively difficult to determine the causal relationship between a biological measure and intelligence’ (Brody, 1992, p. 215; emphasis added).
Dynamic Assessment’s Entanglement

A debate has been ongoing since the publication of Feuerstein’s (1979) groundbreaking book on the dynamic assessment of retarded performers, a debate that resurfaced in 1992 when Frisby and Braden severely criticized a number of aspects of dynamic assessment research. During the period between the publication of Feuerstein’s book and Frisby and Braden’s article there were numerous debates within the field but none reached fever pitch until 1998 when Grigorenko and Sternberg (1998) published a lengthy article, once again critiquing the field. Proponents of dynamic assessment recently engaged in a peer-reviewed debate about the issue of dynamic assessment’s integrity and it is pertinent to expand on it as it further qualifies the need for this issue to be redressed. Issues in Education (2001) dedicated vol. 7, no. 2 to this debate. Of critical importance is the response from a host of astute researchers within the field of dynamic assessment to an article written by Sternberg and Grigorenko (2001a). The core of the issue rests with the confusion pervading the field both between professionals and seasoned researchers and between professionals and novices to the field (Sternberg & Grigorenko, 2001a). Progress within the dynamic assessment field has increased in terms of the number of published articles and results from disparate sources, yet a common and unifying feature is the absence of coherence and a lack of identifiable theory and common thread running throughout the discipline. In fact, the dynamic assessment trend lacks the very ingredients that most theories in science and social science require it to be accepted as a theory at all. A question that can be asked is whether the psychometric approach to understanding intelligence can be called a science at all. Rust and Golombok’s (1992) response is to highlight the fact that social science and natural science research cannot be equated in terms of what constitutes science and its progress.

Sternberg, among others, as a leading proponent of intelligence research, has tackled many burning issues within the field and has subsequently received due criticism of his own (Fernandez-Ballesteros & Calero, 2001; Gerber, 2001; Haywood, 2001). However, his critique has come at a time when it is urgently needed. ‘Some data on dynamic testing are mixed. Some of the data are positive – especially when they are collected by the originators of a given approach’ (Sternberg & Grigorenko, 2001a, p. 161). Furthermore, it has been intimated that dynamic assessment has yet to reveal its ‘promise’ of a revolution in testing and that not all dynamic testing can perform ‘miracles’ of measurement with the zone of proximal development (ZPD). Another important point highlighted by Sternberg and Grigorenko (2002) is the fact that not only are general issues within the dynamic assessment field debated, but even basic issues have yet to receive clarification. It is argued that one of the main reasons why the field is in disarray is due to its lack of a sound and fundamental conceptual framework. Another stumbling block within the broader intelligence field is the fact that it has not moved beyond the conceptual confines of intelligence as construed by Spearman (1904) (Sternberg & Grigorenko, 2001b). A refurbished and renovated or remodelled view of dynamic assessment within intelligence is called for.

Measurement

The Quantitative Imperative

Understanding assessment requires returning to its prime considerations, its foundations, the fertile grounds from which it sprung and grew into what it currently is: a noble yet at times misguided effort to assign numerals and applying a range of statistical techniques to what are purported to be reified constructs in the hope of fulfilling a utopian ideal of equality and success. It has had a chequered history and has often fallen far short of these ideals which, at times, have yielded precisely the opposite results. Psychology’s eclectic array of research efforts has been cited as a main reason why the quantitative imperative has been incorrectly aligned with positivism (Michell, 2003b) even though naïve positivist methodologies have been cited as one among many reasons why psychometrics has had a less than sparkling reputation among some workforces at certain periods (Sehlapelo & Terre Blanche, 1996). Rudolf Carnap was influential in placing his ideas within frameworks, stating that no framework could be judged right or wrong, because it was not an assertion. The need to move science along in terms of bettering the whole enterprise necessitates various methods which seek to do just this, as long as the framework is useful. Stevens’ (1946) scales have been incorrectly assumed to have come from a fully fledged and developed methodological framework. However, there was no such framework but rather an attempt at a solution (Michell, 2003b).
Issues of inference and problematic measurement resulted in psychologists’ increasing tendency to rely on statisticians’ models, so bringing into question the validity and acceptability of the quantification of psychological constructs much later. We now find ourselves once again engaged in a debate about the origins and development of dynamic assessment. It also bears on dynamic assessment’s reluctance to make decisions on static, one-time assessment scores alone (Wiedl, Guthke & Wingenfeld, 1995). A main hypothesis is that dynamic assessment has not found its place within the broader intelligence assessment framework due to misunderstandings about what in fact is meant by ‘measurement.’ When assessed in this light, it is obvious that dynamic assessment is fundamentally, philosophically and psychologically a theory that is not aligned with traditional assessment. This situation is made even more intractable when one considers the almost pure utilitarian value of many intelligence assessment tests (Barrett, 1998).

In this instance, Barrett (1998) stresses that intelligence as a trait construct has much pragmatic value but little causal theoretical backing and hence little scientific value, mostly due to poorly thought-out measurement. Statistics reflect the numbers not the constructs, yet numbers indicate where we are, what we do and how much of it there is and it is imperative to science, as science would be ‘impossible without an evolving network of stable measures’ (Wright, 1997b, p. 33). The task of adequate representation is the psychologist’s responsibility. As Eves and Newsom (1965) state, a particular philosophy can be equated with a process of refinement and ordering of experiences and values, and in so doing find relations that are normally considered disparate and differences among things which are normally considered the same. Hence, a philosophy is essentially a description of a theory concerning the nature of something. Lazarsfeld (1977) posits four reasons why quantification was becoming an increasingly important part of the social sphere as early as the seventeenth century:

1. the rise of capitalism;
2. the prevailing Baconian spirit;
3. pressure to derive accuracy similar to that of the natural science in social endeavours;
4. the increasing role of public administration and planning due to bourgeoning populations – this has much to do with insurance and the role of money and taxation.

Ramul (1963) adds that psychological quantification, measurement and ratings were being practised well before such physicalist notions of measurement were discussed within the psychological domain and cites early usage of ratings and measures within statistics, vision, memory, attention and thought. Most measures of psychological import go back only as far as the beginning of the eighteenth century and only a few were conducted by persons considered psychologists. The need for quantification in psychology proceeds along the following very narrow rationale (Schönemann, 1994):

- science is defined by its quantification via concatenation of its constructs;
- any discipline aspiring to call itself a science must adhere to this principle;
- only if this is so can the discipline be called a science;
- psychology does not possess constructs which are quantifiable via concatenation of these constructs; hence
- psychology is not a science.

Measurement rhetoric has done a grave disservice to the psychological assessment enterprise and no amount of sophistication as exemplified by statistics and mathematical modelling can ever hope to rectify a problem which is clearly insoluble from this approach; the problem needs to be solved from another level entirely. Currently psychology exists within many realms, each claiming to have scientific accuracy, reliability and validity. These terms can lose their meanings very easily if misapplied. Dynamic assessment is currently placed in both realms, thus resulting in tension which has yet to be resolved. However, this is not only a fault of this sub-discipline but a trend within the whole of the psychological discipline. Michell’s (2001) pointed criticism is levelled at the misguided efforts touted by the social science measurement effort which he envisages as ‘instances of the scientific method applied to psychology’ (p. 211). The manner in which psychometrics is taught, he says, subverts the scientific method. Once again, it is necessary to reiterate that the tools of a trade are not necessarily at fault; it is the incorrect tools which are being used which is very much at fault. The difference inherent in scientifically experimenting a priori and instrumentally going about the practical work of extracting scientific concepts are the tasks of quantification (Michell, 1997). Yet utilizing the instruments before one has worked out the scientific basis for measures is ‘pretence of science’ (p. 359).
Using psychometric tests to assess psychological constructs is not a proven mechanism and remains at best hypothetical (Michell, 2001). Rumblings about the soundness of psychometric measurement can be traced back to the first quarter of the twentieth century and is thus not a new concern for psychometrists (Maraun, 1998; Stevens, 1946). However, due to ‘big business’ psychological measurement and the seeming lack of mathematically trained psychologists, the utilization of measurement and the ever-increasing sophistication of statistical techniques (Barrett, 2002, 2003; Blinkhorn, 1997) the characteristic lack of enthusiasm for test use by psychologists is evident (Maraun, 1998; Michell, 2005). The issue of meaning-ladenness and measurement of a construct is suffused with confusion (Barrett, 2001). Utilizing 6 as a measured construct is tautological, as psychometricians assign 6 to the supposedly quantifiable construct ‘intelligence’ and then seek to measure 6. Upon locating it along a continuum of ‘less to more’ 6 is claimed to exist, which is clearly absurd (Maraun, 1998). From this point onwards, the robust and sound statistical techniques used become evermore detailed and inherently presumptuous in terms of manipulating 6 in ways which falsely bespeak of its existence. Constructs are identified a priori as existing, but as to whether they do or not is another philosophical question altogether. Added to this is another erroneous Pythagorean assumption that all attributes are quantifiable (Barrett, 2005; Michell, 1999, 2003b). Assuming that 6 measures intelligence has to be done within a context of rule-bound associations, which are themselves outcomes of human behaviour. Rules are not empirical facts or findings, but a set of instructions to follow (Maraun, 1998). Having identified supposedly quantifiable constructs, techniques further constrain interpretations of findings in such a manner as to lead to the acknowledgement of a methodological artefact and nothing more (Barrett, 1998). This turns the artefact into instantiated fact, which is a leap not always scientifically condoned. What occurs here, states Michell (1997), is a gross instance of ‘thought disorder’, which is defined as blindly following in a tradition of delusion of simply not acquainting oneself with methodological concerns as it pertains to psychological measurement. This, states Michell (2001), subverts the scientific enterprise and is an instance of psychometrics playing the role of a diseased method or pathology of science. Notwithstanding these strictures, there is also the very important point of having no identifiable or workable common unit or metric with which to measure the purported construct (Barrett, 1998; Kline, 1998). Measurement is theoretically assured if, as Wright (1997a) maintains, the following is adhered to:

- to measure is to infer (which is precisely the leap made within assessment, otherwise there would be no point);
- measures are obtained by stochastic approximations;
- measures are one-dimensional;
- measures are counted in abstract units which are of fixed sizes (note that the abstractions are of fixed size which need not necessarily indicate that the constructs being measured are of fixed size);
- measurement results are not influenced by outside influences.

Clearly, the path followed by the natural sciences works for the natural sciences and it could work for varying sub-disciplines within psychology, only if stringent rules are followed and implemented. There are areas amenable to such treatment and there are areas which are not amenable to such treatment (Barrett, 1998; Borsboom, 2005; Michell, 1997). It is the job of psychologists to piece together their discipline and sort out these issues and determine the fit between theory and data or a nomological network (Strauman, 2001). It is clear that psychology’s challenge is to account for its scientific status in a different manner from that of the natural sciences. Neither observability nor levels of analyses will suffice as a method of knowledge-gathering as psychologists work with inference from observation and theorizing (Strauman, 2001). Maraun (1998) follows Wittgenstein’s arguments in terms of rule-based measurement and argues against what he considers a conflation of conceptual and empirical issues when rendering the measurement issue within the context of construct validation theory, as espoused by Cronbach and Meehl (1955).

Measures, states Maraun (1998), and how we measure are not empirical issues but logico-grammatical issues and attempts at solving conceptual issues via rule-based measurements which are predicated on human judgement as to what constitutes these rules cannot be equated. Cronbach and Meehl’s (1955) predicates for construct validity are based on a nomological net of concepts derived from this philosophy of science and are more applicable to the natural sciences than to the social sciences. The concept of validity within the natural sciences is redundant (Kline, 1998) as concepts are a public domain or more obviously manifest and
detecting error in what is purportedly measured is far easier within the natural sciences, which is not to say that all constructs within the natural sciences are amenable to immediate comprehension.

Think of g and one immediately knows of much research attesting to its statistical existence, but substantive psychological theory has yet to account for it, not to mention trying to explain what it is in a psychological sense (Kyllonen, 1996). Barrett (2005) asks the pertinent question of whether modern psychometrics, which is now dominated by psychological statistics, has lost its way in terms of concentrating on the substantive thesis underlying the statistical thesis. Recall Meehl’s (1967) lament about the lack of fit between theoretical and substantive theories in terms of null hypothesis significance testing. Building models predicated on constructs which have been validated is precarious because a number of assumptions are being made, among others:

- that the construct actually exists (it is possible that it likely exists in some form or another);
- any tool utilized to search for the construct is purpose-built (with constructs being perpetually inferred) (Utley, Haywood & Masters, 1992). This is tautologous as it is speculated that \( \sigma \) exists, a technique is brought in to search for \( \sigma \) which was custom built to find \( \sigma \). Given this logic, it will in all likelihood find \( \sigma \). A priori considerations will lead a technique to search for an a priori concern (Williams, Zimmerman, Zumbo & Ross, 2003);
- the nature of \( \sigma \) is housed within the context of science progression itself lodged on the bedrock of any variety of philosophy of science schools;
- searching for \( \sigma \) is loaded before we even start the investigation;
- \( \sigma \) is found and conclusions are drawn in favour of its empirical existence;
- \( \sigma \) is rarely noted for being an extension of science practice dictated to by the above considerations;
- \( \sigma \) is defined according to the construct definition used. Any construct is as valid as any other provided one has followed the strict tenets laid down by whatever model or school one happens to endorse. This unfortunately still tells us nothing about the actual underlying nature of the construct (Barrett, 2001).

In such a case, neural conductivity might well function as an intelligence correlate. The correct tools should be employed to determine this. Tools are not to be borrowed from domains for which they were clearly not designed. Psychometric measures and physiological measures are bound to correlate, but how certain can we be that this is not another instance of Meehl’s (1990; 1997) ‘crud’ factor? Measurement of characteristics follows on directly from definitions of both measurement and the characteristic at hand (Maraun, 1998). The logic of quantification in the social sciences usually runs as follows and is perfectly acceptable practice bar one in the correct domain in which one can apply such strategies. This is that the first level of quantification would be one of assigning constructs numerics or the metrification of constructs which proceeds with summarizing statistics of these numerical counts and ends with the mathematicization of supposed theoretical entities (Meehl, 1998). As has been argued above, the logic flowing from this argument is sound enough given the correct circumstances in which to practise such dealings.

However, the first premise is flawed if one considers that numbers of entities supposedly existing is both right or wrong depending on how one views the situation. Numerical assignation relates to this discussion of measurement; hence the need to include in this larger debate the mathematical foundation of measurement. Ross’s (1964) delineation of the formal analytical view of theory constituents is similar in nature to his numerical assignation discussion pertinent to this chapter. Depending on the nature of a strict, one-to-one, isomorphic relation between hypothesized constructs and their numerical counterparts, some schemes are more amenable to numerical assignation than others and this assumes a common unit across the discipline, thus making it axiomatic (Barrett, 2000). Most often, as is the case within psychology, the question as to whether one can even assign numerals to non-quantifiable traits is never asked (Barrett, 2003). Hypothetico-deductive means of investigating non-quantifiable traits exist, such as facet theory within intelligence research and cellular automata, and have existed for some time (Süß & Beauducel, 2005). The question then is why such methods cannot be employed within psychometrics (Barrett, 2003). Is there a mismatch between ability as a predictor and task performance as a criterion (Ackerman, 2005)? g, if it exists, can most likely be probed via methods and tools amenable to such probing. Currently the wrong tools are being used. The deployment of theoretical models, schemes and other myriad conceptual frameworks of how the brain
functions during intelligence tests are premised on statistical findings which are derived from mathematical artefacts, themselves products of underlying mathematical models which guide the interpretation of psychometric test findings.

The assumption underlying this path of inference is that there seems to be a one-to-one correspondence or mapping of theoretical mathematical entity and actual brain functioning and processing. Granted that sophisticated neurological and less subtle invasive techniques were not yet developed during the heady days of Pearson's statistical development and analysis of data, a mathematical tribute and contribution to the measurement of human abilities were conducted in part by Galton and all their successive followers within the same tradition (Nunnally, 1978). Notwithstanding the great leaps in intelligence research, the role of mathematical modelling to fit data at a behavioural level is perhaps overstated or slightly outmoded. Mapping local brain functioning on a one-to-one basis with models developed from this type of data would seem to be more parsimonious than what has gone before. Advocating parsimony is not an underlying assumption within the preceding statement, as it is erroneous to think that in all spheres both the behavioural and social sciences will progress indefinitely in a parsimonious fashion. Cognizance is taken of the fact that the mere introduction of any one measuring technique immediately delimits the area of investigation in terms of what can and cannot be observed and/or derived. No single technique known to the natural or social sciences can derive all aspects of a function or structure. There are, however, methods and models available today which come close to doing just that as opposed to the continuous utilization of some assumptions inherent within models followed from the early days of twentieth-century psychophysics.

Chapter Summary

This opening chapter has introduced the reader to three interconnected domains: dynamic assessment, intelligence and measurement. These three domains form part of the larger enterprise which is collectively understood to be a science of human behaviour, namely, psychology. Dynamic assessment was contextualized within the broader field of assessment, but persistent issues which have yet to be resolved were highlighted. It may seem rather negative to introduce disputes within the field at such an early point in this book. However, it is these very issues with which this book concerns itself. In order to understand more fully any discipline within science, it is always good practice to start with its historical development. In this instance, dynamic assessment offers a wealth of historical information assisting the reader in placing the discipline today. The essential meaning of dynamic assessment is not new but has existed in one form or another for the past 150 years.

Early progenitors of the movement was briefly sketched, with emphasis on three major nineteenth- and twentieth-century exponents: Vygotsky, Binet and Feuerstein. Each brought to the field a unique and lasting theoretical contribution. The geographic spread of dynamic assessment practice was mentioned, with particular emphasis placed on the importance of socio-cultural impingements. The fundamentals of the movement were provided, with attention being paid to the nature of learning as a tool and measurement, the nature of the transfer of skills, the pivotal notion of mediation and varying assumptions within the approach. The next section investigated the often contentious field of intelligence where myriad definitions reflect the ongoing concerns of this field. Key aspects of intelligence research were looked at and included aspects such as g, adaptability, lay and expert opinions of intelligence, approaches to the study of intelligence and various traditions of explanation. Dynamic assessment and intelligence were finally brought together to position one within the other and to help identify the various concerns within the movement. Dynamic assessment can, it is supposed, be construed as being entangled in terms of basic philosophies and methodologies. The chapter concluded with an overview of what is commonly referred to as the quantitative imperative and sets the tone for the discussion in chapter 3 dealing with measurement as an enterprise within psychology.

A Glance at the Rest of the Book

Chapter 2 entreats the reader to study carefully the philosophical underpinnings of psychological science as it is encompassed within social science research and the broader field of scientific knowledge acquisition. Also included is an introduction to and discussion of the meta-theoretical framework utilized, according to which theories and models of dynamic assessment
within intelligence are to be studied. This chapter also discusses the influence of historicity, socio-politics, concepts, theories, schemata and models within social science research. Chapter 3 addresses the fundamentals of psychological assessment, includes sections on the mathematical, statistical and measurement foundations and concludes with how these foundations form and are informed by intelligence assessment – specifically dynamic assessment – and details the manner in which these concerns fit into the larger attenuated Madsenian framework. Chapter 4 revolves around the comparison of dynamic assessment theories and models within intelligence assessment and seeks to explore the developed meta-theoretical framework for dynamic assessment and intelligence. Chapter 5 concludes with summaries, conclusions and recommendations.