Chapter 3
Prevailing Models of Dynamic Assessment

Abstract This chapter presents an overview of the leading approaches to DA that have emerged around the world in the decades since the introduction of Vygotsky's work outside Russia. The two broad schools of thought on DA, interventionist and interactionist, are introduced, their strengths and drawbacks assessed, and key studies in their research literatures discussed. Interventionist DA, which emphasizes standardization, offers special advantages such as the ease of generating results for large numbers of learners that can be easily compared. Of course, standardizing interactions places limitations on the mediation that can be offered to learners thereby decreasing the chances of co-constructing a ZPD. Particular attention is given to interactionist DA, which is more in line with Vygotsky's vision of how the ZPD can be used to reorient education to learner development and is therefore more relevant to the classroom. Among the DA models reviewed are those associated with Budoff; Guthke; Carlson and Weidl; Campione, Brown, and Ferrara; and Feuerstein.

Keywords Standardization, dialogic interaction, interventionist DA, interactionist DA, zone of proximal development

3.1 Introduction

Imagine the following scene: an introductory university foreign language class is hard at work engaging in a conversation activity, in pairs, that requires the use of new vocabulary as well as some challenging grammatical structures. The teacher is circulating the room, pausing to listen to pairs of students, who of course become more serious and focused as the teacher approaches. Now imagine that the teacher has devised a set of prompts and hints to offer students if they needed it, in this way mediating their performance. Things are going along smoothly until she stops by a pair of students who are struggling with the activity and who, she realizes, need assistance that she had not foreseen. What should the teacher do in this instance? Should she abandon the mediation she had prepared in order to help her students or

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should she let a valuable teaching and learning moment pass because she only wants to offer the students a certain kind of support?

Many teachers would likely advocate altering the planned mediation in favor of providing optimally effective support and instruction. After all, why resist doing what is best for the learners? One might reasonably argue that identifying the source of a learner's difficulty and responding appropriately is a hallmark of good teaching. And yet, if the scenario above were changed to an assessment activity rather than a pedagogical one, all bets would be off. For example, some would contend that the teacher should not interact at all with the students because it might bias outcomes in favor of some learners but not all. Even proponents of Dynamic Assessment, who would all recommend providing some form of mediation, would be split over the question of whether the teacher should stick to her original plan or interact flexibly with the learners. The instruction–assessment dualism is so well entrenched that even DA practitioners continue to wrestle with how to integrate mediation into their procedures without completely abandoning traditional assessment principles. The problem can be summarized with the following question: Is the procedure focused exclusively on understanding and promoting learner development or does it have additional purposes? DA procedures that maintain a development orientation favor flexible mediator–learner interaction. Indeed, from this perspective, withholding support that one suspects would foster learner development may be considered unethical. On the other hand, when other purposes are introduced, such as producing results for large numbers of learners that can be easily compared, standardizing procedures becomes an appealing option. Standardized approaches are also attractive to investigators wishing to study the effectiveness of DA using traditional research methodologies, which often call for large sample sizes and quantified results.

Of course, placing limitations on the mediation that can be offered to learners decreases the chances of co-constructing a ZPD, but some DA practitioners are willing to make this sacrifice to meet the demands of their assessment or research context. As I hope to demonstrate in this chapter as we review the major approaches to DA, both the interventionist and interactionist frameworks contribute to our understanding of the processes of development in ways NDA does not. We will begin with interventionist DA, since this orientation continues to incorporate principles of NDA, and then move toward Reuven Feuerstein's approach to interactionist DA, which I argue is more in line with Vygotsky's vision of how the ZPD can be used to reorient education to learner development.

3.2 Interventionist DA

As explained in Chapter 1, the defining characteristic of interventionist approaches to DA is that the mediation offered to learners is standardized. Mediators are not free to respond to learners' needs as these become apparent during the procedure but must instead follow a highly scripted approach to mediation in which all

prompts, hints, and leading questions have been arranged in a hierarchical manner, from implicit to explicit, and usually assigned a numerical value. This move is motivated by a desire to maximize the assessment's objectivity, defined in traditional psychometric terms and not as the concept was understood by Vygotsky (Luria, 1961; see also discussion in preceding chapter). However, producing outcomes in a quantified form as scores means that learner performance can be discussed using constructs from NDA, such as generalizability, validity, and reliability. More will be said about this in the next chapter, but for now it is worth noting that interventionist approaches may be more readily accepted than interactionist DA in assessment contexts that are accustomed to psychometric testing. That is, services and programs that require test scores of IQ, college aptitude, or language proficiency might have fewer reservations about the legitimacy of DA in an interventionist form than in the highly interactive and qualitative approach discussed later in this chapter. As we will see, the assessment context, including various stakeholders, is an important consideration when choosing a DA procedure.

3.2.1 Budoff's Learning Potential Measurement Approach

Budoff's work emerged out of a concern over the validity of scores produced using standardized measures of intelligence. According to Budoff, traditional intelligence assessments may be adequate for understanding the abilities of many children, but for some – especially those from low socioeconomic backgrounds – interpretations of assessment outcomes are compromised by the disjoint between the culture of the school and the children's own culture (Budoff, 1987; Budoff and Friedman, 1964). In other words, poor performance on a traditional intelligence test may be due to a lack of certain kinds of educational opportunities rather than to cognitive impairment. Inspired by Luria's (1961) work with underachieving students in the Soviet Union, Budoff reasoned that the effects of a child's background on his test performance could be mitigated to a degree if the child were familiarized with the test and taught strategies for solving the kinds of problems it contains (Sternberg and Grigorenko, 2002, p. 73). In Budoff's view, if children improved their test scores as a result of training, this change should be taken as an indication of their *learning potential*.

Budoff's is the earliest DA research outside of the Soviet Union and it also remains the closest to NDA. He used only test instruments whose psychometric properties were well established, such as Kohs Learning Potential Task and the Raven Learning Potential Test, and his interpretations of learners' abilities were based exclusively on their test scores. In fact, Budoff pioneered the *sandwich* format of DA (see Chapter 1), which was taken from the classical research design in experimental psychology: pretest – treatment – posttest. Budoff's approach to mediation resembles the "treatment" phase in that the experimenter follows a standardized procedure to instruct learners in problem-solving strategies. Thus, Budoff's approach is like NDA except that it allows learners to be trained and retested.

In high-stakes testing, coaching students to improve scores has become commonplace (Cronbach, 1990, pp. 82–86). One might legitimately question whether Budoff's work can be considered "dynamic." I would like to suggest that the answer lay in the purpose behind the procedures. In coaching programs, the aim is to help students improve their score on a particular test in order to gain admission to a university or achieve some other objective (ibid.). Budoff is interested in improving learners' test performance because he believes the degree of change reveals their potential for future learning (Budoff and Friedman, 1964). It is true that, unlike other approaches to DA, Budoff does not mention cognitive development as a goal of the procedure. Nevertheless, he shares with other DA proponents a conviction that cognitive abilities are amenable to change if appropriate opportunities are provided. To recall our discussion in Chapter 1 of Sternberg and Grigorenko's (2002, p. 30) proposed distinction between "dynamic testing" and "dynamic assessment," Budoff's Learning Potential Measurement may be considered an example of the former since it is intended to explore potential for development rather than promote development.

Budoff's approach makes an important contribution to DA's claim that cognitive abilities are dynamic and not stable because participants in his work responded differently to the mediation phase. Budoff was able to group individuals according to the differences in their pretest and posttest scores, demonstrating that they benefited differentially from training. In this way, two learners who performed similarly on their pretests might perform differently on their posttests, or vice versa. According to Budoff, such information was crucial to understanding their potential for future learning. He proposed grouping individuals into one of three categories: *high scorers* are learners whose initial pretest performance is good; *gainers* are individuals who show improvement after training; and *nongainers* are learners who perform poorly on both the pretest and posttests.

Budoff's Learning Potential Measurement, with its standardized mediation phase and reliance on traditional testing instruments, is best suited for contexts involving large numbers of individuals. One can imagine, for instance, adapting this approach to use in the administration of a language proficiency exam to select candidates from a large pool for acceptance into a university and possible placement in an intensive academic English program. The approach is not intended for classroom applications. One notable feature of Learning Potential Measurement is that there is no follow-up to the posttest; scores are simply reported to school officials. Budoff and his colleagues have yet to outline an intervention program for participants based on test performance (Sternberg and Grigorenko, 2002, p. 83), and they have not investigated how learners' gains might be affected by the kind of instruction offered during the mediation phase.

Budoff's reluctance to alter mediation during administration of a Learning Potential Measurement is due to his commitment to standardizing all aspects of the procedure. He has criticized DA approaches such as Feuerstein's (discussed below), arguing that "it is difficult to distinguish the contribution the tester makes to student responses from what the student actually understands and can apply" (Budoff, 1987, p. 56). Budoff's perspective is clearly grounded in more traditional approaches to

psychological measurement, and so he is concerned with determining how much of a test performance can be attributed to the "environment," as represented by the tester, and how much is to be attributed to the student. This contrasts sharply with Vygotsky's understanding of the person–environment relationship, as seen in Elkonin's (1998, p. 299, italics added) observation that for Vygotsky interaction is "not a factor of development, not what acts from outside on what is already there, but a *source* of development." This important point will be returned to in the next chapter when we consider psychometric criticisms of DA.

3.2.2 Guthke's Lerntest Approach

Guthke and his colleagues at Leipzeig University have built upon Budoff's work in the development of a number of their own DA procedures, which they refer to collectively as the *Lerntest* (see Guthke, 1982), or more recently as the Leipzeig Learning Test (LLT). Making specific reference to Vygotsky's understanding of cognitive development, Guthke has argued that individuals have not just one ZPD for general intelligence or learning ability, but multiple domain-specific ZPDs (Guthke, 1993). His work has sought to move DA procedures beyond the domain of intelligence testing to include content areas, such as language aptitude (Guthke et al., 1986).

Contrary to Budoff's preference for separating the mediation phase from the test administration phases – and, consequently, perpetuating the assessment–instruction dualism – Guthke's incorporates mediation into the test itself. The form of mediation provided in the LLT has changed considerably over the last two decades although it remains standardized. In early versions of the test, only one type of assistance was offered to examinees who produced an incorrect response: they were asked "to think properly once again" (Guthke et al., 1986, p. 905). If examinees were still unable to produce the correct response, the examiner revealed the solution and they moved on to the next item. More recently, Guthke and his colleagues have devised a menu of five standardized hints that they use when administering the LLT (see Guthke and Beckmann, 2000). The following example illustrates how an LLT language aptitude assessment might be conducted.

Examinees are given sets of geometric figures paired with words from an invented language and are asked to complete a variety of tasks, one of which is to complete a pattern, as in Fig. 3.1.

If an examinee's first attempt to complete the pattern is incorrect, she is provided with the following vague hint: "That's not correct. Please, think about it once again." If the second attempt is also unsuccessful, the examiner offers a more explicit hint: "That's not correct. Think about which rows are most relevant to the one you are trying to complete." If the third attempt fails, the examiner offers an even more explicit hint: "That's not correct. Let's look at rows three and four." If the response is still inaccurate, a very explicit hint is offered: "That's not correct. Let's look at rows three and four and focus on the differences in both the positions

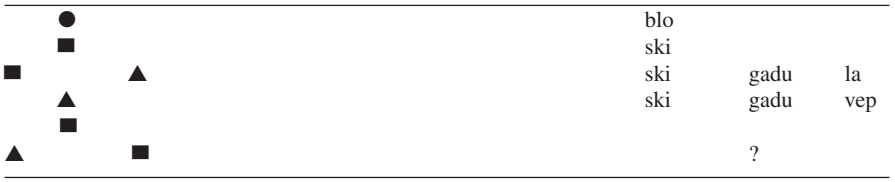

Fig. 3.1 Leipzeig Learning Test (LLT) language aptitude diagnostic (Guthke et al., 1986, p. 906)

of the objects and the words." If this fails to produce the correct response, the examiner provides the correct pattern and explains why it is correct: "That's not correct. The correct pattern is *gadu ski la* because we see that *gadu* represents the triangle, *ski* represents the square, and *la,* which indicates the objects' relative horizontal positioning, should be the final element in the clause, as can be seen in rows three and four." At this point, the examinee will move on to the next item on the test. While the items become increasingly complex, the same standardized set of five prompts is used throughout. In another variation, the assessor also asks examinees to explain the rule underlying the patter whenever they produce a correct response and in this way identify instances of random guessing.

Guthke has devised several innovations that make the LLT easily adaptable to a variety of assessment contexts, including the classroom. For instance, a chapter or unit test might be adapted for LLT administration and the results integrated with ongoing instruction. One advantage of the LLT is that it moves well beyond Budoff's classification of participants as *high scorers*, *gainers*, and *nongainers*. Guthke and his colleagues have developed a system for reporting LLT results that includes both a score and a profile for each learner. The former is based on the number of prompts needed and the amount of time taken to complete the test. The latter comprises an analysis of the types of errors the examinee made (e.g., difficulty remembering which invented words matched which symbols, problems processing longer sequences, etc.), and the forms of assistance to which the examinee was most responsive (e.g., being given a second chance, receiving a reminder, and in-depth explanation of the solution).

An additional development over Budoff's methodology is that examinees' profiles serve as the basis for an intervention or teaching phase in which instruction is offered to individuals or to groups in order to redress problems that arose during the assessment. The LLT is therefore dynamic in the sense that mediation is part of the assessment but also because this assessment is tied to subsequent teaching. Thus, while Budoff simply sought to diagnose and categorize learners on the basis of their responsiveness to the assistance he proscribed, Guthke uses these insights into learners' abilities to promote their development. The teaching phase is followed by a parallel version of the initial assessment and examinees are once again offered hints as needed. This second administration of the test does not assume that all examinees will complete all items without assistance but, rather, it is expected that the hints required will be fewer and less explicit. If this is indeed the case, it is argued that the examinees have developed, and this is an explicit goal of the LLT.

3.2.3 Carlson and Wiedl's Testing-the-Limits Approach

Wiedl, a colleague of Guthke, has codeveloped an alternative version of the LLT approach, known as Testing-the-Limits. Like Guthke, Carlson and Wiedl also employ standardized hints and requests that learners verbalize their reasoning. However, this latter form of mediation is much more extensive than in the LLT. While Guthke uses verbalization primarily to control for learners producing correct responses by guessing, Carlson and Wiedl advocate questioning learners' reasoning after both correct and incorrect responses in order to more fully understand learners' thought processes. In their view, understanding how learners arrive at their answers supercedes whether or not the answer is correct.

Although their research is framed within information processing theory, the Testing-the-Limits approach also embodies many Vygotskian principles. For instance, many of the hints used in this approach are intended to mediate learners' planning processes, which Carlson and Wiedl recognize as an important feature of performance and a common cause of low test scores (Kar et al., 1993, p. 14). They explain:

> Planning is a uniquely human cognitive process and plays a central role in the general regulation of any goal-directed activity. It entails making decisions, judgments and evaluations and includes the generalization, selection and execution of strategies in cognitive performance…planning, therefore, may be viewed as the essence of human intelligence. (Ibid.)

Planning figures prominently into Vygotsky's account of internalization. Indeed, as Lantolf (2003, pp. 350–351) argues, planning relates to the human ability to perform actions on the mental plane without needing to do so physically, and this has profound implications for human activities ranging from building a skyscraper to baking a cake.

Relying on the work of Duncker (1945) and Claparede (1933), Carslon and Wiedl (1992, p. 163) have developed various levels of standardized verbalization prompts designed in some cases to encourage learners to think aloud so that the researchers can better assess where problems occur during task solution ("Try to think aloud. I guess you do so when you are alone and working on a problem" or "Think, reason in a loud voice, tell me everything that passes through your head during your work searching for the solution to the problem"), while in other situations the verbalization itself is a means of intervening in a learner's thinking by encouraging her to approach a task in a particular way ("Tell me what you see and what you are thinking about as you solve the problem. Tell me why you think the solution you chose is correct. Why is it correct and the other answer possibilities wrong?"). They advocate interrupting test administration as necessary to provide hints and elicit verbalization rather than introducing a separate mediation phase. As with the LLT, the standardized approach to mediation makes it relatively easy for examiners and classroom teachers to learn to administer the procedure. Interpreting and reporting results, however, can be challenging. Typically, Testing-the-Limits procedures produce the same kinds of scores and profiles as the LLT but the profiles may be more involved as they must take account of learners' verbalizations. Carlson and Wiedl have not developed their own instructional program based on the

results of their assessments, but prefer instead to report scores and profiles to assessment stakeholders and make recommendations for future instruction.

Recently, Wiedl has begun to use the Testing-the-Limits approach with various populations, including dementia patients (Wiedl et al., 2001), but the majority of research in this tradition has been concerned with underprivileged children. Carlson and Wiedl concur with Budoff that conventional tests often underestimate the abilities of learners from low socioeconomic backgrounds. Their analysis of learners' verbalizations has led them to conclude that poor test performance can often be attributed to the following: learners are ineffective in how they orient to problems; they have difficulty maintaining focus; and they experience high levels of frustration (Dillon and Carlson, 1978, p. 437).

Research on the Testing-the-Limits approach has primarily concentrated on comparing the results of this procedure to those obtained from non-dynamic administrations of tests. Another area of interest has been the effect of altering the order and combination of mediation techniques with different populations of learners (e.g., offering hints during the test and eliciting verbalization afterwards; relying only on verbalization during and after the test; using hints and verbalization during the test, etc.). A consistent finding of particular interest is that learners who typically perform poorly during NDA tests show greater improvement when asked to verbalize than do those learners whose initial performance is already high (Kar et al., 1993). Interpreted within a Vygotskian framework, one could argue that the high performers do not need to re-externalize cognitive processes they have already developed and so do not benefit from the verbalization condition while learners who have not yet fully developed the requisite capabilities are better positioned to regulate their thinking through verbal speech.

The degree to which the Testing-the-Limits approach integrates assessment and instruction is difficult to determine. Clearly, this approach stands to contribute more information about learners' abilities than either Budoff's Learning Potential Measure or Guthke's Lerntest. Nevertheless, Carlson and Wiedl have yet to actually integrate assessment results with an instructional program. Typically, the scores and reports that are generated for individuals and groups of learners are used for research purposes or are given to stakeholders along with recommendations. However, proposing an instructional course of action is very different from continuing to work with learners to mediate their development. This issue of "follow-up" to a DA procedure is a driving force behind the Graduated Prompt approach, which we will now consider.

3.2.4 Brown's Graduated Prompt Approach

Brown and her colleagues have devised a series of DA procedures for specific content domains, focusing especially on reading and math with normal and special children (see Brown and Ferrera, 1985; Campione et al., 1984). Like other interventionist approaches to DA, the Graduated Prompt approach relies on a fixed

menu of standardized hints and leading questions that are used during the administration of the test after each item or problem. This mediation is arranged from most implicit to most explicit and culminates with the correct answer. The unique contribution of the Graduated Prompt approach, and what makes it especially important from a Vygotskian perspective, is its inclusion of *transfer tasks*.

In their procedures, examinees are first presented with questions or tasks and, when they experience difficulties, the examiner offers mediation intended to help them discover and applied principles necessary for solving the problems. Once these are mastered so that the examinees can solve the problems independently, the researchers then attempt to discover how far the individuals can transfer their new ability to novel problems. Thus, these Brown offers a dimension to the emerging picture of development that was absent from the other DA approaches we have considered. Guthke, basing his argument on the ZPD, suggested that perfect performance on the posttest is not the sole indication that development has occurred; it may be the case that learners have developed and now require fewer and less explicit prompts. Brown and her colleagues, also drawing on Vygotsky, claim that an additional and crucial feature of development is that an individual's performance change not only on a repetition of the original test (or a parallel test) but on different kinds of tasks.

After examinees are able to independently solve "novel exemplars" of the original problem types, they are given a set of "near transfer" problems which integrate the same principles as the original task but in new combinations (Campione et al., 1984, p. 81). Then the examinees are presented with a set of "far transfer" problems requiring "the use of a new but related rule or principle in addition to the familiar ones" (ibid.). Finally, the examinees are asked to respond to a set of "very far transfer" problems that are even more complex. Based on the examinees' performance throughout the procedure, the researchers generate learner profiles comprising two axes – one measuring how quickly they are able to learn the new patterns and the other measuring how far they can extend this knowledge to novel problems (see Brown and Ferrara, 1985).

Brown's interest in measurement is characteristic of interventionist DA but is a clear parting of the ways from Vygotsky. She and her colleagues explicitly reference Vygotsky and the ZPD in explaining the theory of development underlying their approach (Campione et al., 1984). Indeed they praise Vygotsky's explication of the processes of development and the "interactive learning situations that provide structured guidance for the learner" (p. 80). However, while Vygotky focused on optimally promoting development through mediation, Brown and colleagues are more interested in the "metric of learning efficiency"(p. 82), which they define as "the number of hints required for the attainment of the learning criterion" (ibid.). Thus, although they include transfer of learning as part of their procedure, they are concerned with quantifying as an "index of speed of learning" (Brown and Ferrara, 1985, p. 300) the amount of help required for a learner to quickly and efficiently reach a prespecified end point. Using a train metaphor, Elkonin (1998, p. 300) states that those interested in speed and efficiency of learning are concerned with how quickly a train moves toward the final station along a set of tracks. Vygotsky,

on the other hand, was not interested so much in the *speed* of the train along the already constructed track but with helping the person lay down *new* track leading toward a station that is potentially always being relocated (see Newman and Holzman, 1993, on development as creativity and transformation).

While transfer tasks may bear a superficial similarity to using posttests in experimental research to ascertain the effects of a treatment, transfer in the Graduated Prompt Approach to DA can be distinguished by the continuing provision of mediation. That is, at no point in the procedure does the "treatment" end so that examinees are required to perform independently. Of course, if they do not encounter problems, they do not receive mediation. However, the examiner is always ready to support them when their performance begins to breakdown. Linking sessions together in this way is a considerable advance in DA methodologies because, if followed to its logical conclusion, assessment and instruction are fully integrated. Of course, Brown and colleagues do not take the matter so far. Transfer and mediation eventually end whenever examinees have efficiently run through all the tasks. However, from a Vygotskian perspective, each transfer task continues and extends previous work, with examiners continuing to offer mediation, and so learner development is ongoing. The "assessment" need never end because there are always more difficult tasks and there is no endpoint to development. This is the idea behind organizing all assessment and instruction around the ZPD, which is precisely what Reuven Feuerstein has attempted to do in his approach to DA.

3.3 Interactionist DA: Feuerstein's Mediated Learning Experience[1]

Although Feuerstein's approach to DA was developed independently from Vygotsky's work[2] the similarities are such that in many ways the research and instruction being done at Feuerstein's International Center for the Enhancement of Learning Potential in Israel are a continuation of the defectology work begun by Vygotsky and Luria more than 70 years ago. There are basic commonalities of course between Feuerstein's model and those we have considered thus far. However, Feuerstein differs from other DA researchers in important ways. He has expended considerable effort to articulate a view of human abilities that, as we will see, is closely aligned with Vygotskian theory. In addition, Feuerstein's model is the most

[1] Mediated Learning Experience (MLE) appears in Feuerstein's work as a part of SCM theory (see his discussion of mediated and direct learning) but it is also used to refer to his approach to DA. Both these meanings of MLE are preserved here; the context in which the term appears should indicate whether it is referring to a type of learning or a DA methodology.

[2] While Feuerstein and his colleagues have always insisted that they developed SCM theory and the MLE concept without any knowledge of Vygotsky's work, they were at least aware of Vygotsky: Feuerstein's classic text on DA (Feuerstein et al., 1979) references the 1962 translation of Thought and Language in a footnote providing examples of psychologists who have expressed dissatisfaction with traditional intelligence measures.

comprehensive approach to DA in that it includes similar innovations to those proposed by other DA practitioners, such as Carlson and Wiedl's emphasis on learner verbalization and Brown's concept of transfer. Most importantly, Feuerstein fully integrates assessment and instruction so that the one does not exist apart – and, indeed, is indistinguishable from – the other. Although he does not employ Vygotsky's terminology, I argue below that Feuerstein realizes Vygotsky's vision of creating a single educational activity that involves co-constructing a ZPD with learners in order to promote development. For this reason, I also argue that Feuerstein's approach holds the most promise to transform classroom activity.

3.3.1 Feuerstein's Structural Cognitive Modifiability Theory

The work conducted by Feuerstein and his colleagues (Feuerstein et al., 1979; Feuerstein et al., 1980; Feuerstein et al., 1988; Feuerstein et al., 2003) as well as the research of those inspired by Feuerstein (Karpov and Gindis, 2000; Lidz, 1991; Peña and Gillam, 2000) is rooted in the basic belief that it is possible to intervene in the development of human cognitive abilities. This conviction has been formalized as Feuerstein's theory of Structural Cognitive Modifiability (SCM), and is supported by numerous cases of individuals who have benefited from Feuerstein's assessment procedures and cognitive education program, including several "success stories" such as one young boy labeled as mentally retarded who eventually went on to earn a PhD in psychology (Feuerstein et al., 1988, provide additional examples of these remarkable cases). According to SCM theory, human beings are "open" rather than "closed" systems, meaning that human cognitive abilities are not fixed traits resulting purely from biology in the way that one's height and hair color are determined genetically, but rather they can be developed in a variety of ways depending on the presence – and the quality – of appropriate forms of interaction and instruction (Feuerstein et al., 1988, p. 5). In Vygotskian terms, this is equivalent to the claim that the uniquely human forms of consciousness emerge through participation in object-oriented social activity.

For Feuerstein and his colleagues, the psychological functioning of individuals living in a rapidly changing, technological, late Modern society can hardly be characterized by stable and predictable patterns; on the contrary, "modifiability" and "autoplasticity" are more important than ever (Feuerstein et al., 1988, p. 62). However, he notes that in the context of education, and particularly in educational testing assessment, the ability of human beings to change – to develop abilities that are qualitatively different from any they previously displayed and that could not have been predicted a priori – encounters a good deal of opposition from the widely accepted but often unstated belief that mental abilities are "static."[3] Reminiscent of

[3] Indeed the use of the terms "static" and "dynamic" in the DA literature is rooted not only in differences regarding assessment administration procedures but also in the underlying beliefs concerning the stability or modifiability of cognitive functions.

the discussion of Valsiner's models of the future in Chapter 1, Feuerstein and his colleagues argue that most education systems continue to assume that learners' *future* functioning can be perfectly predicted on the basis of their *present* performance, "ignoring a possibility that the predicted destiny may not materialize if powerful intervention takes place" (Feuerstein et al., 1988, p. 83). The authors continue:

> The belief in the predictability of certain biopsychological signs is so strong that some professionals think they can (and must) precisely forecast the whole life trajectory of a young child with retarded performance, going out of their way to make sure that the parents understand that nothing can be changed. (pp. 83–84)

Elsewhere, Feuerstein stresses that SCM theory does not differ from other approaches to cognitive assessment in its recognition and identification of individuals exhibiting low levels of achievement. However, "by considering this level as pertaining only to the manifest repertoire of the individual, it [SCM theory] takes into consideration the possibility of modifying this repertoire by appropriate strategies of intervention" (Feuerstein et al., 1979, p. 95). Put another way, SCM can be seen as a conviction that the predictive power of NDA can be undone by helping an individual create a new developmental trajectory. This idea is captured nicely by Feuerstein's preference for the term *retarded performers* rather than *retarded individuals,* emphasizing that it is individuals' performance – their interaction with people and objects in the world – that is "retarded" and in need of modification.

A key component of SCM theory is mediation, which Kozulin (1998) argues is understood in very similar ways by both Vygotsky and Feuerstein. Feuerstein has illustrated mediation in the following way. In direct, nonmediated learning the child interacts with his environment in a trial-and-error, experimental manner. In this type of learning, which closely resembles the stimulus–response conditioning model of the behaviorist paradigm, the child remains trapped in the here-and-now situation, unable to interpret the world or to construct meaning in a way that will allow him to see connections between events, situations, and individuals. In mediated learning, the stimulus–response model is altered so that the child is no longer interacting with his environment in a direct, haphazard fashion. Instead, an adult or more competent peer enters into a relationship with the child and "selects, changes, amplifies, and interprets objects and processes to the child" (Kozulin, 1998, p. 60). Feuerstein terms such an interaction a Mediated Learning Experience (MLE). The following section describes MLE and illustrates it within the context of Feuerstein's research with special children.

3.3.2 Mediated Learning Experience

Feuerstein et al. (1988) explain that a child who has had only direct learning experiences is left with an "episodic" grasp of reality. Feuerstein has referred to such children as *culturally deprived. Culturally deprived* individuals are not "deprived" in the sense of not having gained access to a particular culture. Rather, according to Feuerstein and his colleagues, these individuals have not acquired *any* culture.

Of course, being born into a community and living among other people the child will have been exposed to a culture, but for Feuerstein this is not enough. He maintains that what separates humans from other animals is that adult members of a community mediate the world to their young through language, gesture, ritual, and including them in the various activities of daily living. Thus, the culturally deprived child is one who has not had his culture mediated to him in a sufficient or adequate manner (Kozulin, 1998, p. 68). Kozulin explains that "the lack of mediation is observed in children whose parents and other caretakers do not extend their attention beyond the here-and-now satisfaction of the children's vital needs …. Separate experiences, linked only to specific stimuli or reinforcers, remain unconnected in the child's mind" (ibid.). Kozulin goes on to assert that the culturally deprived child lacks many of the cognitive functions necessary for subsequent learning both in and out of school, including the ability to plan, to make comparisons of similarities and differences, to formulate and test hypotheses, and to develop representations, among other processes (ibid.).

Feuerstein explains the relationship between mediated and direct learning experiences and the fundamental importance of the former in the following way:

> The more a child is subjected to mediated learning experiences, the greater will be his capacity to benefit from direct exposure to learning. On the other hand, a lack of MLE will produce an individual who will benefit very little from direct encounters with learning tasks. (Feuerstein et al., 1988, p. 58)

In Vygotskian terms, the mediator in a MLE facilitates the child's internalization of their interaction, moving it from an *intermental* to an *intramental* plane of functioning (Vygtosky, 1978). In this way, the child's social interaction with the mediator provides a model that the child can imitate and transform, developing beyond his current capabilities.

In addition to culturally deprived children, Feuerstein and his colleagues (Feuerstein et al., 1979) have identified two additional groups of retarded performers: *culturally different* individuals, and those whose learning difficulties are predominantly rooted in their biology rather than cultural conditions (e.g., children with Down syndrome). While this latter group often does not show the dramatic improvement characteristic of the other two categories of learners, it is important to note that these individuals are nonetheless responsive to many of Feuerstein's techniques. Many of these children, after having been subjected to numerous non-dynamic assessments and labeled mentally retarded, turn out to be capable of very high levels of cognitive functioning. Feuerstein's conviction that even children whose cognitive challenges are the result of biology can be modified parallels Vygotsky (1994a) statements regarding deaf and blind children. Vygotsky pointed out that such children have not only a biological condition to contend with but also a social one:

> It goes without saying that blindness and deafness are biological facts and not at all of a social nature, but the teacher has to deal not so much with these facts as with the social consequences of these facts. When we have a blind child as an object of education before us, we are compelled to deal not so much with the blindness in itself, as with the conflicts which arise therefrom within the child when it enters life … Blindness or deafness, as a psychological fact, is not at all a misfortune, but, as a social fact, it becomes such. (p. 20)

Vygotsky goes on to describe how, under traditional instruction, attempts at speech would be suppressed in a deaf and dumb child, which in turn impacted upon his cognitive development and made subsequent efforts to promote speech development much more problematic. In Feuerstein's approach, this is precisely where the mediator fits in. By interposing himself between the child and the object or task, the mediator can guide the child while simultaneously assessing her responsiveness to assistance. For Feuerstein, the difficulties encountered by such children are as much a result of their biology as their social world, which often responds to "abnormal" children by withdrawing the opportunities for interaction – MLEs – that "normal" children enjoy. This is tragically ironic when one considers that these challenged children perhaps need MLE more than anyone.

The other group of children Feuerstein describes, those who are c*ulturally different*, are particularly common among immigrant populations and some ethnic minorities (e.g., Ethiopian immigrants to Israel). These learners have acquired their own culture but, owing to the divergence between the dominant culture and their own, they often struggle to bring together the ways of thinking and the representations of the world learned at home with those presented in the school setting (Feuerstein et al., 1988, pp. 97–99). This disconnect places an additional burden on the culturally different child, who must not only struggle with the school curriculum but with the norms, values, and interactional patterns that are also new.

The creation of these three broad categories of retarded performers (see Feuerstein et al., 1988, for an in-depth discussion of each of these categories and examples of subcategories) is the result of several decades of clinical work with diverse populations, especially children and adolescents usually categorized by teachers and school psychologists as learning disabled. Like Vygotsky and Luria, Feuerstein realized early on that not all the children who exhibit poor performance in school do so for the same reasons. He reasoned that if his theoretical views regarding the importance of mediated learning were correct, then an individual's modifiability could be gauged through analysis of his interactions with an expert during a session of *intensive* mediation – a dynamic assessment.

For Feuerstein, then, the MLE is the very heart of DA. During an intensive MLE – intensive because the assessor provides as much mediation and as many forms of mediation as possible – the adult mediator engages in a task with a learner, all the while noting the learner's responsiveness to mediation and making changes accordingly. The mediator's goal is to diagnose the child's potential for cognitive change. This is accomplished by actually helping the child to change *during the assessment itself*. The degree to which the child changes and the mediation required to bring about that change are both crucial components of the diagnosis. Before moving on to a discussion of the specific tasks mediator and learner engage in during one of Feuerstein's DA sessions it is important to consider precisely what constitutes an intensive mediated learning interaction. This is a topic with which Feuerstein and proponents of his approach have become increasingly preoccupied (Feuerstein et al., 1988; Kozulin, 1998; Lidz, 1991). In part, this is due to criticisms of his earlier work but it is also the result of recognition of the need to tighten up certain parts

of SCM theory, particularly as the MLE approach to DA continues to be applied to increasingly diverse contexts (see Tzuriel, 2001).

3.3.3 MLE Attributes

Feuerstein has clarified that not just any interaction between an adult and a child constitutes an MLE and that this becomes evident in the analysis of the intensive MLE sessions he and his colleagues conduct in their approach to DA. Feuerstein et al. (1988) have outlined 11 attributes of MLEs that distinguish them from other types of interaction. Figure 3.2 lists all 11 attributes and summarizes all but the first three, which are described in detail below:

The first three attributes – *intentionality and reciprocity*, *transcendence*, and *mediation of meaning* – are, according to Feuerstein, the most important in transforming a given interaction into a MLE. These are basic elements common to all MLEs and lead to the development of uniquely human forms of higher thinking, while "the other attributes, largely culturally and situationally determined, are responsible for the development of differences in cognitive style, creating great diversity in human existence" (ibid.).[4]

The first and most basic of the MLE attributes outlined by Feuerstein is intentionality, that is, the adult's deliberate efforts to mediate the world, an object in it, or an activity for the child. While it may seem obvious that a mediator must intend to mediate just as a teacher must intend to teach, this remains an important point. Intentionality, for Feuerstein, marks the MLE as the direct opposite of the haphazard, incidental learning described above. Instead, the MLE is focused on the child's cognitive development through guiding him as he participates in various activities that he would likely not be able to successfully complete on his own. As such, intentionality, according to Lidz (1991, pp. 74–75), includes a number of mediator behaviors, such as "initiating, maintaining, and terminating the interaction" but also "regulating and refocusing the child's attention and participation" during the MLE. Feuerstein et al. (1988, p. 62) provide the example of a mediator who wishes to call a child's attention to a particular object. The mediator "transforms the stimulus, rendering it more salient and attractive to the child, changing its amplitude (e.g., loudness, brightness), its frequency, and the duration of its exposure" (ibid.). Importantly, the authors argue that the intention to mediate transforms not only the stimuli but also the child and the mediator. Thus, while stimuli are rendered "more

[4] Interestingly, Feuerstein implies that the above-mentioned MLE attributes are somehow less culturally determined than the others. From a Vygotskian perspective, however, this distinction makes little sense. Here it is not just that the social gives rise to higher forms of consciousness; it is in the social that consciousness resides. All human experiences, all forms of mediation, and all forms of learning are cultural. In this way, human consciousness cannot be understood in isolation from an individual's history, and so even intentionality and reciprocity, transcendence, and mediation of meaning are part of that history.

1. *Intentionality and reciprocity*
2. *Transcendence*
3. *Mediation of meaning*
4. *Mediation of feelings of competence* – offering various forms of assistance to help the learner to successfully complete a task previously perceived as too difficult and interpreting to him the meaning of his success.
5. *Mediated regulation and control of behavior* – regulation of the child's impulsivity and attention in ways that lead to the child gradually taking on more and more responsibility for the control of his own behavior.
6. *Mediated sharing behavior* – involves the mediator communicating to the learner her own orientation to the task, her perception of its demands, reactions to problems that arise, and feelings at various stages of task completion while also attempting to elicit the child's feelings and perceptions, emphasizing the joint nature of the interaction.
7. *Mediation of individuation and psychological differentiation* – emphasizes the learner as an individual with thoughts, feelings, and abilities that may be different from but can certainly complement those of others.
8. *Mediation of goal seeking, goal setting, goal planning, and achieving behavior* – proposing and perceiving goals; planning specific actions, including the achievement of sub-goals, that will lead to task completion; using representational modes of thinking; and execution of problem-solving strategies.
9. *Mediation of challenge: The search for novelty and complexity* – attempts to mediate an activity the learner has already mastered will not produce the feeling of competence described above and may lead to boredom and frustration. MLE tasks should target what the learner is not yet capable of doing independently.
10. *Mediation of an awareness of the human being as a changing entity* – the core of Feuerstein's SCM theory, the belief that all human beings are modifiable.
11. *Mediation of an optimistic alternative* – related to the above, the insistence that individuals can be more than their present abilities suggest.

Fig. 3.2 Mediated learning experience attributes (Feuerstein et al., 1988, pp. 61–62)

salient and attractive," the child's curiosity is aroused, his attention guided and his perception focused, and the mediator does everything she can to maintain the child's alertness, including pointing out significant features, asking questions, making suggestions, gesturing, and constantly reading the child's responses and making adjustments and changes to maintain his engagement (pp. 62–63). *Reciprocity* is the term Feuerstein uses to describe this interaction since the actions of both participants are necessarily intertwined. Feuerstein also uses the term to emphasize that the child is no longer a passive recipient of knowledge but an active co-constructor of it. Lidz (1991) expands upon this notion of reciprocity, arguing

that the learner's contributions in DA are often overlooked by MLE researchers, who have tended to focus more on the specific forms of mediation used in the procedure. This is an important criticism that we will return to in the next chapter.

Intentionality contrasts with direct, incidental learning by structuring the MLE in a specific way and highlighting the most important elements of the object or activity. *Transcendence* provides an additional and related way in which a MLE differs from direct learning: the goal of the MLE is to bring about the cognitive development required for the child to move beyond the "here-and-now" demands of a given activity. Feuerstein (Feuerstein et al., 1979, p. 92) argues that true development *transcends* any specific task and manifests itself in a variety of ways under a multitude of differing conditions. It is for this reason that the MLE typically proceeds from an initial training phase on a particular problem to the tackling of "a series of tasks that represent progressively more complex modifications of the original training task" (ibid.). Feuerstein reasons that the structuring of the MLE to include tasks that vary in their level of difficulty and complexity require of the learner the same kinds of adaptations that will be expected of him in daily life. In this way, *transcendence* runs counter to the often-voiced concerns regarding "teaching to the test." Because the MLE strives above all to help the individual develop, it should be understood not as "training…oriented toward a specific content" but rather a series of procedures designed to establish the basis for higher cognitive functioning (p. 105). As illustrated above, the Graduated Prompt Approach to DA developed by Brown and her colleagues makes similar claims regarding the nature of development, and for this reason they have included transfer tasks as a necessary step in their assessment program.

Mediation of meaning, the third of the key MLE attributes described by Feuerstein, emphasizes the point made above with regard to culturally deprived children: the significance of objects and actions cannot be intuitively understood by the child but must be mediated to him so that relationships and connections become clear. Without understanding meaning, the child is left with an "episodic" grasp of reality and is unable to connect present events to those in his past and, conversely, cannot project into the future on the basis of the present or past. Each of his experiences is regarded by the child as standing alone, unconnected to the rest of his life. That is, in order for the learner to *transcend* a particular problem or set of circumstances he must develop what I will call a conceptual understanding of the principles involved in successfully completing the task. Lidz (1991, p. 77) reviews the available literature on the MLE and concludes that *mediation of meaning* concerns the mediator's attempts to get the child to notice certain features, to elaborate on their significance, and to engage in cause-and-effect and inferential thinking. She adds that "important cognitive outcomes of mediation of meaning include the ability to compare and to categorize, based on perceptions and explanations of how events and objects relate" (p. 76). Thus, while *intentionality* describes the approach taken by the mediator (e.g., structuring the experience, scheduling the stimulus, maintaining the child's focus, etc.) and *transcendence* refers to the goal of the MLE (i.e., the child's cognitive development), *mediation of meaning* can be understood as the glue that holds both of these together. That is, meaning explains both what

development looks like for Feuerstein (conceptual understanding of objects and activities) as well as what specifically needs to be mediated to the child (relationships and connections). Meaning is that which the mediator must intend to help the child develop and it is also what enables the child to move beyond the specific MLE to the larger world of social relations. For Feuerstein, this is the core of human learning. Indeed, as Bruner (1980) enthusiastically observed, "MLE is not only for the handicapped, it is for all of us since it's MLE which makes us human!" (cited in Feuerstein et al., 1988, p. 58).

3.3.4 Learning Potential Assessment Device

As should be clear from the above discussion of MLE attributes, the mediator is not tied to a script or set of rules but is required to respond according to the learner's needs throughout the DA procedure. The session itself is largely structured by the specific tasks or "tests" mediator and learner are cooperating to complete. These tests are known as the Learning Potential Assessment Device (LPAD).[5] The LPAD is a battery of 15 instruments that are dynamically administered to a learner during the MLE session. In this way, Feuerstein and his colleagues have managed to put their theoretical model of the MLE into a concrete form that can be readily accessed by researchers and practitioners; workshops are regularly offered around the world to provide training in the administration and evaluation of the LPAD.

Many of the LPAD instruments are well-known standardized tests Feuerstein has simply adopted while others were created by Feuerstein and his colleagues for use as part of their program. The complete LPAD battery consists of the following tests and tasks: Raven Colored Progressive Matrices and Standard Progressive Matrices, Set Variations B-8 to B-12, Set Variations I, Set Variations II, Complex Figure Drawing Test, Numerical Progressions, Diffuse Attention Test (Lahy), Organization of Dots, Positional Learning Test, Associative Recall (Functional Reduction and Part-Whole), Reversal Test, Plateaux Test, 16 Word Memory Test, Representational Stencil Design Test (RSDT), Tri-Modal Analogies, Organizer. Some or all of these tests are administered to the learner in a "flexible, individualized, and intensely interactive three-way (task-examinee-examiner) process" (Sternberg and Grigorenko, 2002, p. 55). Typically a learner is dynamically administered the LPAD without an initial static pretest. The reason for this, as Minick (1987, p. 117) explains, is that Feuerstein and his colleagues believe that for many learners such a pretest would provide yet another test-related experience of failure and frustration that would only serve to reinforce a negative attitude toward the test and toward learning, thereby jeopardizing the rest of the DA procedure. Of course, as Minick and others have pointed out, such a move prevents Feuerstein and his

[5] The LPAD, or Learning Potential Assessment Device, is referred to in some publications as the Learning Propensity Assessment Device. This difference in name does not, as far as I am aware, indicate any other difference in procedures, techniques, materials, or approach.

colleagues from being able to ascertain (i.e., quantify) the *amount* of improvement a learner has made as a result of the procedure and "they have resisted modifying their won assessment techniques in ways that would allow them to produce these kinds of quantitative measures" (ibid.). Following Feuerstein, Minick reasons that the kinds of changes to the assessment that would be required to produce traditional quantitative measures might very well undermine the whole system. According to Minick (1987, p.138), the considerable freedom the mediator enjoys in reacting to the learner brings this approach to DA very much in line with Vygotky's understanding of the ZPD as a means of "diagnosing development." Through successful mediation of the LPAD battery, the psychological processes underlying performance are brought to the surface. Indeed, Sternberg and Grigorenko (2002, p. 55) conclude that the significance of the LPAD is that "it provides an MLE by creating a ZPD." Working in cooperation with the child, offering guidance, and negotiating assistance, the mediator identifies cognitive functions that are in need of attention and begins working to develop them there in the testing situation. In Vygotsky's terms, the interaction between the mediator and the learner as they are collaborating to complete a task serves as an intermental model of the cognitive functions that the learner will eventually perform intramentally (Vygotsky, 1978). This effort to "modify the cognitive structure of the individual" (Feuerstein et al., 1988, p. 204) that is begun during administration of the LPAD is continued in the next phase of Feuerstein's approach to DA (discussed below).

Before moving on, a final word is in order regarding the LPAD. Rather than producing a "score" or "grade" to summarize the learner's performance, the results of the LPAD procedure are used to create a profile that: (a) assesses the individual's current cognitive functions such as perception, logical reasoning, attention, and general problem-solving abilities through analyzing what he is able to do without assistance or with minimal intervention from the mediator; (b) evaluates the learner's responsiveness to particular forms of mediation as determined by how much and what kinds of mediation are required for him to complete the assessment tasks; and, most importantly; (c) provides a "sample" of the individual's modifiability understood as how much the learner was able to improve with assistance, both during the dynamic administration of the tests and on follow-up posttests. This profile serves as the basis for an individualized cognitive education program designed to foster the development of the specific cognitive functions that the DA procedure revealed to be a source of difficulty for the individual. Feuerstein refers to this education plan as the Instrumental Enrichment (IE) program.

3.3.5 Instrumental Enrichment

Feuerstein et al., (1988) define IE as "a program composed of two major elements: a set of materials – the 'instruments' – and an elaborate teaching system based on mediated learning experience" (p. 209). Given that Feuerstein and his colleagues have primarily worked with children with various kinds of learning

disabilities, it is not surprising that the specific materials used in IE focus on the development of basic cognitive functions found to be deficient during the dynamic administration of the LPAD. Exercises such as Organization of Dots, Orientation in Space, Analytical Perception, Comparisons, and Categorization are the principle tasks mediator and learner collaborate to perform. A full listing of Feuerstein's IE instruments is provided in Fig. 3.3, along with a brief description of each.

In its current form, Feuerstein's IE program consists of around 300 h of exercises. Learners typically require about 2 years to complete the program, although there is a good deal of variance here given the range of ability levels and prior experiences that characterize Feuerstein's participants.

While Feuerstein's approach to DA is recognized as following one of the most individualized methodologies – and indeed as we have seen this is the crux of Feuerstein's aversion to psychometrically-oriented procedures – Feuerstein and his colleagues generally conduct the IE program in a classroom setting with between 10 and 30 students. They maintain that the diversity of needs, strengths, and ability levels actually produces an enriched learning environment where collaboration and multiple ways of understanding move to the fore (Feuerstein et al., 1988, p. 210). Although Feuerstein does offer IE in a one-on-one tutoring format, he warns that "the socializing and amplifying aspects of interactions in groups will be lacking," and suggests that the mediator take this into account as she plans her work with the learner (ibid.).

The main goal of IE, in keeping with SCM theory and the rest of Feuerstein's approach to education, is to help the child learn how to learn by fostering the development of the prerequisite cognitive functions needed for daily living as well as for the study of academic disciplines. Feuerstein contrasts IE with other instructional programs by explaining that in his approach:

> [T]he emphasis is on making the student able to learn how to acquire more information and to figure out what to do with it, to make him more efficient in his efforts to acquire new skills, and to make him more able to find adaptive ways to solve problems. (Feuerstein et al., 1988, p. 211)

To date, IE programs have been developed for and adapted to a wide range of learners, including those with Down syndrome, autism, cerebral palsy, attention deficit disorder, and hearing impairment. Given Feuerstein's interest in remediating deficient cognitive abilities and the needs of the populations his work has targeted, IE programs have not been created for instruction of specific content domains. In fact, Feuerstein has resisted tying IE any given discipline, insisting that individuals must first develop the ability to learn before attempting to study a content area. This is a significant departure from Vygotksy's thinking on the relationship between schooling and development, a point also made by Kozulin (2003), and one to which we will return in the next chapter. At this point we will turn to some of the empirical work that has been done in the Feuersteinian tradition. The DA procedures, the mediator–learner interactions, and the follow-up IE programs are all richly described by Karpov and Gindis (2000) and Peña and Gillam (2000). These studies will be considered in some detail in order to illustrate the insights into an individual's learning processes that can be gained by employing Feuerstein's model.

1. *Organization of dots*: the learner must identify shapes and patterns represented by clusters of dots. "Successful completion requires segregation and articulation of the field" (p. 213).
2. *Analytic perception*: these exercises focus on the relationship between a whole and its parts, the various ways a whole can be divided into parts, and the multiple possibilities that exist for recombining the parts to form new wholes. The goal is to overcome the learner's tendency for "blurred, sweeping, and global perception" that is "incomplete and imprecise" (p. 214).
3. *Instructions*: requires the learner to translate verbal instructions into a motor act and, conversely, to create verbal instructions to describe motor acts. These exercises are also helpful in emphasizing the need to breakdown directions and actions and to form plans before acting rather than respond impulsively.
4. *Orientation in space I*: designed to help learners "use concepts and a stable system of reference for describing spatial relationships" (p. 215), these exercises demonstrate that objects and events can be viewed from multiple positions and that the observer's vantage point affects his perception.
5. *Orientation in space II*: these exercises introduce learners to the systematic use of compass points and coordinates to describe and understand positions of objects.
6. *Categorizations*: learners group items into categories based on the presence or absence of characteristics that define the category and distinguish it from other categories; as the exercises become more complex, learners develop an understanding that items can be grouped according to a variety of criteria and that they can create the necessary relationships.
7. *Representational stencil design*: following specific instructions, learners use stencils to produce a "representational reconstruction of a design" (i.e., a transformation of the design rather than an exact copy of it).
8. *Family relations*: examines the ways in which each member of a family can be identified in differently depending upon her relationship to other members of the family, but that she retains her identity all the while.
9. *Numerical progressions*: designed especially to counter an episodic grasp of reality, these exercises require the learner to identify patterns in series of numbers in order to explain the presence of the numbers in the sequence and to add more numbers to it.
10. *Comparisons*: systematic comparisons of objects and events according to set criteria.
11. *Syllogisms*: identification of relationships among members in a set and drawing logical conclusions about the set.
12. *Temporal relations*: helps learners to "understand time as both an object and a dimension," and the "relativity of future, past, and present" and their relationship to verbal tenses.
13. *Transitive relations*: similar to syllogisms but focuses particularly on "greater than," "less than," and "equal to" relationships.
14. *Illustrations*: development of explanations to describe progressions of events and changes from picture to picture in a series of images.

Fig. 3.3 Instrumental enrichment program instruments (Feuerstein et al., 1988, pp. 213–227)

3.4 Applications of MLE in Educational Contexts

3.4.1 Analogical Reasoning Among Children with Learning Disabilities

Karpov and Gindis (2000) focused on one aspect of Feuerstein's LPAD, analogical reasoning, as they evaluated children with learning disabilities. The authors developed a number of mediational strategies as they attempted to first determine the children's current level of analogical reasoning and then to help them move beyond it. Largely following the work of Piaget, Karpov and Gindis identified three levels of reasoning ability: visual-motor (in which the participant relies on manipulating physical objects to complete the analogy), visual-imagery (the participant no longer needs to physically move the objects but still requires them to be present as at this stage he manipulates them in his mind), and the final, most advanced stage where the participant can complete the analogies without the use of any external mediational support.

Karpov and Gindis conducted a series of case studies with children with a variety of learning disabilities. One of the cases they report on concerns a seven-year-old child whose teachers described her as immature and as having limited cognitive and linguistic abilities and who had been identified as having attention-deficit-hyperactivity disorder (ADHD). Departing slightly from Feuerstein's procedure, the authors first conducted a static assessment to determine the child's independent level of functioning. According to their hierarchy of analogical reasoning, the child was unable to complete the tasks even at the visual-motor level (i.e., her performance was not improved even by the presence of objects she could move). When mediation began, the assessor had to offer constant reminders to maintain the child's focus and to direct her attention to various features of the objects that were important for the completion of the task. Through cooperation with the mediator, the child proved capable of analogical reasoning at the visual-motor level. During subsequent enrichment sessions, the mediator guided the child to abandon her reliance on physical manipulation of the objects and, with help, she succeeded in passing to the visual-imagery level of reasoning. She then went on to self-mediate through the use of private speech, no longer requiring assistance from the mediator. While the authors admit that the children they studied exhibited differing levels of ability when offered mediation (some jumped to the nearest level and a few were able to move from the most basic to the most advanced) and were also not uniform in their ability to maintain their level of reasoning when assistance was no longer provided, the significance of their work lies in the diagnosis of the children's functioning. In the case of the child just described, Karpov and Gindis concluded that she was not cognitively deficient but that she simply required instruction in how to overcome her ADHD through self-regulation (p. 151).

3.4.2 Language-impaired Learners and Learners with Language Differences

Just as Feuerstein has argued for the identification of culturally-deprived and culturally-different learners, Peña and Gillam (2000) present a series of case studies in which they sought to distinguish children with language impairment from those whose difficulties are the result of a language difference. The authors operationally defined language impairment as "unusual difficulties learning language" (p. 543); some of the language-impaired children Peña and Gillam identified struggled with learning in general while for others their problems seemed specific to language. Language difference, on the other hand, was used to refer to bilingual children and children who spoke a nonstandard dialect of the language of instruction. In a series of case studies, the authors assessed the vocabulary, narrative ability, and discourse performance of children as they engaged in a variety of tasks. Like Karpov and Gindis, the researchers broke with Feuerstein by following a pretest–mediation–posttest format but remained true to Feuerstein's preference for highly interactive forms of mediation. For instance, Peña and Gillam attempted to facilitate the children's use of single words to refer to objects, events, and concepts by relating the task to the children's personal experience ("Have you ever known someone who was _____?" and "What does it mean when X said Y?") and by encouraging them to make predictions about hypothetical situations ("What would happen if the puzzles were moved to the art area?") (p. 553).

In one study, the performance of a 4-year-old Spanish-English bilingual child on the *Expressive One-Word Picture Vocabulary Test-Revised (EOWPVT-R)* was below normal, but on the basis of her performance alone it was not possible to tell whether this was due to the linguistic and cultural bias of the test or to a genuine language impairment (p. 551). For most test items, she was either nonresponsive or simply replied, "I don't know." Through a DA procedure, Peña and Gillam were able not only to uncover the source of the child's problem but also to provide mediation to help her overcome the problem to some extent. While her performance on the *EOWPVT-R* did not improve following mediation, she did show improvement in her ability to self-regulate and plan, as well as in her motivation and attention to the task. Based on the DA, the researchers concluded that the child was suffering from a language impairment and not just a language difference problem. They also made a series of recommendations the teacher could implement in the classroom setting to help the child develop her vocabulary despite the impairment.

3.5 Conclusion

The widespread and growing interest in Dynamic Assessment among educational and psychological researchers is evidenced by a number of recent developments in these fields, including the following:

- A discussion of DA in the most recent edition of Cronbach's (1990) seminal text on psychological and educational measurement
- The appearance of DA studies authored by leading researchers in psychology and education, such as Robert Sternberg and his colleagues at Yale (e.g., Sternberg and Grigorenko, 2002)
- The publication of edited volumes, the contents of which attest to the great variety of current DA methods and the diverse contexts in which those methods are being employed (e.g., Lidz and Elliott, 2000)
- The creation of online resources that enable DA researchers the possibility to share their work and exchange ideas (e.g., www.dynamicassessment.com)

The review of DA in this chapter cannot pretend to be comprehensive nor does it represent all of the research traditions that have emerged in the DA literature. As the body of research grows, the picture becomes increasingly complex, with new models appearing that blend aspects of other traditions. Although Feuerstein's approach is clearly the most successful in realizing Vygotsky's vision of development-centered education, this does not mean that other DA models should be abandoned. Indeed, as we saw in the previous chapter, Vygotsky himself employed the ZPD in different ways depending upon the problems and questions he was facing.

In interactionist DA, the priority that trumps all others is learner development. The mediator's responsibility is to co-construct a ZPD with the learner in order to optimally promote the development of maturing functions, and this requires constantly fine-tuning mediation to be appropriate to the learner's needs. The highly flexible and dialogic nature of interactionist DA makes it an excellent choice for classrooms and for institutions that allow learner development to be documented in ways other than test scores. Contexts that require standardized assessments and the scores and percentile rankings they generate are not likely to welcome the open-ended approach to mediation advocated by interactionist DA. In such settings, interventionist approaches to DA are a viable option because they present a compromise by integrating mediation into a standardized procedure. They do not isolate individuals in the way that NDA does, but instead consider learner responsiveness to hints, prompts, feedback, or questions that may open a ZPD. To be sure, the mediation offered may not be sensitive to individuals' present level of development, but as proponents of interventionist DA would no doubt argue, providing some support is better than none at all.

In addition to these relatively general conclusions about possible DA applications, each of the five models discussed in this chapter offer theoretical constructs and research findings that are important to our understanding of DA and its potential contributions to the L2 field. Within interventionist DA, we have seen that Budoff, who was the first researcher in the West to apply the ZPD to testing, provides convincing evidence that providing even standardized mediation during test administration can distinguish individuals with learning disabilities from those whose poor school performance must be attributed to other factors, such as low socioeconomic status. In this way, Budoff's *Learning Potential Measure Approach* demonstrates DA's connection to issues of social justice – a dynamic procedure can

reveal abilities that remain hidden during NDA, and these insights can have profound consequences for how individuals are treated in a school system and the opportunities they are afforded. Guthke's *Lerntest Approach* is noteworthy because it moves DA beyond the realm of intelligence testing, suggesting that individuals have not a single ZPD for general cognitive development but rather ZPDs specific to various content domains, including language learning. Brown's *Graduated Prompt Approach* argues that true development resulting from collaboration in the ZPD involves much more than improved performance on a given test. The inclusion of transfer tasks makes it possible to distinguish learners who have effectively become better at completing the original assessment tasks from those who have developed and can recontextualize their knowledge and abilities as they encounter new problems. Carlson and Wiedl's *Testing-the-Limits Approach* highlighted the important differences in learner performance that result from simply requiring learners to verbalize the cognitive processes involved in task completion both during and after the assessment procedure, an observation that has substantial theoretical support in Gal'perin's (1989) views on internalization.

Reuven Feuerstein, the leading advocate of interactionist DA, has developed the most theoretically robust and complex model of DA to date, and so much of this chapter was devoted to understanding his *Mediated Learning Experience*. Feuerstein's approach is unique in that it the initial DA session serves to identify problems underlying learners' performance and the forms of mediation to which learner are most responsive. This information is then used to individualize instruction during an ongoing enrichment program that continues the ZPD collaborations begun during DA. Importantly, the same principles of mediated interaction guide the DA and enrichment sessions, and in this way the MLE approach fully integrates assessment and instruction as a single activity oriented toward learner development. Feuerstein's approach is obviously a radical departure from conventional approaches to assessment and instruction. It has consequently received even more criticism from mainstream educational researchers than other DA approaches, as we will see in the next chapter.