

The Learning Potential Assessment Device*

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In 1979, the senior author, in a book entitled *The Dynamic Assessment of Retarded Performers*, presented the rationale for needed alternatives to conventional psychometric assessment, as well as a new approach to the assessment of learning potential, the Learning Potential Assessment Device (LPAD). The LPAD was, and continues to be, related to the development of the theory of structural cognitive modifiability (SCM) and its applied systems – both conceptual (Mediated Learning Experience; MLE) and programmatic (Instrumental Enrichment - IE). That formulation of the concepts and processes of what came to be generally described as dynamic assessment stimulated considerable research and clinical interest.

As early as 1981, Ramey and MacPhee, in a review of the Feuerstein et al (1979) book, identified the theory and approach as representing a new paradigm with regard to assessment, with particular impact on conventional psychometric practice. The shift from traditional assessment methods was, they said, impelled by disenchantment with the logical inconsistencies in the traditional system (theory and practice), by a recognition of the need to respond differently to specific segments of the population, and by the emergence of a new conception of learning and intelligence that spurs the development of a new "technology." That paradigm, presented by Feuerstein and his colleagues, stimulated great interest in the development of procedures and methodology to provide alternatives to a wide range of conventional practices.

This interest has been reflected in the development of a number of systems and approaches to assessment that have been identified as dynamic. They have been subjected to critical review and comparative analyses (see Campione, 1989; Jitendra & Kameenui, 1993; Sternberg and Grigirenko, 2002) and have joined the LPAD in the pantheon of attempts to address the acknowledged need for paradigm shifts. Among the more systematically developed are Assisted Learning for Transfer (Campione & Brown, 1987), Testing the Limits (Carlson & Wiedl, 1978, 1979), the Continuum of Assessment Model (Bransford, Delclos, Vye, Burns, & Hasselbring, 1987); Learning Potential (Budoff, 1974, 1987); and Learning Tests (Guthke, 1992; Guthke & Stein, 1996). Each of these approaches has addressed aspects of the dynamic assessment paradigm, adding important dimensions to the definitions and processes of assessment, but – as we shall describe below – none goes far enough to implement changes in the process to fully meet what we believe are the critical and essential requirements of the assessment process. There is a growing literature, stimulated by our initial thinking and operational propositions but less closely related to our perspective, that considers the various elements, needs, methodologies, and research applications of alternative assessment processes that are to some degree categorized as dynamic in their nature and purpose (see Hamers, Sijtsma, & Ruijsenaars, 1993; Haywood & Tzuriel, 1992; Lidz, 1987; Lidz and Elliott, 2000).

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The LPAD reflects a different view of human beings and their development. It represents a sharp departure from practices that are based on a view of human characteristics as fixed, immutable, and therefore subject to study by psychometric methods of measurement. In its underlying theory, in its structure of instruments, and in its development of procedures, the LPAD presents a radical alternative to the statistically based, normative comparisons and predictive goals of conventional assessment. In its simplest sense, the LPAD shifts the focus from what the individual is able to do (at a given moment in time) to what the individual *can become able to do* in the immediate time frame and in subsequent, future interactions. In the LPAD, whatever is done, through the process of assessment and stimulation of behavioral changes, cannot be considered as the limits of the individual's ability to benefit from the intervention or the examiner's activity. It is the limit of what can be done at the particular moment. Eventually, at some other time, with modified and adapted interventions, or in some other regions of functioning, further modifiability can be anticipated. It is this basic understanding – that we cannot reach all of the regions or potentials of knowledge about the other without an open, adaptive posture in our process and our instrumentation – that underlies the LPAD philosophy.

In this regard, it has become necessary to change some of our nomenclature. As the goal of the LPAD is to discover the hidden potential of the individual, which is not revealed by manifest levels of functioning, the use of the term *potential* has come to be somewhat ambiguous and used in a limiting and restrictive way. We have pointed out elsewhere (Feuerstein, Feuerstein, & Gross, 1996) that the construct of potential is as limiting as the concept of intelligence to a given quantity or even quality of the individual's functioning. We are therefore proposing the term *propensity* to denote qualities of power, energy, orientation, and inclination, so as to better reflect the individual's unrevealed innate capacities. Thus, the Learning *Potential* Assessment Device, which has had an active life of over 40 years in use, becomes the Learning *Propensity* Assessment Device to do greater justice to the mental construct of intelligence as a propensity to change and adapt.

The LPAD Process of Dynamic Assessment

The LPAD is designed to achieve goals that are substantially different from traditional, static psychometric assessment methods. The differences can be characterized according to the dimensions listed in Table 1. These dimensions require a theoretical conception that supports and guides these activities. The LPAD paradigm is based on the theory of SCM and on MLE. In addition, two operationalized theoretical constructs have been developed to guide the observation and decision making of the assessment, and they will be described here: the *deficient cognitive functions* and the *cognitive map*. The LPAD is thus "theory- and construct-specific," and users of the approach must be familiar with the philosophical belief system that holds individuals to be modifiable, as well as amenable to registering and detecting adaptive changes. The LPAD is a first step toward the goal of postulating definitions of the enhancement of human modifiability, setting theoretical conditions and giving legitimacy and direction to the intervention necessary to produce the desired and feasible changes (Feuerstein et al., 1996).

Table 4.1 Comparative Assessment Methods

Structural Cognitive Modifiability (SCM): Human beings are viewed as having a unique propensity to change or be modified in the structure of their cognitive functioning, as they respond to changing demands of life situations. Changes occur in response to external stimuli and internal conditions. They are also a product of an active involvement in the process of learning and changing. Change is structural when (a) change in a part affects the whole to which the changed part belongs; (b) when the very process itself of change is transformed in its rhythm, amplitude, and direction; and (c) when the produced change is self-perpetuating, reflecting an autonomous, self-regulatory nature. SCM is assumed to occur when the changes are characterized by a certain degree of permanence and pervasiveness and when they are generalizable. Human beings are viewed as open systems, accessible to change throughout their life spans, and responsive to conditions of remediation, providing that the intervention is appropriately directed (in quantity and quality) to the individual's need.

Mediated Learning Experience (MLE) – Dimensions and Quality of the Interaction

Cognitive development occurs through an individual-environment interaction. This interaction is affected by certain characteristics of the organism (including those of heredity, organicity, maturation, and the like) and qualities of the environment (educational opportunities, socio-economic status, cultural experience, emotional contacts with significant others). Changes produced by interaction between the organism and the environment happen through two modalities: (a) as a *direct* learning experience, immediately consequent to direct exposure to stimulation, and (b) through a *mediated* learning experience that requires the presence and activity of a human being to filter, select, interpret, and elaborate that which has been experienced. MLE theory holds that the organismic and environmental factors are *distal* determinants of cognitive development (causing differential responses to the environment), whereas MLE constitutes *the proximal* determinant that influences structural cognitive development and the potential for being adaptive to and modified by experience (see Appendix p.).

For MLE to occur, an *intentional* human being must interpose him or herself between the stimuli and the learner's response, with the intention of mediating the stimuli or the response to the learner. This is mediation in the sense that the situation (stimuli and responses) are modified by affecting qualities of intensity, context, frequency, and order, while at the same time arousing the individual's vigilance, awareness, and sensitivity. The interactional experience may have the quality of repeating or eliminating various stimuli, relating events in time or space, or imbuing experience with meaning (see Appendix p.).

MLE requires the presence of three parameters that are the object of planful attention on the part of the mediator: intentionality and reciprocity, transcendence, and meaning. In addition, situational variables in the encounter present opportunities to mediate for other important parameters of the experience: regulation and control of behavior, feelings of competence, psychological differentiation and individuation, sharing behavior, goal seeking/planning/achieving behavior, competence/novelty/complexity, self-change, optimistic choice of alternatives, and feelings of belonging. Each of these criterial parameters offers opportunities for the mediator to make planned and systematic choices to exploit the mediational potential of the situation to encourage cognitive functioning and stimulate modifiability.

Mediation is different from other kinds of interventions, such as coaching, teaching, or testing the limits (which is one of the features of another approach to dynamic assessment; see Carlson & Wiedl, 1978, 1979). The mediator is animated by intentionality, and this is coupled with reciprocity, which engages the examiner in a process of actively changing the three partners in the mediational interaction: the mediator, the mediatee, and the message or content of the interaction. The mediational interaction creates a closed loop between the components. For example, the examiner emits a message – a stimulus. If the examiner does not make sure that the subject has indeed received it, then the mediational interaction has not been experienced, intentionality requires the mediator to be alert, vigilant, and animated if the situation is to have all the necessary conditions to assure that the subject grasps the task and is ready to focus and interact with it. As meaningful changes are observed, the subject is encouraged to go beyond the strictly necessary to the areas and regions to which the recently learned has been applied successfully. The mediation of transcendence goes beyond the immediate content of the interaction. For example, in a matrices problem, when a subject must distinguish the two determinants of shape and color and responds with "green and black lines," that person is led to use the higher order concepts of color and shape because in subsequent problems those concepts will be needed to describe elements, differing from those previously experienced. When individuals are able to identify and describe various characteristics of the stimuli they experience, they acquire concepts that are not restricted to the immediate context in which they are learned but transcend immediate needs and are available- to be applied to elements in a variety of situations. The mediational process therefore extends beyond a simple, task-oriented, product-oriented, coaching/teaching objective toward making the individual able to function independently of specific situations, and it renders the learner able to adapt to the new dimensions that he or she will confront.

The procedures and instruments of the LPAD are designed to enable this to occur to the highest degree possible. Detailed descriptions of the particular qualities and manifestations of the MLE parameters are available in a number of other sources (Feuerstein et al, 1979,1980, 1995; Feuerstein & Feuerstein, 1991).

MLE significantly affects the individual's capacity to become modified structurally through direct exposure to stimuli. The more MLE acquired by the individual, the more benefit that person derives from direct exposure to learning; the less MLE received, the less a person is able to learn from direct exposure, and the less adaptive the individual will be. This is a central construct for the structure and application of the LPAD as an assessment methodology.

Deficient Cognitive Functions – Dimensions of the Individual

Inadequate MLE leads to cognitive functions at the input, elaboration or output phases of the mental act that are undeveloped, impaired, or fragile in their presence and contribution to learning and cognitive behavior. The process orientation that is part of the LPAD creates conditions that elicit the appearance of deficient cognitive functions and determine their level, nature, and amenability to change – as an index of potential for structural cognitive modifiability.

These deficiencies do not necessarily appear in toto as a complete repertoire of the cognitive characteristics of the low-functioning individual (e.g., the culturally deprived, the learning disabled, etc.). Certain deficiencies may appear in a given individual whereas others may be absent. Accordingly, different individuals will need more

or less investment in one function rather than another and be more or less resistant to change, according to the profile of modifiability that emerges from the assessment process. The presence of a deficient cognitive function, the pattern of both deficiencies and well-established and/or modifiable functions, and their saliency in the profile of the individual will determine the nature of the intervention, according to the amount of resistance encountered and the extent of the investment required to overcome it.

The cognitive functions are presented as deficiencies for the very important reason that we wish to focus on intervention, modifiability, and change. To do so, we describe the functions in terms of their absence or impairment to direct attention and effort toward needed and available interventions and strategies, as well as the propensity in the individual to be modified. There has been a tendency by some proponents of dynamic assessment to describe the cognitive functions from a positive perspective – that is, in terms of their presence in the behavioral repertoire of the individual. Although this can be viewed as the other side of the same coin, there is the danger that such an effort contributes to a fixed and static view of the individual's functional potential, which is contrary to the goals and philosophy of the LPAD approach to dynamic assessment.

The deficient cognitive functions can be analyzed as they manifest themselves in the three phases of the mental act: the input phase, the elaboration phase, and the output phase (see Appendix). The input and output phases can be described as peripheral compared to the elaboration phase, which is the core of the mental act. This orientation links deficient functions to the phases of the mental act and helps define the specific factors impairing successful mastery of the task, suggesting types of strategies for their correction. Although this division is somewhat artificial (in the sense that the mental activity within these phases is indivisible), it helps in both diagnosis and prescription. The interactions occurring between and among the phases are of vital significance in understanding the extent and pervasiveness of cognitive impairment. An additional dimension, the affective-motivational factor, has a significant effect on the three phases of the mental act.

The Input Phase: Deficiencies at the input phase include all those impairments concerned with the quantity and quality of data gathered by the individual in the process of solving a given problem or at early levels of appreciation of the nature of the problem. Some impairments at this phase include:

- Blurred and sweeping perception
- Unplanned, impulsive, and unsystematic exploratory behavior
- Lack, or impairment, of receptive verbal tools that affect discrimination (e.g., objects, events, and relationships are not appropriately labeled)
- Lack, or impairment, of spatial orientation and lack of stable systems of reference by which to establish organization in space
- Lack, or impairment, of temporal concepts
- Lack, or impairment, of conservation of constancy's {e.g., size, shape, quantity, color, orientation) across variation in one or more dimensions
- Lack of, or deficient need for, precision and accuracy in data gathering
- Lack of capacity for considering two or more sources of information at once. This is reflected in dealing with data in a piecemeal fashion rather than as a unit of facts that are organized.

These factors, acting either by themselves or in clusters, result in a condition of deficiency in *readiness for response*. The response will invariably be inadequate

because appropriate data have not become available to the examiner. If we were to trace the response back to the premises from which it originated, we might find that sound elaboration techniques were employed for the processing of inadequate data. Impairment at the input phase may also, but not necessarily, affect the ability to function at the phases of elaboration and output.

The Elaborational Phase: Deficiencies at the elaborational phase include those factors that impede the individual's efficient transformation of the available data. In addition to impairments in data gathering, which may or may not have occurred at the input phase, these deficiencies operate to obstruct proper elaboration of whatever cues do exist:

- Inadequacy in the perception of the existence of a problem and its definition
- Inability to select relevant as opposed to irrelevant cues in defining a problem
- Lack of spontaneous comparative behavior or the limitation of its application by a restricted need system
- Narrowness of the mental field
- Episodic grasp of reality
- Lack of need for the education or establishment of relationships
- Lack of need for and/or exercise of summative behavior
- Lack, or impairment, of need for pursuing logical evidence
- Lack, or impairment, of inferential, hypothetical ("iffy") thinking
- Lack, or impairment, of strategies for hypothesis testing
- Lack, or impairment, of planning behavior
- Lack, or impairment, of interiorization

Non-elaboration of certain cognitive categories occurs because the verbal concepts are not a part of the individual verbal inventory at a receptive level, or because they are not mobilized at the expressive level.

Deficiencies in the elaboration of cues occur, often in combinations, with marked frequency in the culturally disadvantaged and retarded performing individual. It is the elaboration of cues to which we usually refer when we speak of "thinking." Inadequate or inappropriate data do not preclude an appropriate, original, or creative response. Elaborational processes may occur in situations where there is a perception of inappropriate elements, or where not all the elements are perceived and some must be deduced. Incomplete data may well be the cause of inadequate elaboration (reflecting dimensions of narrowness or episodic qualities of the mental field). The outcome may be either a personalized or bizarre response, an impoverished one using only the data meaningful to the respondent, or perhaps no response at all – a blocking in anticipation of complete failure.

The Output Phase: Deficiencies at the output phase include those that result in inadequate communication of final solutions. Even adequately gathered data and appropriate elaboration can result in inappropriate expression if difficulties exist for the individual at this phase. Specific difficulties include:

- Egocentric communication modalities
- Difficulty in projecting virtual relationships
- Blocking
- Trial and error responses
- Lack, or impairment, of verbal or other tools for communicating adequately

elaborated responses

Lack, or impairment, of need for precision and accuracy in the communication of one's responses

Deficiency in visual transport

Impulsive, random, unplanned behavior

LPAD examiners must be thoroughly familiar with the deficient cognitive functions to detect their manifestation in the performance of the examinee; they must also know the mediational interventions offered to correct such deficiencies. Sources of difficulties are identified, interventions are directed toward them, and the instruments are presented, manipulated, and interacted with to stimulate responses that elicit change and indicate that the change is structural. The reader will become familiar with what this process entails, as we further discuss the structure of the LPAD process and the nature of the instruments.

The Cognitive Map – Dimensions of the Task

To understand sources of cognitive impairment, it is necessary to analyze the characteristics of the task to which the individual is required to respond. The analysis is done with the help of the cognitive map, wherein critical elements require the individual to generate responses relevant to the demands of the tasks. These components of the task interact with the cognitive functions in the formulation and production of responses, which may be adequate, appropriate, and facilitative of learning and problem solving, or may combine to generate failing, inadequate, and inefficient performance.

The cognitive map includes seven parameters by which a task can be analyzed: content, modality, phase, operation, level of complexity, level of abstraction, and level of efficiency. Tasks thus require mastery of elements that in turn require adequate cognitive functions for efficient thinking to occur in a process-oriented approach.

Content: Each mental act can be described according to the subject matter with which it deals and the universe of content on which it operates. Experiential and educational background (e.g., prior learning that has been assimilated) and culturally determined saliency (the importance and value as a factor of an individual's cultural experience) lead to differential levels of competency in individuals.

If the content is strange to the learner – and indeed, people differ greatly as to the specific content they are exposed to and familiar with – or if facts, events, or details of the required performance are not within the individual's experiential repertoire, there will need an investment in acquiring mastery before the learner can be expected to focus on the cognitive operations that are the target of the assessment. Failure to respond, therefore, must be considered in light of the presence or absence of relevant content dimensions embedded in the task. Any attempt to evaluate the intelligence of the individual without considering content as a source of success or failure is doomed to do injustice to the individual.

Modality: Tasks may be presented in a variety of languages: verbal, pictorial, numerical, figural, or a combination of these and other codes, which range from mimicry and metalinguistic communication to conventional signs that are detached from the content they signify. Efficiency in use of specific modalities may differ among

individuals because of their preferential modes or because of their differing saliency for particular socioeconomic, ethnic, or cultural groups. It is also a function of specific distal factors (such as neurological or sensory deficits, lack of exposure to specific teaching, etc.).

Functional impairment must be considered in light of the modality(ies) required by the task, as well as the range of cognitive functions present in the learner to make possible the reception of stimuli. Inadequate responding can be changed by shifting the modality of presentation of the task and its required expression of solutions. One cannot conclude that an operation is inaccessible to a learner simply on the basis of an inability to perform it in a specific modality. On the other hand, difficulty involved in using a particular modality must be understood in order to be bypassed or challenged, depending upon the goal.

The Phase of the Mental Act: The three phases of the mental act – input, elaboration, and output – may be differentially represented in a given task. When functioning is appropriate, it is difficult to clearly identify the contribution of each specific phase. With failure, however, it is necessary to isolate the responsible phase and understand its role in interfering with performance, as a basis for assessment and intervention. A task that places too much emphasis on input from the individual may disadvantage that individual in subsequent performance. For example, an individual's response may be inadequate because of incomplete, imprecise data gathering, which, even if elaborated properly, would lead to failure at the output phase.

As a dimension of the task, examiners must analyze the specific phase requirements or emphases embedded within it to understand failures in performance, and then link them more specifically to the cognitive dysfunctions that may be present in the individual. If, for example, the task requires primarily input or output phase functions, performance on the task may be more resistant to change than if elaboration is emphasized, and this may require more investment of time and energy or focus on structural interventions. The analysis of impaired performance in terms of phase helps to locate deficient cognitive functions and the source of difficulties and attribute a differential weight to success or failure. Thus, an arithmetical problem requiring the computation of 100 additions is measurably less difficult than one requiring four types of operations ordered in a given sequence.

Operations: A mental act may be analyzed according to the operations that are required for its accomplishment. An operation may be understood as a group of activities that enable information derived from internal and external sources to be organized, transformed, manipulated, and acted upon in a way that generates new information. In defining the nature of an operation, it is important to identify the prerequisites necessary for its generation and application. For example, classification, seriation, logical multiplication, or analogical, syllogistic, or inferential thinking are more complex in the demands they place upon the individual to use cognitive functions than recognition or comparison.

When the examinee's performance is impaired, the examiner must determine the component elements in the task necessary for the acquisition and/or application of the required elements and assess the presence or level of impairment in the related cognitive functions required to achieve the operation.

Level of Complexity: The level of complexity of a task may be understood as the quantity and quality of units of information required to be handled for its solution. However, this in turn is contingent on the quality of the information, its degree of novelty for the individual/and the level of conceptual organization. The more familiar the units, and the more organized, even if they are multiple, the less complex the act; the less familiar, or organized, the more complex the mental act. It is thus necessary to analyze the task from three perspectives: (a) the number of units of information contained in the task, (b) the degree of familiarity the subject has with the task and its component elements, and (c) the degree of organization, grouping, and categories that allows a reduction in the complexity of the task. Intervention and mediation is then directed toward these dimensions. As these elements are modified by mediation of organization, levels of complexity change, both within tasks and across tasks with similar structures or modalities.

Level of Abstraction: The level of abstraction is defined as the distance between a given mental act and the object or event upon which it operates. Thus, a mental act may involve operations on the objects themselves, as in sorting, or it may involve relationships between hypothetical propositions without direct reference to real or imagined objects and events. The level of abstraction as here defined becomes a source of interpretation of the difficulties the examinee has in acceding to higher levels of functioning, as well as the modification that occurs when such levels become accessible as a result of MLE.

Level of Efficiency: This parameter is qualitatively and quantitatively different than the other six, although it is determined or affected by them, singly or in combination. It is defined as the structure of the task requiring a certain degree of rapidity and precision in order to be solved. A third dimension is the level of effort experienced by the subject as needed to generate or sustain a given performance.

The relationship of level of efficiency to the other parameters may be observed, for instance, Where a high level of complexity, attributable to a lack of familiarity, may lead to inefficient handling of a task. The inability to differentiate efficiency from capacity is an important potential source of error in assessment, resulting in faulty labeling and erroneous prognosis. The lack of efficiency, defined as slowness in response generation, reduced production, or imprecision (lack of accuracy), may be totally irrelevant to the propensity of the individual to grasp and elaborate a particular problem and may need to be analyzed from the perspective of other parameters of the cognitive map. Indeed, tasks may differ widely as to the efficiency they require from the performer.

With regard to the dimension of perceived level of difficulty, a variety of task-intrinsic and/or task-extrinsic factors may be present. These can be categorized as *affective-energetic* factors in performance, and they need to be carefully considered in the analysis of results (see discussion of Interpretation of Results later in this chapter). Fatigue, anxiety, lack of motivation, and the amount of required investment may all affect the individual in the performance of a task. In addition, the recency of acquisition of a pattern of behavior must be considered, as behavior not yet automatized or crystallized is more vulnerable to the impact of interfering factors and can thus be described as fragile.

Conventional test scores more often than not actually reflect efficiency in terms of rapidity and accuracy (the number of correct responses) without taking into account any other parameters of the mental act. Dynamic assessment, on the other hand, considers these parameters in conjunction with a careful analysis of the cognitive processes underlying performance, to provide a meaningful assessment of mod inability and to search for the most efficient and economical ways to overcome the barriers presented by the retarded performance.

The cognitive map as an analysis of the dimensions of the tasks to which the individual is required to respond is thus an important element in the process of dynamic assessment and the use of the LPAD. It influences the examiner's choice of the types and order of instruments to use in the assessment, the amount of time and extent of focus within an instrument, and the nature and type of mediation to offer in the interaction with the instrument(s). Together with a deficient cognitive function (describing the individual), the cognitive map describes the nature of the task and is crucial for the process of interpretation.

Using the LPAD in a dynamic manner requires a continuous interweaving of these elements, at levels of both theory and application. Effective processing and inclusion of these dimensions enable (the LPAD examiner to orient the assessment toward seeking – through a process orientation – answers to critical questions that frame the relevance and purpose of the assessment process:

What are the observed obstacles to effective performance?

How amenable to change are the observed deficiencies?

How much change can be expected?

What is the nature of the investment required to produce the desired changes?
(content areas, modalities of response, mental operations, etc.)

How much investment is required to produce the desired changes?

How much stability can one attribute to the desired change?

How much generalization can one achieve following MLE intervention?

The Instruments of the LPAD

We will here briefly describe the instruments developed that compose the LPAD battery of tests. A full description of the instruments, including specific procedures for administration, scoring, interpretation of responses, and their use in a clinical assessment process are presented in the *Revised Examiner's Manual* (Feuerstein et al, 1995).

An LPAD assessment consists of the administration of a battery of several instruments, selected to allow the examiner to observe and interact with the examinee. As the examinee responds, the examiner gathers information, develops ideas about the learner's needs and deficient functions, and uses these observations to guide further teaching to elicit and stimulate changes in performance, directed toward creating the profile of modifiability. Therefore, the time required for the assessment, and the number and range of instruments selected for the assessment process, can vary a great deal.

*Instruments Focusing on Visual-Motor and Perceptual Organization
Organization of Dots*

On this test, the subject looks at a model figure containing simple geometrical shapes, starting with squares and triangles and increasing in complexity with subsequent task demands to include shapes composed of both regular and irregular curvilinear and rectilinear forms. The subject is then asked to "find" the model shapes in frames filled with unstructured, visually amorphous clouds of dots. The task is to draw lines to connect the dots to produce the shape of the model, presented in many instances as overlapped, rotated, and superimposed in various ways. The subject must look for the relationships, plan and use information that must be internalized, and exercise eye-hand coordination to draw the connecting lines. As the subject completes the tasks, the examiner observes and mediates the development and use of cognitive strategies such as planning, inferring, and regulating perceptual conflicts. (See Figure 1)

Figure 1. Organization of Dots, Training Sheet

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The primary modality of the task is figural and grapho-motor. Operations included in this task include differentiation, segregation of overlapping figures, conservation of the figure across changes in its position, articulation of the field, and representation (interiorization).

Complex Figure Drawing Test

The Complex Figure Drawing Test is adapted from Rey (1959) and Osterreith (1945). The subject is asked to copy the Rey/Osterreith complex geometric design, looking at the model. The subject must use organizational principles to create an efficient production in the face of the complexity of the task. The great number of units

of information becomes reduced by organization and awareness of the succession of steps to internalize the multitude of details. During the first reproduction phase, only minimal orienting mediation is offered. Following the first reproduction, and after a 3- to 5-minute latency period, the subject is asked to reproduce the design from memory (without looking at the model). Following the memory phase, and based on observations of the subject's performance, a mediation phase is conducted where the examiner reviews with the subject aspects of his or her performance, identifies errors and inefficiencies, and teaches organizational and design aspects. After mediation, the subject is asked to copy the design again from the stimulus model, and again from memory. Assessment is directed toward the initial performance (organizational approach, accuracy of motor skills and structural details, etc.) in reproducing the design and changes in the second copy and memory productions, following mediation.

The task requires functioning in a figural and graphic modality and measures both short-term learning and the persistence of perceptual organization difficulties. The mental operations involved in this test include discrimination, segregation of proximal elements, the articulation of a complex field, and reproduction, representation, differentiation, integration, and visual-motor coordination.

An additional phase is also available for this test, the Representational Organization of Complex Figures, in which the subject is presented with a template containing 10 designs, constructed in such a way that a central geometric figure is embedded in a set of adjacent or juxtaposed figures. The subject is asked to scan the first figure and indicate which part of the figure he or she would prefer to draw first, and the order in which all of the remaining parts would be drawn. The examiner then proceeds through the rest of the figures. No figure is actually drawn – the subject merely indicates the parts and sequence in which they "would" be drawn. This phase is useful for those subjects who present persistent difficulties in organizational aspects of the Complex Figure Drawing and reveals the effects of mediation offered in earlier phases of the instrument. It removes from performance any difficulties the subject may have in the visual-motor modality.

Instruments Focusing on Memory, With a Learning Component *Positional Learning Test (5 x 25)*

This test is adapted from the work of Andre Rey. The subject is shown a grid of 25 squares, organized in five rows and five columns, with five positions (corresponding to one for each row and column) designated and indicated by the examiner using an auditory verbal and motor modality (saying "here" and pointing). After a short (10-second) latency period, the subject is asked to reproduce the indicated positions by marking them on the same grid. The procedure is repeated, with minimal mediation, until the subject can reproduce the pattern correctly three times in succession. If difficulty is experienced, mediation is directed toward the apparent source of the errors and toward establishing strategies that the subject can use. After the examinee learns one pattern, the procedure is repeated similarly with different patterns, enabling the examiner to observe learning of new patterns in the presence of previously learned and potentially confounding patterns. The learning on this instrument reflects a visual/motor and graphic modality and requires the subject to use the operations of encoding, sequencing, and reproducing a perceived set of positions.

Plateaux Test

This instrument is also adapted from the work of Andre Rey. On this test, the subject is presented with a set of four plates, superimposed upon one another in the subject's view. Each plate contains nine buttons or pegs, arranged in three parallel columns or rows (a 3x3 design). Each plate has one peg that cannot be removed. The fixed peg is in a different position on each of the four plates. In the exploratory phase, the subject is asked to search for the fixed peg on the first plate by taking out the pegs and replacing them until the fixed one is located and to identify its position. The subject is asked to repeat the process for the remaining three plates successively, being encouraged to develop strategies leading to learning the positions on each plate and discovering a generalization – rule or principle – relating to the pattern of fixed positions. After the subject has learned the four positions (making three errorless repetitions), the orientation of the plate is rotated, and the subject is asked to identify the position of the fixed pegs following the rotation(s). A second, representational phase is undertaken when the subject is asked to draw the pattern of fixed pegs on paper, reflecting a two-dimensional transition and interiorization. This phase assesses the transition from the concrete position to the use of a memorized or internalized representation from a three-dimensional experience to a graphical two-dimensional plane – a substitution of learned reality. A third phase is introduced in order to learn about the plasticity and flexibility of the memorized data. In this phase, the well-established positions and their successions are successively rotated by 90, 180, and 270 degrees, and the examinee is required to represent schematically (on paper) the fixed pegs in the new positions produced by the respective rotations. This phase represents a higher-order cognitive operation than the simple reproduction of the positions and their initial graphic representations, reflecting the outcome of rotations requiring shifting of learned positions.

Associative Recall: Functional Reduction and Part-Whole

This test consists of two versions, similar in organization and objective but differing in stimulus presentation. The subject is shown a page that contains a row of 20 simple line drawings along the top, selected for their familiarity to the subject and the unambiguity of their figural presentations. In the first row, the objects are presented in their entirety, and the subject is asked to name them (a labeling phase). In the second row, on the Functional Reduction page, drawings of functional substitutes are shown. On the Part-Whole page, a salient feature of the object is presented. In the third and fourth rows, there is a further stimulus reduction and changes in order of presentation. The subject is asked to recall the original labeled object on the top row from a visual inspection of the reduced stimuli under the various conditions presented in the subsequent rows that are exposed, with the preceding rows concealed. The Functional Reduction page is used with most subjects, and the Part-Whole page may be used when the examiner feels further mediation is needed for repetition or crystallization of the functions learned on the Functional Reduction page, or when the subject's level of perceptual functioning suggests that restricting the task to a focus on structural details as the link to associative memory will yield more efficient and elaborative responses. Both pages also enable the assessment of immediate free recall and delayed free recall of the original 20 objects. The modality of this test is visual, auditory, motor, and graphic. It requires the subject to use the operations of encoding, symbolization, and the discovery of functional relationships.

16- Word Memory Test

This test consists of a group of 16 simple common words presented orally to the subject. The words are presented in a fixed but conceptually random order. The subject is asked to repeat as many as can be recalled following the presentation of the list and a latency period of about 10 seconds. The subject is told that the process will be repeated several times. No mediation is offered for the first three or four repetitions. The examiner observes the subject's spontaneous recognition and inclusion in memory of the four categories into which the 16 words can be grouped. After about four repetitions, mediation is offered, if needed to encourage the memory process, using a variety of cues, both mnemonic and cognitive, until the subject can recall all or a majority of the list using internalized memory functions and achieve accuracy and efficiency of response.

The modalities of this test are auditory and verbal, and the mental operations require the reproduction of an auditory set of stimuli, internalized controls, organization, and both encoding and decoding (representationally) skills.

Diffuse Attention Test (Lahy)

This instrument was developed by Lahy from the work of Zazzo (1964). It is used in the LPAD procedure to assess the subject's adaptability and flexibility, manifested in rapidity and precision on a task that requires visual scanning. The subject must maintain attention and focus on a visual/motor and repetitive process, learning a perceptual set, and either maintaining it over time or being able to learn a new set without interference from the learning. Three of the eight figures are designated as model figures, and these are isolated at the top of each section of the test page, which the subject learns to differentiate. The subject must then scan lines of 40 figures, including the 8 figures presented in a random order, and mark the three model figures when they are perceived and identified. The stimulus field is thus perceptually quite dense and requires the subject to scan carefully and work to maintain visual tracking and cognitive attention. There are two forms of this test, one having only one such array, and 24 lines of stimuli to scan. A second form has three sections, with three different sets of three model figures, thus enabling the assessment of retroactive inhibition – the effect of teaming one set of differentiations on the subsequent performance on another set. Performance is observed in 1-minute intervals, yielding scores of the proportion of correct and incorrect inclusions and omissions within the segments. No mediation is typically offered during the performance on the task, but the task can be practiced and mediated in a variety of ways after performance and repeated after various practice experiences, to assess the changes with "over learning."

The modality of this test is visual-motor and graphic. The operations included are limited to the identification of differentiated cues (an encoding process) and the "recognition" of the model.

Instruments Involving Other Cognitive Processes and Mental Operations

LPAD Matrices: Raven Colored Progressive Matrices and Standard Progressive Matrices.

Set Variations B-8 to B-12, Set Variations I, Set Variations II

The instruments used in the LPAD procedures are those of the published Raven's (1956, 1958) Colored (CPM) and Standard Progressive Matrices (SPM). Set Variations B-8 to B-12 are based on Raven's CPM items 8 to 12. Set Variations I is based on items from the CPM levels A, Ab, and B. Set Variations II is based on principles similar to SPM levels C, D, and E, but the items present greater novelty in the modality of presentation. The LPAD objective in the presentation of these problems to the examinee is to assess to what extent a rule and set of prerequisites acquired to solve a particular problem are adaptively used in variations of the task, and to what extent do the learned elements of the original task become the facilitating factor in adaptation to the new task.

The Raven's instruments are administered according to LPAD procedures, using a "test-teach-retest" approach. The Set Variations instruments are constructed and administered on principles similar to those of Raven's, with a sample problem for each set of variations that receives intensive mediation; then, independent performance is observed on a series of problems similar to but also becoming progressively more difficult than the mediational example. The tasks require the learner to look at a series of designs and complete the series by selecting a correct alternative from a number of choices. To choose the correct alternative, the subject must understand the relationship among the variables. The tasks progressively add variables and change the dimensions used to establish the relationships. What is assessed on these tasks is the subject's ability to think using analogies presented as figural (visual/perceptual) information and their response to the teaching of strategies to solve the problems. The operations involved are those of perceptual closure and discrimination; the generation of new information through synthesis, permutations, and seriation; inferential thinking; analogical thinking; deductive reasoning; and relational thinking. (See Figure 2)

Representational Stencil Design Test (RSDT)

The RSDT is based on the Stencil Design Test of Grace Arthur (1930), but it differs significantly in its structure and technique of application, primarily in its shift of the task away from the concrete, manipulative modality toward a representational, internalized modality. In the LPAD procedure, the design is constructed by the subject on a purely mental level. The instrument consists of 20 designs that the subject must deconstruct representationally by referring to a page of model "solid" and "cut-out" stencils that must be mentally superimposed upon one another. The problems increase in level of difficulty (on dimensions of form, color, and structure) and are organized so that mastering simpler problems leads to the ability to solve harder ones. The procedure of this test orients the subject to the stencil page, offers a test page of problems, and then provides a training page to mediate various processes and strategies according to what is observed during performance on the test page. A Parallel Test is provided to be used following mediation. The instrument assesses the subject's ability to learn a complex task using internalized systems of organizing, and to use acquired learning to solve more complicated problems. Part of what is assessed in this instrument is how readily available the learner's inner (representational) processes are and how easily and adaptively they are used in subsequent problems of increased complexity and abstraction. The modalities involved are figural, numerical, and verbal. The operations involved in successful mastery of the tasks are segregation, differentiation,

representation, anticipation of transformation, encoding and decoding, and generalization.

Figure 2. Examples of Matrix Variations I Based on the Learning Potential Assessment Device model
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Numerical Progressions

This test assesses the subject's capacity to understand and deal with relationships, identify them as rules, and apply them to building new information, using numerical and graphic modalities. The task presents progressions of numbers, related to one another according to rules that must be deduced from the available information. At the end of a sequence of numbers, the subject is asked to supply the two missing numbers. A correct response suggests that the subject has understood how the numbers are related to one another. The format is that of a pretest, a learning phase, and two forms of a posttest. In the learning phase, the subject is encouraged to formulate and state the rule by which the answers were achieved. The examiner teaches relationships that are not understood and establishes strategies according to an analysis of needs (errors and performance on the pretest). Following mediation, a posttest is given to determine how well the subject has learned strategies for solving the problems. The parallel form of the posttest makes possible assessing the permanence and stability of what has been learned over time. The operations involved in this instrument are those of basic mathematics (addition, subtraction, multiplication, and division) and the more generalized mental operations of differentiation, segregation, inferential thinking, and deductive reasoning.

Organizer

This instrument presents the subject with a series of verbal statements consisting of sets of items that must be organized according to closed, logical systems. The task involves the subject placing the items (colors, objects, people, etc.) in positions relative to one another according to the determined attributes or conditions presented in the statements. A series of statements or premises is presented in each task. Each premise permits the extraction of only a part of the needed information required to determine a full and precise placement of the items. Thus, the subject must gather available information, develop and test hypotheses with succeeding information given, and generate information that is not immediately available in the given propositions. The

tasks become more complex because of more units of information and the level of inference needed to solve them. What is assessed in this instrument is the subject's ability to gather new information through the use of inferential processes, formulate hypotheses and test them according to new information or assumptions generated, and apply strategies for discovering relationships. The instrument consists of pretest, learning, and test phases.

The modality is verbal, with a numerical subcomponent. The operations involve decoding, encoding, representation, inferential thinking, transitive thinking, prepositional reasoning, negation, with a heavy loading of mnemonic (memory) functions.

Other Instruments Associated With and Sometimes Used in the LPAD

Two other instruments have been used in the LPAD battery and may be included by various dynamic assessment practitioners and LPAD trained examiners. They are the Test of Verbal Abstracting (TVA) and the Human Figure Drawing (administered according to LPAD procedures). The reader can find complete descriptions in the first edition of the *LPAD Examiner's Manual* (Feuerstein et al., 1986) and in the *Revised Examiner's Manual* (Feuerstein et al, 1995).

The Structure of the LPAD

The LPAD represents a shift from a static to a dynamic goal of assessment, notably from searching for stable characteristics to determining the potential for modifiability of the individual. This requires changes in four dimensions of the testing conditions:

1. The structure of the test instruments
2. The nature of the testing situation and procedures
3. A shift of emphasis from product to process
4. A change in the interpretation of results

The Structure of the Instruments

The objective of assessing the modifiability of functions requires a more or less radical restructuring of the test instruments. Conventional psychometric tests are shaped by the belief in the fixity and stability of intelligence and its measurement. There are a number of aspects of instrument construction that manifest this conceptualization, all of which lead to the search for reliability, and ultimately for predictability. For example, items that are known to produce unstable results are eliminated because they are too sensitive to the changes that the individual's cognitive function may undergo. There is often little or no inherent relationship from one item to another as long as they are statistically correlated and prove their predictive capacity. There is little or no provision for feedback of previous performance to the examinee, so that the examinee is not prepared for handling subsequent-items. Even tests such as Raven's (1947, 1956, 1958) Progressive Matrices, which makes an attempt to present items that prepare the subject for subsequently more difficult items, fails to foster learning when presented in the standardized manner, as explanations are permitted only for the easiest items. Thus, the failure to perform on tasks oriented in the manner of conventional psychometrics is usually interpreted as a limited capacity to handle higher mental processes. This has been used by Jensen (1969) in describing his concept of Level I intelligence, and others

(see Herrnstein & Murray, 1994) to justify supposed innate deficiencies in thought processes and intelligence for certain classes of individuals.

The LPAD instruments are designed to overcome the limitations inherent in the conventional psychometric approach. We have developed a model that serves as the basis for the construction of a number of different kinds of tests, presenting an array of tasks, all of which are oriented to assessing fluid rather than crystallized intelligence. As noted above, these instruments present a sharp departure from the goals usually set for assessment. "LPAD Cylinder" (see Appendix p.) illustrates the model by which the instruments are constructed, reflective of the goals described above. The very small circle at the top center of the cylinder represents a problem, task, or situation first presented to the examinee for solution and mastery. As the subject responds to the problem, the examiner explores with and/or teaches the individual to use or employ appropriate given principles through the application of relevant cognitive operations. The examinee is given the training necessary to enable the solution of this initial problem. Once mastery is achieved, the examinee is then presented with additional tasks that represent more complex modification of the initial training task, represented in the model as moving outward from the center, as the diverging, concentric circles indicate. This movement entails varying the novelty, difficulty, and complexity, which simulates the adaptational requirements that often confront the individual in real life. The progressive novelty, difficulty, and complexity are produced by changes in one or more dimensions inherent to the solution of the task. One can change the objects or the situation; one can change the relationship between objects or their specific functions with regard to one another; or finally, one can change the cognitive operations that are required to solve the problem. The radial lines that divide the top of the cylinder into sections indicate that the task selected can be presented in different modalities, indicated as spatial, pictorial, concrete, figural, verbal, logical-verbal, or numerical. Variations in modalities of presentation are also presented to the examinee, both within the same level of novelty, complexity, and difficulty, and as the demands on these dimensions are increased.

Thus, one may keep the operation constant while changing objects and relationships, or keep the objects and relationships constant while only varying the operations. Novelty can then be observed by considering the number and nature of dimensions introduced in the problem, as compared with those of the initial task used for training purposes. The specific operations required by the problem represented by the center small circle and by the diverging tasks introduced following initial training can be presented to the examinee in a variety of modalities or "languages." A third dimension of the model represents a selection of mental operations relevant to the task, such as analogies, logical multiplication, permutations, syllogisms, categorization; sedation, and so on, reflected in the vertical layers of the cylinder.

By using instruments constructed according to this model, one may gather data relating to the following critical dynamic assessment criteria:

The readiness of the examinee to grasp the principle underlying the initial problem and to solve it

The amount and nature of investment required in order to teach the examinee the given principle

The extent to which the newly acquired principle is successfully applied in solving problems that become progressively more different from the initial task

The differential preferences of the examinee for one or another of (the various modalities of presentation of a given problem

The differential effects of different training strategies offered to the examinee in the remediation of functioning, involving the criteria of novelty-complexity, language of presentation, and types of mental operation

The use of this dynamic approach in assessment assumes that the individual represents an open system that may undergo important modifications through exposure to external and/or internal stimuli. However, the degree of modifiability of the individual through direct exposure to various sources of stimulation is considered to be a function of the quantity and quality of MLE. It is the MLE that sensitizes the human organism to specific characteristics of the stimuli and establishes sets and modalities for grasping and elaborating reality, vital for the appropriate integrated use of new experience.

Static measures completely neglect separate assessment of the dimension of modifiability because they equate the measure of manifest functioning with the true, fixed, and immutable capacity of the individual. The dynamic approach does not deny the fact that the functioning of the individual, as observed in the level of achievement or general behavior, is low; but by considering this level as pertaining only to the manifest repertoire of the individual, it takes into consideration the possibility of modifying this repertoire by appropriate strategies of intervention.

The tasks in the LEAD instruments are shaped in such a way as to provoke the appearance of the deficient cognitive functions viewed as responsible for the failure of the individual to master the task and adapt to a variety of life and learning conditions. It is the objective of the various instruments to tease out the types of deficiencies and, through the analyses of the process, observe what is causing success or failure. The tasks are therefore selected and constructed according to the dimensions of deficient cognitive functions and the cognitive map. In the RSD instrument, for example, we try to figure out the type of perception of the individual, the capacity to analyze, to create cardinal order, to represent what is perceived abstractly. Each task, in this and all other instruments, is presented to permit addressing certain conditions of cognitive functioning that are related to functioning in other areas – modalities of responding, academic areas of performance, and the like.

An additional goal determining the structure of the LPAD tasks is the search for indicators of even the most minimal changes in the functioning of the individual, to be used as representative samples of modifiability. For example, increased speed of formulating responses or expressions of certainty or energy in responding, often signify the establishment of changes at a structural level and give the examiner cues for further or different interventions.

The Nature of the Testing Situation and Procedures

Changes in the instruments are not by themselves sufficient to fully elicit and assess the modifiability of the individual, even though they are a most vital component in a more adequate system of assessing the retarded performer. The testing situation itself must be changed in a way parallel to changes in the instrumentation in order to reach the dynamic goals set by the LPAD.

Conventional psychometric tests are characterized by uniform, standardized, and controlled sets of procedures from which no deviations are permitted. When the purpose is to rank an individual in terms of the manifest level of performance according to a set of established norms, such an approach is not only justified but is also a condition of the comparability of the test results to others examined. However, this comparability is not the purpose of the LPAD; consequently, the procedures governing the assessment must be adjusted. Not only is the purpose of the assessment to evaluate the individual's ability to learn, but it is also designed to yield information regarding the manner and modality through which learning is best achieved. This necessitates a highly flexible and individualized approach in which the role of the examiner is to produce change – to prod and explore for signs of modifiability and also to attend to the functions that appear to impede the progress of the individual.

Two distinct aspects of the testing situation, although strongly interdependent, must be considered separately: (a) changes in the examiner-examinee interaction and (b) the introduction of training (teaching) as an integral part of the assessment process.

Examiner-Examinee Relationship

The motivation of a low-performing and/or culturally deprived examinee in the conventional test situation is usually low because the tasks included rarely have appeal. A reduced level of curiosity is only one reason for a lack of motivation. Another is that the perception of novelty necessary to elicit an orienting reflex and an arousal followed by an exploration is not always present. Perception of novelty depends upon cognitive functions such as comparative behavior, analytic perception, and a capacity to grasp relationships and their transformation within a constant framework. The lack of task-intrinsic motivation is then further aggravated by the negative valence with which the presented task may be endowed, provoking an avoidance reaction in the individual, who associates the task with repeated experiences of failure. Failure experiences become the source of deeply ingrained feelings of intellectual insufficiency that further increase the negative reaction evoked by the novel tasks.

The examiner must therefore orient the relationship toward this condition of reduced motivation about the test situation, paying particular attention to three distinct determinants: (a) lack of curiosity resulting from deficiency in the prerequisite cognitive conditions, (b) lack of a need system that endows successful performance with specific meaning, and (c) the existence of a negative component – an avoidance reaction to tasks that have been associated with repeated experiences of failure, which leads to deeply ingrained feelings of intellectual inadequacy.

Given the lack of positive task-intrinsic motivation and the presence of aversive qualities, one can understand that the specific weight of emotional factors in determining the outcome of the conventional test situation is much greater than one is led to believe by the casual mention usually made of the meaning of the examiner-examinee relationship and the maintenance of the rapport established between them. The presence of a neutral, even sympathetic, and yet basically unresponsive examiner who limits the interaction with the examinee to issuing dry, standardized instructions cannot but add a further negative valence to the test situation. The examinee's possibly fragmentary grasp of the instructions, as well as a potential lack of motivation toward the task, will lead either to a correspondingly vague or imprecise way of dealing with the problem at hand, accompanied by a low level of anxiety and a "tuning-out" of the examiner, or – to the contrary – to a high level of anxiety, involving a feeling of great

threat and low expectation of success. Thus, the lack of manifest interest on the part of the examiner, prescribed by the standardized test procedure, is potentially interpreted by the examinee in two different ways, both leading to negative reactions. First, "if it doesn't matter to you, why should I be concerned with it?" This is then followed by a tuning-out by the examinee, who no longer pays much attention to the task and proceeds to respond in a random or casual manner. Second, the examinee may interpret the neutrality of the examiner, even if basically benevolent, as a manifestation of hostility and an expectation of performance failure. This reduces efficiency by lowering motivation to cope or by energizing a countering hostility that interferes with any cognitive process that might otherwise have emerged.

The LPAD technique not only allows but intentionally creates the conditions for a radical change. This is accomplished by a shift in the roles of examiner-examinee into the relationship between teacher (the mediator) and pupil (the mediatee). What follows is an elimination of the neutral, indifferent role of the examiner in exchange for the active cooperative role of the mediator, who is vitally concerned with the maximization of the success of the pupil. It is through this shift in roles that we find both the examiner and the examinee engaged in the same task, in a common quest for mastery of the material. Thus, the examiner constantly intervenes – questions, orients, makes remarks, interprets results, and gives explanations whenever and wherever they are necessary, asks for repetition, sums up experiences, anticipates difficulties, warns the examinee about them, and creates reflective insightful thinking in the individual, not only concerning the task but also regarding the examinee's reactions to it. To accomplish all this, the examiner must be alert to each reaction of the individual, and in the course of behaving this way, the examiner acts radically different than the usual psychometrician. "The examiner is vibrant, active, and concerned instead of aloof, distant, and neutral, giving the examinee the feeling that the task is important, difficult, yet quite manageable and that the examiner is committed to the examinee's success.

With the establishment of such an interactive process, we usually observe a sharp increase in motivation. At the beginning, it is purely extrinsic, with the major motive of the examinee being to please the examiner. At this stage, any manifestation of reduced or discontinued interest on the part of the examinee is followed by a marked decrease in the efficiency of the trainee. Later, as the teacher-trainee relationship develops, and includes the task as a part of it, turning the dyad into a triad, we invariably observe a shift from extrinsic to intrinsic motivation. That is, the examinee begins to delight in the task itself, having grasped the deeper meaning of his or her own activity and the successful mastery of the task.

This shift is basically produced by two factors. One is directly linked to the capacity of the individual to perceive the nature of the problem by having integrated a series of criteria, at the end of which the solutions that are confronted become problems. Here, the TOTE (Test Operate-Test Exit) model is relevant in explaining the growing interest in the task itself, following the establishment of internal standards through previous experience (Hunt, 1961; Miller, Galanter, & Pribram, 1960). The second factor has to do with the development of a positive approach to problem solving through increased mastery of tasks, especially when the sequence of tasks follows the LPAD model of progressively increasing difficulty. Such mastery immediately raises the need in the individual to repeat the experience. This repetition has functional value in that it consolidates and crystallizes a successful pattern of behavior in a way similar to the circular reactions described by Piaget, and at the same time, it raises the level of

aspiration and the achievement motivation of the examinee. At this point, it is the task that becomes the center of interest and motivation of the examinee, and no longer is motivation solely aroused by the examiner.

This shift in motivation, achieved by assigning meaningfulness, giving encouragement, and ensuring the experience of success, will not suffice to make the examinee's problem-solving behavior successful and efficient. For this, it is necessary to provide the examinee with a constant, fine-grained feedback of this interaction with the task that transcends the task itself and uses a variety of communicational modalities. In the usual psychometric model, feedback is often considered valueless or deleterious to either the examinee, to the standardized testing procedures, or to both. It is considered deleterious if the individual is told of his or her failure, without helping and permitting correction in a meaningful way. Even if correction is allowed in certain tests, it does not take the form of a thorough feedback strategy, focused on helping the examinee to master the present material in order to enable more effective performance on future test items. In tests whose structure does not involve interitem dependency, the task-bound feedback is considered to have negative instead of positive implications for future test items. The individual learns only that failure has occurred, but not how or why. Even if the examinee should be shown how or why, little or nothing is gained that the individual cope with subsequent items because they will be very different. No wonder the psychometrist conventionally limits the amount of feedback interaction with the examinee. The usual static test is structurally not suited to the use of feedback procedures.

In the case of the dynamic LPAD procedures, the feedback fulfills a variety of functions. It is used as a constituent part of the training process. The examinee is informed of the nature of the product (his/her responses) in a differentiated way, allowing for an immediate correction of incorrect responses or permitting generalization of the specific behavior employed if the response was adequate. In both cases, there is neither an increase in anxiety nor a reduction of the optimal motivation needed to maintain interest in further accomplishment. Successes are acknowledged through the conveyance of exuberance, interest, and pleasure, intended to communicate the meaning of the experienced success. Failure, on the other hand, is acknowledged in a tone that, although it diminishes the importance of the failure, still includes the challenge to do better. In other cases, behavioral patterns leading to one or another result are analyzed and explained, thus rewarding certain types of behavior as differentiated from other facets of the response.

In summary, the personal interaction between the examiner and the examinee on the LPAD has as its basic outcome an increase in the test-taking motivation of the examinee by the fact that the examiner (acting as a teacher-trainer) conveys to the examinee (responding as the pupil-trainee) the meaning of the task, the importance of mastering it, the capacity to do so, and finally, by a process of feedback, an ability to select the appropriate behavior leading to success. This process is also intended to produce a shift from extrinsic to intrinsic motivation in the examinee, thus engendering more independence and, to a certain extent, more reality orientation. We feel that in this kind of testing the personal relationship, which entails the change in interaction patterns as described, is a necessary condition for the appropriate assessment of the modifiability of culturally deprived and low-functioning individuals. This has implications leading to an emphasis on individualized testing, with one-to-one relationships, careful focus on mediational strategies, and much care to preserve the critical characteristics of the

interactional models described above. However, it is possible to extend the process to group situations (see below) and to other modalities of interaction, such as programmed learning systems that may or may not be computer based. However, in such extensions, one must argue for extreme caution and vigilance, not only as to the application but even more so as to interpretation of the results, lest the mediational and interactive aspects essential to the approach be lost or so diluted as to become counterproductive.

The Training Process Integral to the Test Situation

Here we describe the examiner-examinee interaction in the LPAD procedure, which aims at inducing the cognitive prerequisites for the examinee's successful confrontation with the testing task. It should be understood that this training is not merely oriented toward a specific content but includes the establishment of the prerequisites of cognitive functioning for a wide array of behavioral patterns and the repertoire necessary for problem-solving behavior. The six areas on which mediation focuses are:

- Regulation of behavior through inhibition and control of impulsivity, as well as the initiation of appropriate responsive behaviors

- Correction of deficient cognitive functions and activation of available but fragile functions

 - Enrichment of the repertoire of mental operations

 - Enrichment of the task-related content repertoire (e.g., labeling of relationships such as up, down, equal to, etc.)

 - Creation of reflective, insightful thought processes

 - A shift from reproductive to productive, creative information-generating activity

A Shift in the Goals of Assessment From Product to Process – Profiles of Modifiability

Dynamic assessment requires a shift from a product-oriented to a process-oriented approach. Rather than simply registering, summarizing, and computing the obtained results and comparing them to existing scales, the major effort is directed to the understanding of the processes involved in their evolvment. This will require a special intervention on behalf of the examiner/mediator, modeled largely on the clinical method employed by Piaget in his interviews and observations. As indicated earlier in this chapter, the shift demands both theoretical/philosophical changes and new conceptual and methodological structures. There are many specific implications of these changes, in the constituent conceptual framework and in the clinical application to individuals and groups. An important aspect of the shift is, therefore, the creation of modalities of observation and registration of indices of the processes responsible for the outcome of the assessment. Here again we remind the reader that the ultimate purpose of dynamic assessment, from the perspective of the LPAD, is to create samples of change by which one may identify the propensity (of cognitive change) and to describe that change in such a way that subsequent learning and cognitive interventions will be identified and recommended.

Toward this end, the two conceptual formulations described above (the cognitive map and the deficient cognitive functions) are used in an integrated way in the establishment of what we refer to as the *profile of modifiability*. It must be made clear that these profiles are not to be considered as the ultimate traits and characteristics of the individual, but rather they refer to the process that has been set in place by the mediational interaction, a process that will result in a continuous set of changes based

on the modifiability demonstrated and observed. We emphasize that the profile is a process and not a product. The structure of the profile reflects the special nature of the LPAD as a dynamic assessment procedure inasmuch as it releases the examiner from the more fixed and prescribed patterns of scores and other similarly rigid prescribed statistical and comparative portrayals. Moreover, the LPAD directs the summary and analysis to comparisons *within* the individual rather than to comparisons *among* individuals. Finally, the LPAD creates a structure that serves as a point of departure in consultation between the examiner and the relevant professionals and significant others (parents, spouses, relatives) in the life of the subject. As a tool of dynamic assessment, the structure for conveyance of results and recommendations must comprise dynamic qualities – flexibility, descriptiveness, multidimensionality, and forward-thrusting – leading to its use as a road map for subsequent activities.

The LPAD profile represents a conceptual tool that permits the examiner to organize, describe, and systematically interpret changes produced in the examinee through the LPAD assessment. The use of the profiles to describe and evaluate modifiability goes beyond the mere registration of the absolute magnitude of observed changes in performance, extending to include a series of qualitative characteristics of these changes as well as the examiner's assessment of their functional meaning. The functional meaning of the observed changes is determined in particular with regard to their predictive value for the accessibility of the individual to additional changes, as well as the preferential interactions and environmental conditions that make such changes possible.

Dimensions of the LPAD Profile

The LPAD profile is based on three dimensions that the examiner relies on to produce the specific assessment of the functional meaning of the change. The first of these dimensions is the area in which the change has been observed, considering (a) changes in certain contents of the repertoire of functioning of the individual's concepts, operations, and strategies; (b) changes in cognitive functions; (c) changes in the affective, energetic aspects of behavior; and (d) changes observed in the individual's efficiency of functioning. Incorporating these as dimensions of the profile requires a conceptual, descriptive development and the examiner's familiarity with how they operationally manifest themselves in performance (see Feuerstein et al, 1979, 1995). The second dimension deals with the qualitative nature of the produced changes. The extent to which they are of a structural nature is observed on the parameters of (a) retention/permanence, (b) resistance, (c) flexibility/adaptability, and (d) generalizability/ transfer (see description in Criteria to Evaluate Change below). The third dimension focuses on changes in the amount and nature of the required mediational intervention that was necessary, first to produce, and then subsequently to sustain the given results. An additional variable that must be considered in the eventual interpretation and conveyance of results is that of the magnitude of change, considered with reference to information obtained with the referral, other baseline data, and the changes observed and registered within the assessment itself.

The LPAD examiner, integrating the concept of the profile into the assessment process, is called upon to consider the given and produced evidence of specific changes within these three dimensions. The examiner seeks to specify the types of interventions that may have to be offered to the examinee, as well as the accessibility of the examinee to specific changes that may have to be considered and developed to enable the reaching

of autonomous-independent functional potential.

The LPAD profile represents a break with tradition in two inter related ways. The first of these is that it is based on the assumption that the qualitative aspects of the observed changes are as significant – if not more so – than the quantitative aspects, especially for estimating the functional predictive meaning of the observed changes for modifiability of the individual. The second is the way in which the profile breaks with the conventional role attributed to the examiner: The examiner is called upon to exercise the subjective judgment of a well-trained professional who has in-depth knowledge of the processes being assessed and is thereby able to interpret the phenomena observed.

The source of these differences lies in the focus of the LPAD upon assessment rather than measurement. Measurement, which means the application of a standard gauge to a stable element with reiterated and uniform results, may be useful in particular situations and with certain types of data that conform to physical laws. However, in light of (the considerable degree of flexibility and plasticity of human mental and emotional characteristics, as well as their great complexity, the utility of measurement as a means of evaluating human cognitive capacities is very doubtful. The problem is exacerbated when measurement is accompanied by the conviction that the obtained results truly reflect fixed and immutable characteristics of the observed phenomenon behavior. The issue of the use of standard measurement practices becomes even more critical when the obtained results are considered to reflect linear, one-dimensional rather than multidimensional projections or, in other words, to reflect predictable rather than divergent conditions.

Because the focus of the LPAD is on assessing the modifiability of the cognitive structure of the examinee, and then on intervening to modify that structure, its main focus and findings relate to the very process of change rather than to the numerical benchmarks and the differences between the two static poles of an examinee's baseline and end-product performance. Even more than the magnitude of the observed change, it is the process of change itself – its rhythm, amplitude, and direction – that is the LPAD's major concern. A qualitative change whose effect may be insignificant quantitatively may still be of great interest and value when it is seen as a process that is emerging within the examinee, and that may orient his or her cognitive behavior in directions different from the present course of functioning.

The Role of the LPAD Examiner

In the attempt to modify the examinee in the course of dynamic assessment, a great variety of techniques and strategies must be used to first produce and then detect changes. What is required is a highly refined MLE interaction in conjunction with the use of the LPAD instruments. In addition, the examiner must have an operational familiarity with the dimensions of the tasks (cognitive map) and the nature of the cognitive functions as they are reflected in the subject's task performance. The process of dynamic assessment aims at manipulating the various conditions under which a given state can be modified, and then registering and describing the optimal conditions by which the modified response can be elicited and maintained. Any attempt to interpret the meaning of an examinee's functioning at any point in the interaction – at the stage of either baseline, intervention, or subsequent performance – must rely on tools that permit the gathering and conceptualization of data that are relevant to the process of change. In an interpretation, a differential weight must be ascribed to the various sources of observed function and dysfunction, and areas pertinent to the dysfunction must be

located and intervened upon to affect the examinee's performance in the desired direction (toward adequate functioning).

The contribution of the examiner is crucial to the proper interpretation of the process of change. The dynamic approach of the LPAD is based on a transactional model that affects the nature of the interaction in a multitude of ways. It considers the assessor no less responsible for the produced change than the characteristics of the subject being evaluated. Expanding the frame of reference from the individual who is being assessed (the examinee) to include an active and involved diagnostician changes the emotional and motivational attributes of both parties in the transaction. The LPAD examiner is highly motivated to have the subject succeed in overcoming difficulties because doing so reflects upon the capacity and investment of the examiner. This will have a reciprocal effect on the responsiveness of the examinee.

To be effective in diagnosing modifiability; the LPAD examiner must be skilled in the ways in which changes in functioning are produced. The examiner must consider (a) why the change has happened and (b) how to make it happen again, or (c) how to keep changes from happening if they are undesirable. In the LPAD, the examiner's responsibility for a subject's success becomes a potent force for a radical alteration in the examiner-examinee interaction, as compared with testing situations in which an examiner only measures and registers certain (presumed) objective, stable, continuous, linear phenomena.

The LPAD examiner establishes an attitude that specifically questions and ultimately reframes the meaning of success and failure. Success is not always indicative of the existence of some potential, and failure is not always indicative of a lack of potential. Both success and failure may have innumerable possible reasons. Simply challenging failure by attempting to modify it, without seeking its real cause, does not permit any conclusions regarding the effect of such failure on the adaptational capacity of the person. To determine the real meaning of success and failure, the LPAD examiner must carefully and precisely observe the interaction of the examinee with the instruments (the tasks). The analysis of the task according to the parameters of the cognitive map is necessary to identify determinants that may be crucial, both in explaining the reasons for various responses and subject performance and in processing the rich repertoire of potential mediational interventions out of which optimal strategies will be selected to solve an observed difficulty in the examinee. Finally, all of these elements must converge in the interpretation of results, an interpretation that must also suggest operational modalities by which to modify a person's deficiencies meaningfully and permanently for his or her better adaptation. The LPAD profile is the structural and process vehicle to make this possible.

The Interpretation of Results

The interpretation of results differs in the LPAD in a number of ways. Absolute numbers derived from the individual's initial performance (at what can be called baseline) or following intervention – or from both – maybe of indicative value. However, except for instances of great success (where they certainly constitute evidence of the individual's capacity to acquire and apply learning), the absolute numbers are not informative about the changes that can be produced in the individual. In situations of lesser success, no success, or negative performance, absolute numbers can be misleading at best or can obscure change potential at worst.

Regardless of the level of efficiency reached by the examinee during the assessment, the LPAD examiner is called upon to detect and make as accurate an assessment as possible of the conditions preventing the individual from functioning at higher levels and to describe the amount, type, and nature of intervention that is needed to overcome them. The LPAD profile, therefore, focuses on a number of qualitative characteristics of the examinee's performance to help the examiner in this task.

As emphasized throughout, the LPAD is a process, and the design of its instruments and its procedures for administration creates the conditions to stimulate and elicit changes in the subject. The most important information generated in this specially structured interaction does not refer to what an examinee *can do* during the assessment experience, but it refers rather to the changes that have to be produced, and can be produced, to permit the examinee to accede to higher levels of functioning, and to maintain and elaborate them. The LPAD is thus an assessment of the propensity to change, and of the modifiability of this very condition. The gathering of data and conveyance of results as an outcome of this process must, therefore, be richly reflective of the change processes structured into the approach.

The data produced by the LPAD should not be considered as evidence of immutable and fixed traits (of modifiability). Even the examinee's modifiability cannot be considered stable. To the contrary, the indicators of modifiability obtained during the assessment constitute a reduced form (with regard to range and extent) of what can be expected with further investment. It therefore follows that the "rate" of observed change may undergo meaningful change in the direction of a higher, a more rapid, or a slower rate of modifiability following intervention. In other words, the recency and fragility of the examinee's acquisitions in the context of a comparatively brief, albeit intensive, dynamic assessment may produce evidence of modifiability that will become more enhanced with consolidation, crystallization, and habit formation, which may be achieved with subsequent interventions over a period of time following the assessment. This may produce a meaningful further enhancement of the individual's modifiability, making the examinee increasingly accessible to both areas and levels of functioning that could not be directly and specifically observed and predicted from the initial assessment of learning potential.

External Sources of Baseline Data

External sources may be implicit, as in a global index of cognitive development, which permits inferences regarding the presence or absence of certain cognitive functions; or explicit, as when some functions or mental operations are singled out to describe or illustrate a more general, implicit assumption about the subject of assessment. All baseline data must be considered in terms of their reliability, meaning, pervasiveness, and direction.

Baseline data of this type can come from parents, teachers, and professionals. They may be the product of direct, prolonged observation by parents, with varying degrees of systematicity; of a focused assessment by an experienced psychologist; or of an interaction with the observed child by a classroom teacher in a variety of situations. The information from various sources may converge when it refers to the same areas and conditions of functioning; however, it may also be divergent both in the description and interpretation of the subject's behavior. Incompatibilities and divergences that appear (and their appearance should be encouraged and paid attention to) may yield important information about a person's capacity above and beyond the manifest level of

functioning. Without negating reports from one or another source of information, divergences may point to failure or success as being situationally determined. The interpretation of results differs greatly from conventional static models inasmuch as normative comparative bases are not used, but rather the significance is derived from an analysis of the performed tasks, the errors made, and the nature of the components of the mental acts responsible for functioning (phases, the cognitive map, etc.). For example, a psychologist may describe a child as being incapable of abstract: thinking, pointing as evidence to the child's IQ of 55. The psychologist's opinion is offered in spite of the fact that the child has mastered reading, writing, and the basic mathematical operations. The psychologist might interpret the incompatibility as being due to the child's strong motivation, rather than as a sign of the possibility that the conclusion regarding the alleged incapacity is unwarranted. Incompatibility on the baseline level should lead the examiner to question certain assertions stemming from the manifest level of functioning. Thus, for example, descriptions of a short attention span may be challenged by observations in particular situations in which the same child persists in attending beyond what the child is requested or permitted to do. In this instance, any attribution of stable and pervasive neurologically based conditions must be questioned in favor of a more differential task-specific reactive response.

Information from external sources should therefore be carefully collected. Opportunities should be sought to identify contradictions, incompatibilities, and divergences, which can then be interpreted as reactions to specific conditions. An attempt must be made to reconcile controversial data, not only to understand the specific conditions under which they were obtained and the dynamics in which certain phenomena appear, but also in order to challenge them (in the assessment process). A way must be sought to correct stereotypic, limited perceptions of the subject, thereby providing evidence against established assumptions.

The baseline data gathered from external sources will often include a global evaluation in the form of a label, or a diagnostic category with psychological meanings from which a number of inferences follow. These inferences often limit the perception of functional adequacy of the individual. Thus, labeling someone as profoundly retarded usually implies a lack of symbolic functioning on a verbal level and – even more so – on the lexic level. Certainly, inferential, abstract, and representational thinking are considered nonexistent and not compatible with such a diagnostic label. Referring to someone as severely retarded implies the possibility (although not necessarily the actuality) of some minimal verbal functioning. No representational, symbolic, or abstract thinking is considered within the available repertoire of functioning. When describing an IQ within the educable mentally retarded (EMR) range (e.g., 50 to 75 IQ), verbal communication and a certain amount of simple, lexic function is assumed to be present and possible. However, the propensity to use thought processes requiring the elaboration of data and the generation of new information as a derivative of such organization is considered inaccessible. The LPAD examiner, who is familiar with the assumptions underlying such labeling and categorization, and who understands the underlying theory of SCM, will attempt to challenge these assumptions by orienting the search of the LPAD assessment to ward the inferences directly derived from them. External sources of information that define a person by IQ, as an example, and other similar indices of manifest functioning do not guide the LPAD examiner in the direction of searching for confirmation (a relatively easy task), but conversely in the direction of seeking invalidation of the label; *or* at least toward the attempt to understand more

precisely and intimately the reasons for the low manifest level of functioning.

Sources of Baseline Data Within the LPAD

Baseline information is gathered during the dynamic assessment in two ways. The first is by confronting subjects with tasks without training or prompting, in which they must show their capacity to cope spontaneously with tasks. The "objective data" thus derived are then used as a target for remedial processes and for change. Although such baseline data are easily gathered in this way, both in individual and especially in group administration formats, the examiner should be extremely cautious about depending on or emphasizing this method in individual, clinical assessment situations. Beyond the tendency to lapse into psychometric assessment styles, the subject's frustration, which may be created by such practices, will not be easily dissipated at later stages of the examiner/examinee interaction, and may limit the extent of the changes the learner can generate. It is of great importance to note that failure experiences risk raising certain resistance to more adaptive ways of functioning, which then may be ascribed to a preference to remain with the familiar – even if unsuccessful – pattern of functioning. A more pervasive consequence is that whenever limited or deficient cognitive processes are used, there is a readiness and propensity to repeat a previously given response, which results in the preservation of failure, rather than stimulating change. A second possibility is establishing baselines of subjects' manifest behavior by inferred information. This is preferable to producing data based on some degree of failure experience, with all that entails regarding the subject's potential lack of confidence. We have observed a tendency to repeat and persevere in producing failing answers even after feedback leading to correction, as if the error has received some legitimization and is chosen because it has become familiar and easily accessible for retrieval. Indeed, the atmosphere engendered by an objective baseline, as described above, is not the type of examiner/examinee interaction fostered and encouraged in dynamic assessment, where the examiner offers the mediational prerequisites for successful mastery of the task.

Observation-Derived Baseline Data

A more desirable way of establishing a baseline of intact and deficient functions, mental operations, affective and motivational factors, and efficiency is by the examiner's direct observation during the LPAD session as the subject performs. The examiner searches for the reasons underlying difficulties experienced by subjects in solving certain problems. This search is guided by the parameters of the cognitive map (see above). The deficient cognitive functions that are evidenced by the subject's performance must be carefully observed and registered, and then elaborated by mediation. The effects of this mediation on the development of adequate modes of coping with problems are then available for observation by presenting the subject with similar tasks to see if the deficiency revealed in the initial performance will produce another failure, or if – in subsequent tasks – the deficiencies have been corrected and no longer negatively affect the subject's functioning. In later stages of the assessment, the LPAD examiner must bear in mind those areas whose correction was attempted in the mediation phase.

Group LPAD Assessment

Our experience over the past several decades, in both clinical and experimental settings, suggests that with careful consideration for the theory and practice of the LPAD, and with well-organized procedural conditions, the LPAD can be effectively and usefully administered in a group setting (see *Revised LPAD Examiner's Manual*, Feuerstein et al, 1995).

Goals of Group LPAD Testing

The major goals and objectives of the LPAD, administered in a group setting, remain the same as those of the individual LPAD: to assess the propensity of individuals to modify their cognitive structures. When concern is directed at the cognitive functions of individuals as they perform in groups, for example, in classrooms, a dynamic group assessment procedure provides a modifiability profile as it may occur in the regular condition. In a general sense, the dynamic approach applied in this context enables the examiner to describe the expected changes in the conditions of educational processes. It must be emphasized, however, that the condition of group dynamic assessment does not offer the individual the-optimal conditions of mediation.

The essential focus of the LPAD in a group format is unchanged from that of individual assessment, at the same time there are some advantages of the group format.

1. Information can be collected on students in situations that are similar to the real learning experience of students, where variables can be observed that are not available in the one-to-one interaction. These include the subject's attending to instructions and explanations, the maintaining of performance when direct monitoring is not being provided, response to distractions, self-control and behavioral monitoring in situations of independent work formats, the effect of peer social relationships, and the like.

2. On the basis of information collected on the group, relevant interventions for the group as a whole can be developed. Observations of group performance, response to mediation, and the emergence of learning and didactic strategies can be formulated into interventional suggestions that can be transmitted to teachers for implementation. In addition, the development of individual programs derived from and relevant to group performance becomes possible.

3. Because group assessment requires a more standard and structured set of initial procedures, the procedure is more amenable and useful for research purposes. The individual LPAD varies from examinee to examinee, from examiner to examiner, and from session to session. This lack of consistency makes comparisons difficult, even within the same subject. The group LPAD assessment procedure is of necessity more structured, with less variability in the mediation, scoring, and examiner interventions, making the baseline data available more appealing for research-oriented applications, but less clinically rich and revealing.

4. Group testing is more economical in that it enables the evaluation of groups of subjects simultaneously. Individual LPAD is potentially a lengthy and extensive process, and it is therefore often viewed as beyond the resource capacities of schools or other institutions. Under proper conditions, group LPAD can be used as an initial

screening, to answer some of the first questions regarding student functioning and classroom pattern variables, with the identification of later interventions emerging from the "first picture" offered by the group procedure.

Target Populations and Essential Conditions for Group Testing

Group testing is not intended to replace individual assessment in those cases where the focus is on the difficulties experienced by the specific individual. The group LPAD assessment is appropriately employed with children, adolescents, and adults who are either functioning at a low level, or where general levels of functioning need to be explored, and among those who are able to function adequately in a group setting. The purpose of group testing under these conditions is to gather evidence regarding abilities and functioning that are not readily observed in manifest behavior.

Group testing is also an appropriate tool for assessing changes in learning ability and cognitive structures of students who have experienced special programs, as in a research paradigm. For example, it is often paired with Instrumental Enrichment (Feuerstein et al, 1980) as an indicator of pre- and post-treatment outcome effects. It can also serve to identify deficient cognitive functions in those learners who are performing at higher levels but have specific learning difficulties.

The group testing procedure of the LPAD can be considered appropriate and useful and complementary to the individual test format, subject to two critical conditions:

The "Mediational" Condition: Mediational intervention is necessarily more restricted in the group procedure. It is obviously not possible to individually mediate all members of the group. The procedure thus requires modified and limited mediation and less than fully responsive interactions during the subject's "independent work" responding to the tasks of the instruments. Therefore, the results obtained by the individual on the group test are considered meaningful to the extent that they demonstrate that the examinee is able to successfully use the training (mediation) provided in the test situation. In this respect, success is defined by the level of functioning achieved by an examinee on the criterion measures. A baseline of the individual's actual level of performance may be established, either on the criterion levels themselves or by tint a from other criteria and performance measures. The fact that an individual is able to achieve an adequate level of performance, or demonstrate;; changes in levels of performance, under the constraint of the limited interaction that occurs in the group LPAD must be regarded as a positive achievement, indicative of an ability to function in situations that provide only limited personal involvement. In a school classroom, for example, such an ability is necessary for adaptation, and hence, adequate performance on the LPAD in the group situation suggests a positive prognosis for adjustment to a school environment.

In the case of an individual who fails to perform adequately on the group LPAD, great caution should be exercised in the interpretation of the results. No decision concerning an individual's true potential to be modified should be made until evidence based on an individual assessment is available. Poor results on the group LPAD may occur because the training required by a particular individual is not provided or the group administration format, with its reduced opportunities for directed feedback, does not meet the individual's specific needs at that point. Whatever the reason for lack of response, individual assessment is mandatory to identify the deficiencies responsible for poor performance, further teaching needs, and capacity for modifiability.

The “Procedural” Condition: The second condition requires that the training phase be presented in a manner that will ensure the maximum possible efficiency. Despite the limitations imposed by the group situation, training must still be oriented toward the correction of deficient functions that are required by the specific tasks, as they are manifest in the various phases of the mental act: input, elaboration, and output. This orients to logistical procedures in the presentation of materials to the subjects (posters or transparencies to display attributes of sample tasks), structures the orientation to initial tasks and mediational phases of tasks, defines specific objectives to orient the examiner during the independent work on instruments, and includes debriefing procedures with the group following the completion of the independent work but prior to the re-testing phases. There are other considerations of logistics that are critical to achieving the objectives of the procedures. Among them are providing differentially structured scoring and data registration procedures, orienting the examiners in their use, and assigning sufficient examiners and/or assistants to monitor the processes and ensure maximal controlled intervention when required.

The Group Test Battery

As the result of many years of experimental and clinical experience, the following instruments have been used in the group LPAD format: Organization of Dots, Raven's Progressive Matrices, Complex Figure Drawing Test, Set Variations B-S to B-12, Set Variations I, Set Variations II, Representational Stencil Design Test, Positional Learning Test, Organizer, and Numerical Progressions.

A group assessment selects some, but seldom all, of these instruments for inclusion, subject to the considerations of time, needs of the students, and institutional structure variables. Order of presentation is also determined by the exigencies of the situation. Researchers, incorporating the LPAD battery into their programs, have also experimented with other instruments, some traditionally associated with the individual administration format (such as Word Memory, the Diffuse Attention Test, and Associative Recall), and other instruments not associated with the LPAD (e.g., standardized tests in cognitive functioning, assessment of academic skills, etc.).

Differentiating LPAD From Other Dynamic Assessment Methods

At the outset of this chapter, we indicated that the LPAD currently represents one among a number of approaches that are identified as dynamic in nature and structure. Although we cannot exhaustively differentiate and elaborate the reasons why we believe that the LPAD remains the approach that most completely fulfills the essential characteristics and requirements of a dynamic approach to assessment, we will here outline some of the more salient points on which the LPAD responds to the dynamic paradigm. It is our intent to deal with these issues much more systematically in forthcoming publications.

Some essential points that need to be addressed to understand the LPAD in the larger context of dynamic assessment are as follows:

1. Basic assumptions regarding the nature of intelligence
2. The types of changes that can or should be produced
3. The means to produce such changes

4. The criteria to evaluate changes
5. The nature of interventions
6. The structure of tasks
7. The role of the examiner
8. The relation to academic content and tasks

Assignations About the Nature of Intelligence

The theory of SCM conceptualizes human intelligence as characterized by the option, possibility, and propensity to become meaningfully changed by experience, to be transformed by the production of new structures that were previously nonexistent or not efficiently used in the behavioral repertoire of the individual. This includes new ways of thinking and acting, as well as the generation of new need systems; themselves. These structures can emerge in individuals in ways that may even be discontinuous for the individual, causing disequilibrium and stress. Contrary to some aspects of Vygotsky's (1978) concept of the Zone of proximal development, the theory of SCM considers the possibility of producing cognitive structures that would not emerge in the individual without MLE.

Thus, SCM defines intelligence as the propensity of the organism to modify itself when confronted with the need to do so, in order to better adapt to increasingly new, complex situations of its existence. Intelligence is thus a state of the organism, in constant readiness for change and adaptation, rather than a trait that has immutable and fixed properties. This definition places emphasis on the process of modifiability, opposed to other definitions that view intelligence as an object, cf. Spearman's *g* factor, which continues to receive contemporary attention, e.g. Perkins (1995), Gardner's (1993) concept of multiple intelligences, and Sternberg's triarchic intelligences, (1985a).

The LPAD imposes the concept of process on the assessment of intelligence, as crucial element, first in understanding the essence of intelligence, and then in making possible the modifiability necessary for human adaptability. This quality of adaptational intelligence rests on the experience of distance in dealing with the content of interactions with the world. We contend that specific learning is of little value if it is not accompanied with the processes necessary to transform specific content experiences into sources of generalization, and that the generalization must become transferable to the newly generated contents; with both transformations dependent on process (Feuerstein, Feuerstein, & Schur, 1997; see their chapter in this volume). This elevates the importance of process-oriented activity of the mind, which allows the individual to operate on the world to create temporal and spatial distances that are the sources for creation of mental operations needed for more complex, richer, and multidirectional learning. A critical comparative dimension, across a number of parameters, is therefore the extent to which the assessment procedure is either content- or process-based, and thus the extent to which the content of the assessment tasks allows for or stimulates the needed modifiability that we hold to be central to the process of defining and assessing intelligence.

Types of Changes Produced

At a basic level, the question can be posed as to whether the changes produced are peripheral to the activity, or whether the changes represent adaptations in the nature and structure of the adaptation of the organism. We hold that the assessment process must look for (create the conditions, stimulate, and elicit) types of changes that are related to the involvement of new strategies, new structures not immediately present in the repertoire of the individual but readily acquired and used, given appropriate conditions. In this regard,

the LPAD is not interested in changes in products (indices of performance), but rather in processes that become the targets for change (see discussion of content and process above). Thus, the major goal of the LPAD is to produce changes in the process and structure of functioning and to extrapolate from those changes to potential for modifiability and further adaptation.

The Means to Produce Changes

The changes produced by the assessment process are a function of several important conditions: the design of the procedure, the nature of the tasks presented to the examinee, the nature of the intervention structured into the procedure, and the role of the examiner in the assessment process. The LPAD has been explicitly designed and developed to reflect these variables in the observation and elicitation of the sample of changes reflecting structural cognitive modifiability. The basic structure of the LPAD procedure is designed to create the process-oriented approach necessary to produce samples of SCM, through the application of MLE. Interactions that are limited in their mediational flexibility, such as graduated prompting (Bransford et al., 1987; Campione & Brown, 1987) or the testing the limits approach of Carlson and Wiedl (1978, 1979) will not make possible the detection of the microchanges which can be produced in the individual on a variety of levels. We hold that dynamic assessment requires a "tight-knit net" that will catch even the smallest elements, at the same time it lets in the biggest. In the LPAD, we create the conditions for the individual to change in the largest sense of the term, but we do not want to lose the slightest indications of change as a sign of the existence of the propensity for modifiability. This means that it is important for dynamic assessment to find ways of going beyond and beneath the manifest levels of functioning.

Criteria to Evaluate Change

The evaluation of changes in performance and functioning is interrelated with a number of other variables: a definition of intelligence and capacity, the nature and structure of tasks, the kinds of interventions permitted by the procedure, and a framework for summarizing and interpreting the results (e.g., the product-oriented vs. process-oriented approach). In the LPAD, we add another important variable: whether the change is peripheral to the organism or affects the cognitive structure of the individual

The four criterial indicators of the presence of structural change are:

1. *Retention/Permanence*: The maintaining of changes under similar task or stimulus presentation. This is manifested in reduced impulsivity, greater control of behavior during latency periods, and higher levels of sustained motivation for continued performance. Individuals who experience permanence in their cognitive structure sustain attention longer, suffer from less immediate fatigue, and seek continued opportunities to perform.

2. *Resistance*: The maintaining of change in situations that differ in time or space. This element describes the sustaining of the change in the face of situational or affective changes in the individual's experience with task or performance.

3. *Flexibility/Adaptability*: The opposite of resistance, in that the individual is able to modify or adapt previously learned structures to accommodate substantively different

conditions, while retaining crucial elements previously learned, which are appropriately applied to the new situation. This element, the plasticity of changes, is applied to situations that present altered conditions.

4. *Generalizability/Transformability*: Acquired structures are applied to a broad set of situations and tasks, reflecting an abstract, representational function of the act. They can be specific to context, as in what can be termed *near transfer*, or related to a more generalized, abstracted aspect of the task, *far transfer*. The ability of individuals to manifest this element in their responses to learning exposure suggests the propensity for higher, formal mental operations. This can be observed in task performance and responses. For their further manifestation in learning tasks and subsequent performance, they must be structured into the dynamic assessment process in order to assess the presence of structural cognitive change.

The degree to which these criterial elements, or as they have been called elsewhere (Feuerstein et al, 1995) *qualitative parameters of change*, are present in the functioning of the subject is an important indicator of the subject's modifiability in a structural, rather than peripheral, manner. In the LPAD, changes in specific task performance are continuously – at the outset and throughout the assessment process – assessed in relation to changes in generalized, higher-order thought processes. Indeed, the mediational interventions offered the learner are designed to build in some of these changes so that they can be observed in subsequent performance.

The LPAD is designed to provide information so that changes in performance are observed, described, and analyzed within domains of functioning (related to a delineation of the cognitive functions) and along parameters of meaningful performance. When scores are obtained, they are used as descriptive of change, from baseline to various degrees of post-intervention performance. They are not meant to be considered normative or comparative, which we consider to be external to the performance of the subject being assessed. It is in this context that we express our concern that to the extent that approaches to dynamic assessment focus on task performance, attempt to preserve psychometric properties of the assessment, and limit the mediational interventions, they will inevitably limit the creation of conditions for structural cognitive change, with restrictions on criterial elements for observation and assessment. This is reflected in the model, design, and implementation of the LPAD.

The Nature of Interventions

Providing mediational intervention to clarify and elaborate a subject's performance is considered a central aspect of the dynamic assessment process. In the LPAD, mediation is designed to be flexible, adaptive to the responses of the subject, and directed toward producing structural change. Intervention is oriented to observing change as the subject responds to further similar and somewhat different tasks, and it is required to generalize from the task to underlying cognitive concepts. This requires the examiner to be flexible and willing to invest and interact with the subject, to encourage, stimulate, and merge with the subject, on cognitive as well as emotional and affective levels. Any approaches that constrict or script the interventions to fit within predetermined standards (see references to *graduated prompting*, *testing the limits* above) or control feedback within the task structure (see, for example, Guthke's 1992 "learning test" approach, also in Guthke & Stein, 1996) will not provide the conditions to elicit the full propensity for

modifiability within the individual.

The Structure of the Tasks

To achieve the goals of dynamic assessment, the tasks must be selected and built into the instruments with careful regard to the nature of the functions to be observed and mediated, as well as methodological and philosophical considerations. This has been described in earlier sections of this chapter.

The Role of the Examiner

The LPAD examiner must possess an extensive and varied repertoire of cognitive as well as affective responses, formulated as modalities of intervention to be used in response to observed deficiencies in cognitive functions and mental operations, according to the parameters that have been identified and described above. The LPAD instruments are vehicles for the production of change, but the examiner uses the instruments to adapt, modify, and innovate to pursue potential change or teach a requisite skill that can facilitate a mental operation and contribute to a potential structural change.

Relation to Academic Content and Tasks

A question has been raised in cognitive education regarding the extent to which the tasks of assessment should be closely related to the specific academic or functional task dimensions to which the subject is expected to respond in the world of school or work – which has been termed *domain specific*. This has been contrasted to a focus on tasks and functions that are more generalized, presumed to be common to all processes and to be related to mental operations and generic cognitive functions. We have addressed above what we consider to be the critical need for the creation of distance in the cognitive learning experience of the individual, to facilitate the development of higher-order mental processing and the uniquely human and creative capacities of the individual. It is our view that selecting tasks from a domain-specific perspective minimizes the experience of cognitive distance for the learner and thus restricts the learning experience and the ability of the assessment procedure to clearly identify crucial elements of cognitive functioning and modifiability. The tasks of the instruments composing the LPAD are therefore designed to assess generalized prerequisite mental operations and modalities of functioning; they are only secondarily or inferentially related to specific academic or other content. Any attempt to make dynamic assessment contingent upon crystallized products of educational and instruction process will of necessity and unavoidably limit the open and flexible assessment of cognitive and functional modifiability, as the experience with the process will be restricted to static curriculum models and performance expectations.

Current and Future Problems for Study

The development of the LPAD is a dynamic process, with the instrument undergoing continual refinement, extension, and elaboration. We will briefly identify several of what we consider to be critical concerns for current activities and the future development of dynamic assessment:

Application of Dynamic Assessment to the Needs of Developing Countries: The

paradigm of dynamic assessment needs to be considered in dealing with the rapid technological developments impinging on many nations and cultures, where assessment and evaluation methods must be developed to identify individuals' propensity and eligibility for higher levels of functioning. Static measurement dooms the individual to being considered on the basis of present levels of skills, of existent modalities of problem-solving behavior, and it creates great areas of inadequate information. The LPAD presents opportunities to develop and use tools to reveal the true capacities of the individual and the propensity of individuals to acquire prerequisites of functioning in newly developed areas of technological and cultural adaptation. We have observed the relevance of this issue in a variety of studies and projects with Ethiopian immigrants adapting to Israeli culture and life. There is great potential for these applications in many other areas of the world, both technologically advanced and developing.

Expansion of the Battery: The battery of instruments has expanded and developed since the first publications on the LPAD (Feuerstein et al, 1979). We have made possible the broader and more precise assessment of cognitive modifiability and improved the linkage from the assessment process to the identification of and focus on prescriptive and remedial strategies. This development includes elaborating instruments in the logico-verbal and numerical modalities, using a variety of operations in accordance with the LPAD model.

Upward and Downward Extensions of the Instruments: Initial instruments and techniques were designed for use with culturally deprived adolescents, regardless of the distal etiology for their manifest levels of functioning. Over more than two decades of development and clinical experience, the LPAD approach has been expanded to apply to a wide range of populations and age ranges: (a) to populations experiencing clinical, psychopathological difficulties, as in schizophrenia; (b) to preschool and primary school-age children and to university students and adults; (c) to populations as diverse as those requiring physical and developmental rehabilitation, those experiencing severe disability due to genetic chromosomal differences, occupational change, and adjustment in adults, and to individuals adjusting to cultural and societal discontinuity; (d) for higher range cognitive functioning as represented at college level and advanced occupational adjustment, and for the general enhancement of intellectual production and performance.

Preferential Modalities: An area of significant interest requiring further research is the determination of individual preferences for learning through specific modalities and mediation. That individuals differ in their optimal use of specific modalities of information processing is well-known and understood. Our current efforts are directed toward the development and expansion of profiles of modifiability to address this question, with particular emphasis on studying the influence of various conditions of MLE on modifiability.

Affective-Energetic Factors: Although the LPAD is focused on the study of the cognitive structure and functions, we in no way neglect the interaction between affective and cognitive elements in the behavior of the individual. There is a growing appreciation (see Goleman, 1995) of how self-image and affective, motivational, and other factors interact with cognitive behavior to achieve a more precise prescription of

remediation strategies. Our work, and the work of many others – in particular referring to MLE – continues to be directed toward an understanding of the specific weight of such factors and how they must be recognized within the dynamic assessment process.

Validity Studies: One of our early concerns was the question of in vitro versus in vivo validity. There is no question that during the test sessions, changes occur in response to mediational interventions. Examinees who become modified within the test situation quite obviously leave the concrete and task-bound level and are able to function with an abstract, internalized, representational conceptual thinking that was inaccurately and unjustly considered inaccessible to them previously. But to what extent and under what conditions will modification achieved within the test situation predict later performance in academic and real-life settings? The question of whether the LPAD procedure can attain degrees of reliability and validity might be answered by asking another question: Under what conditions can and should one test for validity? We continue to study this issue and search for relevant and meaningful answers.

Summary and Conclusions

The LPAD is a needed and necessary alternative to traditional psychometrically based assessment practices. It was a first, initially modest beginning to address complex issues connected to the core of human functioning in educational and social contexts. After many years of clinical experience and experimental study, it remains a well-articulated and focused technique and process to continue the exploration into better alternatives for assessment, placement, intervention, and consultation.

The first area that benefits from a dynamic assessment of cognitive functions is the study and deeper understanding of the widely used constructs of intelligence and capacity. The nature of these constructs is as much in dispute today as it was 60 or more years ago. It is only when we view these concepts and processes from the perspective of changes that may be produced in the nature, quality, and quantity of mental processes under specific conditions of manipulations and intervention that we gain needed clarity. It is under such search and scrutiny that the components of the mental act and their prerequisites for mastery become evident. The limits imposed by age, structure, and the state of the human organism may be better understood as to their central or peripheral nature. Such a philosophy challenges many of the established conceptions and permits the dissipation of many stereotypes prevalent today in developmental and differential psychology. Thus, from this perspective, we define and treat intelligence as a state rather than a stable and fixed set of traits. It is for this reason that we have shifted the emphasis in aspects of our theoretical focus from potential to propensity and reflect this in the changed name of our procedure – the *Learning Propensity Assessment Device*.

Because the examiner – as mediator – is the one to produce samples of change in the cognitive structure, he or she must be in possession of an extensive and varied repertoire of cognitive concepts, tools, and operations that will serve to better understand the functioning of the examinee. A thorough mastery of the list of deficient cognitive functions, manifesting themselves in the failure of the individual to solve problems; the use of the cognitive map to analyze the characteristics of the task; and the rich and varied modalities of mediation aimed at producing the desired changes all become necessary parts of the LPAD as a dynamic assessment process.

Another area of contribution is a better understanding of culturally determined differences between groups, as revealed by cross-cultural studies. These studies, which

mainly use static measures for the description of differences, may bring more relevant information to active consideration once they add a dynamic dimension, focusing on the problem of how such differences could and should be leveled by a process of modification. This is especially necessary considering the rapid changes occurring in societies where development requires adaptation to modalities of functioning that are uniformly based on conceptualized, abstract, and efficient operational thinking. The LPAD has the potential of providing information regarding the extent to which changes are necessary or desirable, the preferential modalities by which a given cultural subgroup may best be modified, and the amount and kind of investment necessary to attain this goal. A most desirable product of such an approach would be how such changes could take place without altering dimensions, attributes, and characteristics vital for and inherent to the cultural identity of the subgroup.

Finally, dynamic assessment, provided through the methodology and procedures of the LPAD, as presented in this chapter and available through well-described and detailed publication and training processes, becomes a source of direct and immediate help for all individuals whose current level of functioning is the basis for far-reaching decisions, of import to the individual him- or herself and to the society in which that individual may contribute. It is not too much to say that such decisions are crucial to both individual and group destinies. It is here that dynamic assessment, and all that it entails, has the potential for systemic impact when it is developed further, implemented in broader and more integral ways, and disseminated to those constituencies in need.

At the outset of this chapter we referred to Ramey and MacPhee, who, in 1981, proposed the question as to whether the LPAD represented a new paradigm for assessment, based on a new conception of learning and intelligence. The development and further implementation of the LPAD, and the years of clinical experience on a worldwide basis, now permit us to say yes, it can and does – if and when it is given the chance. The conditions can be created, and the tools are available.

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Review Questions

1. List five differences between static and dynamic assessment methods.
2. Which of the LPAD instruments evaluate the modifiability of memory?
3. What is the LPAD profile?
4. Which are the criteria of structural cognitive change?
5. How group LPAD assessment is different from the individual?