We are all learning here: Cycles of research and application in adult development

Theo L. Dawson

Developmental Testing Service, Inc.

Zachary Stein

Developmental Testing Service, Inc.

Harvard University Graduate School of Education

Abstract: This paper demonstrates the effectiveness of a specific methodology—*developmental maieutics*—designed to bridge developmental research and practice by setting up an ongoing conversation between test takers and test developers. The approach involves building standardized, diagnostic educational assessments that also function as research instruments. After reviewing the research and theory behind developmental maieutics, we direct attention to a particular instance of current research and application involving the Lectical Decision Making Assessment™ (LDMA). The LDMA focuses on three aspects of decision-making—perspective taking, argumentation, and the decision-making process. It has been used in a variety of contexts, most recently as an online assessment employed by researchers and management consultants to diagnose the learning needs of individual managers. Here, we show how data produced during the process of providing feedback to test-takers has contributed to our understanding of an important aspect of perspective taking and perspective seeking, demonstrating how usable knowledge about human development can be constructed through an ongoing conversation between two groups of learners—test developers and test-takers.

Keywords: cognitive developmental assessment; decision-making; perspective-taking; theory and practice; adult development

Introduction: Building Usable Knowledge About Adult Development <H1>

The history of psychology is in large part a history of quests for usable knowledge (O'Donnell, 1985). From Baldwin and James to Dewey and Hall, the early developmental and evolutionary psychologists were enthusiastic about the practical utility of the new science (Boring, 1929). When behaviorism held sway, the scientific search for immutable psychological laws was wedded to utopian ambitions of "human engineering" (Skinner, 1971). The mid-century rise of cognitivism was likewise accompanied by forays into educational application and theory (Bruner, 1960). Contemporary efforts at operationalizing the new sciences of learning—from cognitive science to neuroscience and genetics—echo these calls for blending research and practice to build usable knowledge (Kurt W. Fischer, 2009).

Developmental maieutics (Dawson-Tunik, 2006) is a broad methodology that builds on these traditions in developmental psychology while formalizing relations among theory, research, and practice. The goal of this paper is to provide an overview of this methodology and an example of how it has been put to use. The Lectical Decision Making Assessment (LDMA) is an exemplary instance of developmental maieutics in action. Its initial development was undertaken as a collaboration between educators and researchers that led to a set of initial descriptions of learning sequences for core decision-making skills and concepts (Dawson & Stein, 2004b). These were refined through subsequent research, informing multiple iterations of the assessment (Dawson & Stein, 2004a, 2006), and resulting in a reliable, standardized, educative, and diagnostic developmental assessment that can be embedded in a variety of learning or research contexts. Importantly, the assessment has been designed both to serve as an educational assessment and as a research instrument, providing feedback to learners while allowing researchers to continue to build knowledge about how learning and development

occur in the decision-making domain. Test takers and their mentors learn from the rich feedback offered in assessment reports, and researchers learn from the answers provided by test takers.

We present results from a sample of 254 individuals who took the LDMA in a variety of contexts, focusing on the finding that while some aspects of perspective taking vary as a function of development and learning—requiring capabilities that are constructed over long periods of time—other aspects appear to be relatively independent of development. These patterns have clear implications for managerial decision making, the delivery of educational feedback, and decision-making curricula. However, our discussion of the specific implications of these findings will be brief because they are offered primarily to illustrate (1) how developmental maieutics can be applied within the context of assessment and (2) the kind of usable knowledge it can generate.

Developmental maieutics: Model, metric, and method <H1>

This section outlines developmental maiuetics by focusing on its component parts. First, we explore a model of learning and development that has informed the methodology, Fischer's (2006) dynamic skill theory. Then we discuss the metric—the Lectical Assessment System™ (LAS) (Dawson, 2010)—which serves as the core of both the data analytic and assessment construction processes. Finally, with these pieces in view, we sketch the overall method of problem-focused collaboration, stressing the iterative nature of the process and its focus on bridging research and practice through the lens of assessment.

The model: Constructive dynamics in adult development <H2>

Neo-Piagetian approaches to human development and learning have been proposed for decades. Generally, the goal of these approaches has been to preserve the key insights that emerged from Geneva while pursuing newer and more rigorous empirical approaches, thus adding new constructs and jettisoning others (T. Rose & Fischer, 2009). For example, Piaget stressed the primacy of development as a factor in cognitive growth, downplaying the dynamics of learning, context, and domain specificity (Piaget, 1977). But during the 1980s, evidence to the contrary began to mount, and the primacy of context and domain specificity became impossible to ignore. This led some to dismiss Piaget's contributions entirely, while it led others to make key alterations to the Piagetian theoretical edifice. Among the most prominent and empirically grounded of these revisionary approaches is Fischer's dynamic skill theory (1980).

Fischer's model preserves the basic Piagetian insight that human development is a constructive and dynamic process that unfolds across a series of hierarchically emergent levels. However, Fischer's research shows that the process of building skills, schemas, and concepts is radically affected by context and domain specificity. Importantly, the distinction between learning and development is not central to the model. Decades of research stressing the dynamics of developmental processes across multiple contexts and various time-scales has revealed the error of drawing sharp divisions between different aspects of the developmental process. While some facets of classic debates about the relationship between learning and development can be re-characterized as debates about the relationships between macro-development and micro-development, other facets of the debate can be considered as concerns about context or domain-specificity or both (Kurt W. Fischer & Bidell, 2006). In this view, learning and

development are seen as two facets of the same process. Development occurs through learning and thinking.

Central to the model is a developmental sequence of hierarchically emergent levels. This sequence can be observed across contexts, domains, and time scales, to both capture the variability of development and to build domain specific learning sequences or developmental pathways. Developmental levels are understood as major re-organizations of behavior that mark the use of qualitatively new kinds of capabilities—higher-order capabilities built upon combinations of previously built lower-order capabilities. These levels unfold over the course of the entire lifespan, ranging from *reflexes* and *sensorimotor action-schemes* through *concrete representations* and *abstractions* to overarching *principles*. The construction of new types of capabilities—moving from one level to the next—involves the active coordination and hierarchical integration of existing skills. Skill theory views human development as a process that integrates active learning and knowledge accumulation with major reorganizations of behavioral repertoires. This process requires effort, resources, and social relationships and is thus greatly impacted by contextual factors, such as education (Dawson-Tunik, Commons, Wilson, & Fischer, 2005; Kurt W. Fischer & Bidell, 2006).

This view suggests that an individual will display a differential distribution of capabilities across domains, having had more experience and learning in some areas, and thus being more developed in them. Moreover, the same individual will perform at different levels on tasks in the same domain as a result of a variety of contextual factors, such as scaffolding, salience, situational priming, and emotional state (Kurt W. Fischer & Bidell, 2006). While there is evidence that domain-general developmental levels, marked by qualitative reorganizations of

action and thought, do exist, development occurs dynamically in specific contexts, unfolding over minutes, hours, and days, shaping the unique learning pathways of each individual.

As an example, we look at data from the domain of managerial decision making. We discuss how skills for perspective taking are a part of this domain, and demonstrate that while certain forms of perspective taking require capabilities that must be built over long periods of time, putting these capabilities to use in response to specific situations is a function of context and the saliency of various situational cues. That is, not everyone whose thinking is developed enough to deploy sophisticated perspective-taking strategies will do so. Development is only one factor relevant in determining the overall adequacy of an individual's decision making; so it is also only one relevant factor in determining the kinds of educational interventions that will be most beneficial.

The metric: One scale, many domains <H2>

In conjunction with the model of development just sketched, developmental maieutics employs a well-validated and reliable developmental assessment system—the LAS (Dawson, 2010). We postpone a detailed discussion of the LAS for the methods section below. Here, we briefly provide enough detail to show how the LAS fits into the broader method.

Kohlberg's (1969) *Stage and Sequence* ushered in decades of longitudinal research designed to reveal the sequences through which skills and concepts develop over the course of the lifespan within particular knowledge domains. As debates about domain specificity became entrenched, each time a new domain of knowledge was studied a new assessment system was devised. In the 1980s, domain-specific developmental assessment systems proliferated. In this context, Dawson, drawing on the domain-general models of Fischer and Commons, began a series of cross-metric comparison studies aimed at isolating the latent developmental dimension

underlying various domain-specific developmental assessment systems (Dawson, 2002; Dawson-Tunik, 2006; Dawson-Tunik, et al., 2005). The result was the specification of domain general, deep structural aspects of verbal performances that can be taken as indices of development. That is, Dawson's cross-metric comparison studies suggest that many of the different domain specific assessment systems—particularly those bootstrapped from longitudinal data sets—share a common developmental dimension.

This underling developmental dimension—best characterized in terms of certain deep structural aspects of performances—is represented in the levels identified by the LAS. These levels have been directly related to the skill theory levels sketched above; so the model and the metric are aligned. Importantly, because the LAS targets domain-general deep structural aspects of performances, it allows for a rigorous separation of the structure of a performance— which is indicative of its developmental level—from the content of a performance—which often reliably co-varies with level but is not an index thereof. This clear differentiation of structure from content is a critical aspect of the overall method, and provides numerous methodological and theoretical advantages over domain-specific scoring systems (Dawson-Tunik, 2004). The advantage most relevant in this context is the ability to identify the full range of within-level variability in content. For example, as discussed below, in the domain of managerial decision-making, a variety of different perspective taking and seeking activities appear at the same developmental level. It would be impossible to see this variability if we used perspective taking type as an index of development. Likewise, because the LAS does not employ content-based scoring criteria, it can be used to ask questions about the relation between developmental level and conceptual content in any knowledge domain. This is one of the core innovations at the heart of developmental maieutics.

The method: Collaboratively building usable knowledge to improve practice <H2>

Based on the combined insights and affordances of Fischer's model and Dawson's metric, Dawson and her colleagues have built a broad method for applying these tools in real world contexts of research and practice. Developmental maieutics (Dawson & Stein, 2008) involves cycles of research and application using the LAS as a developmental assessment system and Skill Theory as a developmental framework. As noted above, this method is the latest in over a century of efforts at tying developmental theory to practice and reform in education.

Developmental maieutics evolved from an educationally oriented cognitive developmental perspective in which the promotion of optimal learning involves understanding:

- the developmental pathways through which concepts typically and optimally develop;

- the particular sub-concepts required to construct increasingly adequate understandings at each new developmental level;

- the range of sub-concepts required for an optimal understanding of a given concept;

- effective methods for developing these concepts; and

- accurate and reliable assessments of conceptual development that can be employed by practitioners to promote and diagnose learning (Dawson & Stein, 2008 p. 92).

We gain this type of understanding by moving through the steps of an iteratively structured collaborative research endeavor (see figure 1). The approach begins with the establishment of a collaborative relationship with teachers (or practitioners of various types with interests in human development, e.g. coaches, therapists, etc.), with whom we select domains and problems worthy of attention (A). We then construct a rough sense of the selected domain based on existing knowledge and identify key learning goals (B). We use this initial sense of

the domain to build a set of developmental assessments of the conceptual areas relevant to the agreed upon learning goals (C). These assessments yield data about the domain that we can use to generate empirically grounded rational reconstructions of the set of learning sequence that comprise the domain (D). In Figure 1, the method employed to describe the learning sequences is represented in the small sub-spiral to the right of the main figure.

The maieutic approach to identifying learning sequences involves submitting interview data to at least two forms of qualitative analysis. First, we analyze interview texts for their developmental level using the LAS. Then we analyze their conceptual content by examining the specific meanings expressed in the performances. A learning sequence (also known as a developmental pathway or learning progression) is an empirically grounded reconstruction of the steps or stages in the acquisition of a concept, skill, or capability. That is, it is a rational reconstruction of how a specific aspect of a domain of development unfolds. Fischer and his colleagues (Fischer & Biddell, 2006) have placed learning sequences at the heart of wide array of discourses concerning human development. Well-conceived learning sequences can be used to improve our understanding of human development, craft curricula, inform assessment, and characterize education and learning at all levels in all contexts. In the context of our approach, learning sequences are wedded to assessments technologies to facilitate the delivery of developmentally appropriate educational feedback.

Figure 1: Cycles of research and application
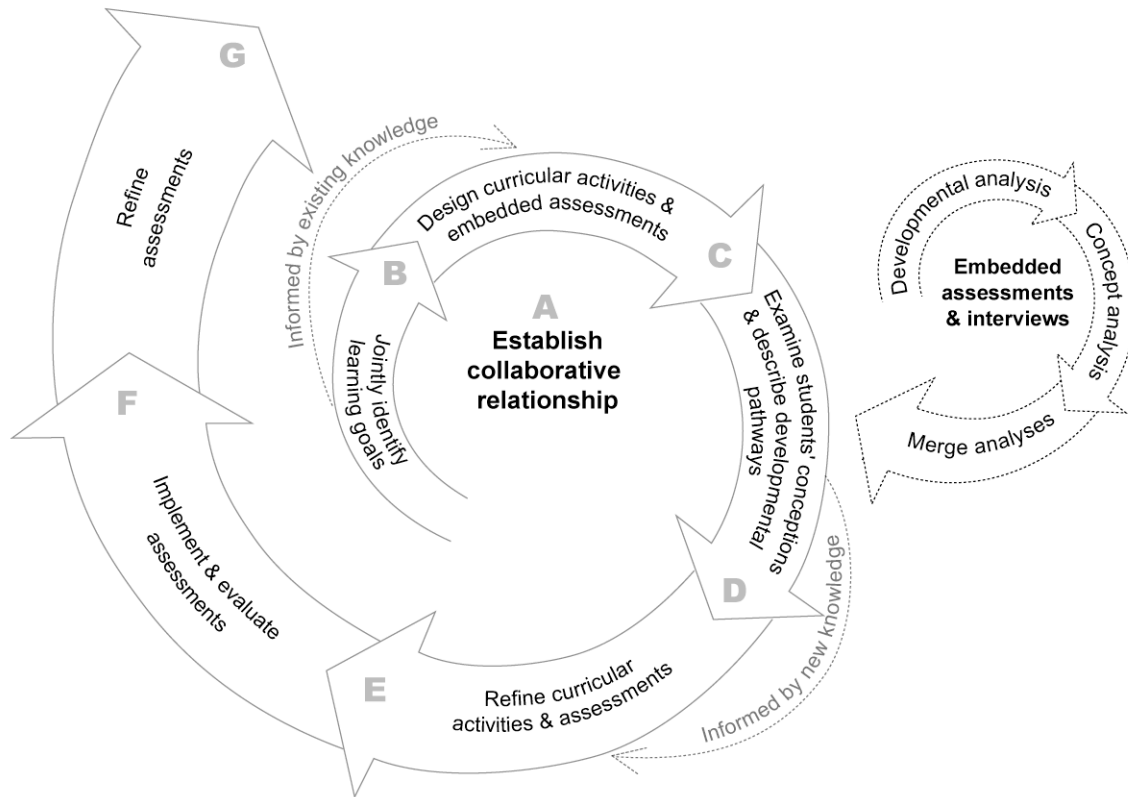
Using this method, we have described learning sequences for conceptions of leadership, good education, epistemology, learning, morality, and the self, as well as for critical thinking, decision-making, and problem-solving (Dawson, 2008; Dawson-Tunik & Stein, 2004; 2004a; 2004b; 2006). Based on our findings about the key learning sequences in the domain, we continually refine learning sequences (E,F,G). After two or three iterations, our depth of understanding about development in the domain is such that we can design reliable and accurate standardized, diagnostic, and educative assessments.

Perspective taking and seeking in adult decision-making <H1>

The application of models, metrics, and methods from developmental psychology in contexts of adult life and work has been steadily increasing since the late 1970s, with contributions from well-known figures like Kohlberg (1977), Jaques (1976), Torbert (2004), and Kegan (1994). The broad goal of these endeavors has been to find ways to make developmental psychology a useful tool for addressing the complexities of the workplace, typically by wedding developmental assessment and theory with various forms of mentoring and education.

One of the key issues arising in these contexts is a mismatch between the capabilities of individuals and the task demands of the institutional and cultural roles they occupy. That is, many adults are in over their heads, unable to meet the demands of the workplace (Kegan, 1994). This pattern of organizational dysfunction was characterized by Habermas (1975) as a "capabilities crisis," which he viewed as a ubiquitous challenge in post-industrial socio-cultural contexts where the rate of technological change and increasing economic complexity make life-long learning a necessity.

As part of the original research that lead to the construction of the LDMA, Dawson and her colleagues were asked to determine the task demands in terms of developmental complexity of a range of management positions in a U. S. federal government agency by scoring (with the LAS) detailed descriptions of standards for four job categories. As part of this research, we also examined the complexity of managers' thinking across a range of domains relevant to their roles. One key finding was that the task demands of management positions were often at a higher level of complexity than was demonstrated by the individuals occupying those positions (Dawson & Stein, 2004b).

Figure 2: The relation between developmental scores and management level by domain
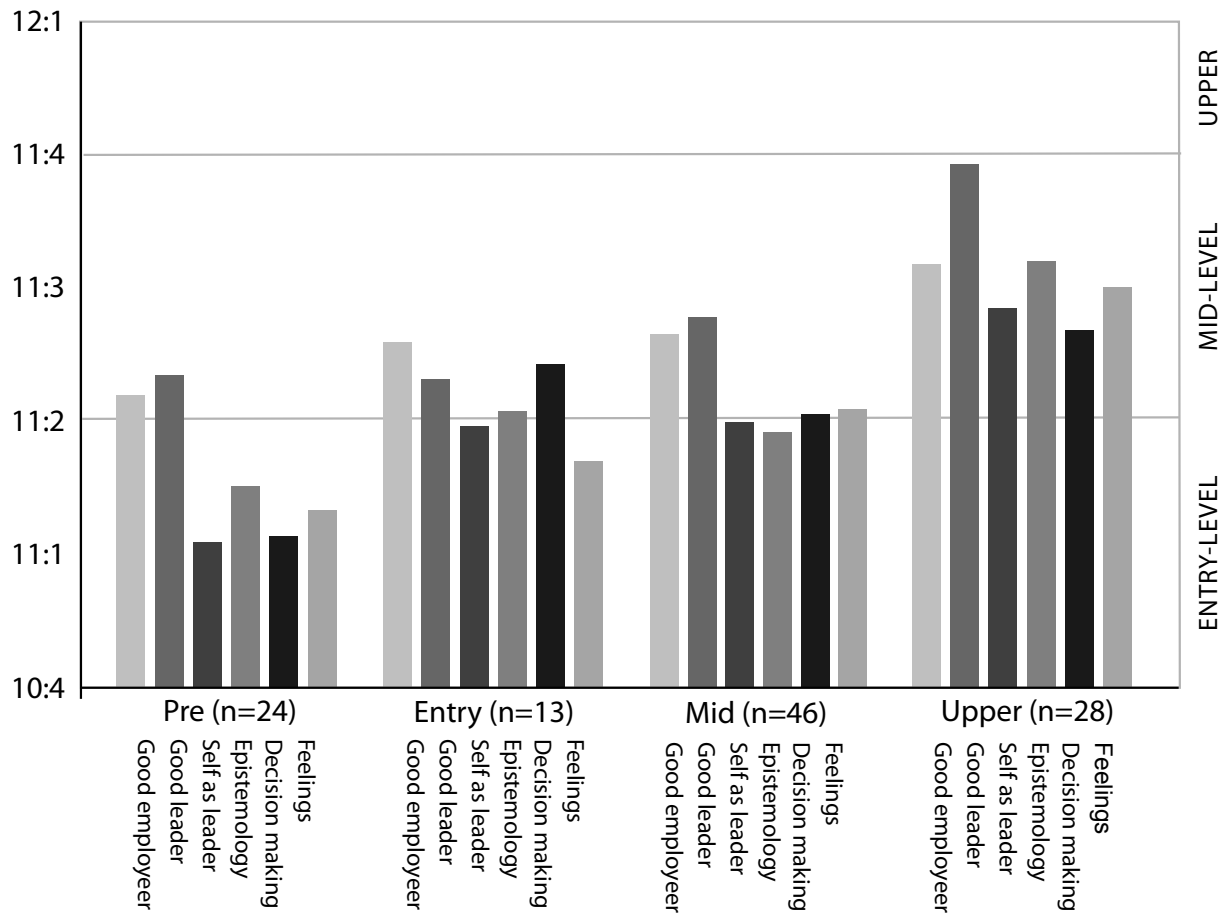

Figure 2 shows the relation between developmental scores and management level by domain. Four management levels are represented on the x axis, and developmental level (left) and the task demands of management levels (right) are represented on the Y axis. Mean scores for pre-managers were generally within the entry-level range. Means for entry- and mid-level managers approach or reach the transition between entry-level and mid-level task demands; means for upper level managers are solidly within the mid-level range. These results suggest that managers are, indeed, in over their heads.

The mismatch between the skills of individuals and the task demands of their jobs was apparent not only with respect to the scores awarded to performances. It was apparent in the

details of their decision-making processes, argumentation, and perspective taking. For the last few years, we have worked to flush out the details of this trend, learning more about the roles of perspective taking and perspective seeking as key aspects of individual differences in decision-making capability and their implications for decision quality.

The literature on perspective taking as it relates to adult development is relatively sparse. This literature, for the most part, employs a set of methods and theoretical frames that stem from the large body of research on perspective taking in childhood. Adult perspective taking, as we conceptualize it, is the grown-up version of "theory of mind," in which adults rely upon insights from their experience and knowledge of persons and institutions to "put themselves in the shoes" of others. It is a prerequisite for *perspective seeking*, a set of behaviors that not only inform perspective taking, but allow for cooperative approaches to decision making.

The history of developmental approaches focusing on perspective taking can be traced to Baldwin (1906) and Mead (1981). Piaget's (1932) early work relied heavily on notion of perspective taking and coordination. But it is Selman's (1977, 1979) levels of perspective taking that inform most of the cognitive developmental work in this area (Enright & Lapsley, 1980; Gurucharri & Selman, 1982; Keller & Edelstein, 1991; Snarey, Kohlberg, & Noam, 1983). Recent comparative and experimental work with children and primates has confirmed and solidified the primacy of perspective taking in socialization, skill acquisition, and education (Tomasello, 1999).

Some early models included major reorganizations of perspective-taking capability extending into adulthood (Kegan, 1982; Kohlberg, 1977). These models characterize late-stage development in terms of increased capacities for complex social perspective taking. More recent contributions likewise position perspective-taking capabilities at the center of research,

theory, and practice in adult development (Armon, 1993; Gaudine & Thorne, 2001; Kegan & Lahey, 2002). Again, the focus is on the transformation of perspective taking capabilities in adult development, where higher-stages are by definition more perspectively inclusive, differentiated, and nuanced. It is worth noting that in many of these models, developmental levels are defined *in terms of* different forms of perspective taking. This differs from the way we consider perspective taking, since we view it as something that varies in complex ways as a function of development, domain, and context.

Our view also differs from much of the literature insofar as we promote a distinction between perspective taking and perspective seeking. Some researchers have adopted a similar distinction (Jarvela & Hakkinen, 2002; Simonneaux, 2007), suggesting that the ability to *take* perspectives developmentally precedes the ability to *seek* perspectives. This implies that taking perspectives and seeking perspectives are distinct, but interrelated skills, which develop non-synchronically and are differentially affected by context. Importantly, perspective seeking is associated with improved collaborative group work and collective decision-making (Jarvela & Hakkinen, 2002; Simonneaux, 2007). But our findings, to which we now turn, suggest that perspective seeking is a skill that needs to be explicitly taught and supported in workplace and educational contexts, because it is not something that even very sophisticated decisions makers do with great frequency.

Methods <H1>

Instruments <H2>

The LDMA is an online assessment of how people make decisions in a management context. It is designed for management students, managers, and individuals who are thinking about moving into management, and was originally developed as part of a project investigating the

development of leadership skills in a U. S. federal government agency (Dawson & Stein, 2004b).

The LDMA focuses on three aspects of decision-making—perspective taking, argumentation, and the decision making process. It presents a common workplace dilemma that involves conflicting interests, then asks the test-taker—through a series of standard probes—to discuss the nature of the problem, describe two possible solutions, compare these solutions, and describe an ideal decision making process for similar situations.

There are several LDMA dilemmas, all of which are designed around real-life management situations that involve the coordination of hierarchically nested perspectives, including those of a protagonist and his or her subordinates (as individuals and teams), a supervisor, senior management, an institution, and people served by the institution. Test-takers choose their own dilemma from a drop-down list. One of the most popular dilemmas is the *Office Reorganization* dilemma:

"You have been a manager in one of the most technically savvy and productive offices in the company for the last three years. Almost 80% of the employees have at least Masters degrees and many have doctoral degrees in engineering or computer science. This has been much easier than your last management position, because here you have such great respect for the ability and drive of your employees. When your supervisor retired 3 months ago, the senior leadership team decided to replace her with an executive hired from outside the company. The individual that was finally selected after a lengthy interview process has only been on the job for 1 week and is already stirring things up. After his first walk-through of the spaces, essentially a large cubicle farm, he announced that he was going to redesign the space to "open things up" and encourage greater collaboration and exchange of ideas among members of the

group. You have been presented with a drawing of how the space will be reconfigured and a very aggressive time-line for the work, both of which you share with your employees. This normally quiet, reserved group is visibly outraged. How can they be expected to do highly technical work without the quiet and privacy of their cubicles? What's wrong with using a conference room when collaboration is called for? They are looking to you to stand up for them."

This dilemma, like all the LIMA dilemmas, is purposefully open-ended and ill-structured. Like the classic Kohlbergian dilemmas, these dilemmas are amenable to multiple interpretations and thus can be understood and approached from multiple developmental levels. So there is no "right" answer, only more or less developed responses displaying greater or lesser degrees of complexity, sophistication, coherence, perspective taking, and other aspects of reasoning and content. And as we present below, even respondents at the same developmental level do not see the same things as relevant or take the same variables as salient. So the dilemmas are sufficiently complex to allow for a wide range of variability in performance. The evidence to date, based on over 1000 LDMA's, reveals no differences in the difficulty or psychometrics of different dilemmas (Dawson & Stein, 2004b, 2006).

The Lectical Assessment System <H2>

The LDMA is scored with the LAS, which (Dawson, 2010) lays out explicit criteria for determining the complexity level and phase (degree of elaboration within a given level) of verbal performances in any domain of knowledge. Its levels consist of the last eight of thirteen complexity levels (single representations, 6; representational mappings, 7; representational systems, 8; single abstractions, 9; abstract mappings, 10; abstract systems, 11; and single principles, 12) corresponding definitionally to Fischer's (1980; Kurt W. Fischer & Dawson-

Tunik, 2006) skill levels. Its phases (transitional, 1; unelaborated, 2; elaborated, 3; and highly

elaborated, 4) are based on empirical evidence regarding the way learning within levels

progresses. This evidence has been derived from a large database of scored interviews and

essays (Dawson & Wilson, 2004). Scores are represented in tables and figures as level:phase.

For example, elaborated abstract mappings is 10:3.

LAS scoring procedures are partially derived from Commons' (Commons, et al., 1995) and

Rose & Fischer's (1989) assessment systems. Like its predecessors, this scoring system is

designed to make it possible to assess the complexity level of a performance based on its level

of differentiation and integration—deep structure—without reference to its particular

conceptual content. Rather than making the claim that a person occupies a level because he or

she has, for example, elaborated a particular form of perspective taking, the LAS permits us to

identify performances of a given complexity level and then to ask (empirically) what the range

of perspective-taking forms are at that complexity level. Thus, it avoids much of the circularity

of many stage scoring systems (Brainerd, 1993), such as the Perry (1970) scheme, Colby and

Kohlberg's Standard Issue Scoring System (Colby & Kohlberg, 1987), Kegan's Self-Object

Interview and Scoring System (Lahey, Souvaine, Kegan, Goodman, & Felix, 2002), and the

Reflective Judgment Scoring System (King & Kitchener, 1994), which define stages in terms

of domain-specific structures like social perspective-taking or forms of relativism.

We have undertaken several studies of the reliability and validity of the LAS and its

predecessors (Dawson-Tunik, 2004). We have examined inter-analyst agreement rates,

compared scores obtained with the LAS with scores obtained with more conventional scoring

systems, and examined scale characteristics with statistical modeling. Inter-analyst agreement

rates have been high, 80% to 97% within half of a complexity level (Dawson-Tunik, 2004) .

Correspondences between the LAS and other developmental scoring systems are also high, consistently revealing agreement rates of 85% or greater within ½ of a complexity level, although comparisons of the construct validity of the LAS and other systems have shown the LAS to be a more valid measure of cognitive performance (Dawson-Tunik, 2004). Employing Rasch scaling, which provides reliability estimates that are equivalent to Cronbach's alpha, we have consistently calculated reliabilities over .95 (Dawson-Tunik, et al., 2005). Overall, our research shows that the LAS to be a valid and reliable general measure of intellectual development. Detailed information about the LAS can be found at the LAS web site (Dawson, 2010).

The reliability of the LDMA for the current sample of 254 performances was determined with a Rasch analysis (Linacre & Wright, 2007). The person separation reliability, which is analogous to Chronbachs' Alpha, was .97 and the measures accounted for 90% of the variance in the data[i]. These values are consistent with those reported for other assessments scored with the LAS (Dawson-Tunik, et al., 2005).

Perspective-taking scale and coding procedures <H2>

When we evaluate an LDMA performance, we both score it with the LAS and code it for three specific dimensions of its content—*argumentation*, *perspective taking* and *seeking*, and *decision-making process*. The coding approach has changed over time as our knowledge about development in this area has evolved. This report focuses on the most recent coding system, which was put in place in 2009.

The primary reason for coding is to provide feedback to the test-taker, but coding schemes are also designed with research in mind. All codes, comments, and scores are entered into a database so they can be used in ongoing research into decision-making behavior. Here we

focus on perspective taking—putting oneself in the position of another person or entity—and perspective seeking—actually seeking out the perspective of another person or entity.

The coding for perspective taking and perspective seeking is straightforward, requiring little inference on the part of the coder. Every dilemma involves a range of explicit or implicit perspectives, including those of (a) the protagonist, (b) one or more individual subordinates, (c) a team or group of subordinates, (d) an immediate supervisor, (e) an organization, (f) people who are served by the organization, and (g) senior management. Analysts record each perspective that the respondent (1) takes into consideration and (2) suggests seeking.

Given the large body of research suggesting that perspective-taking has a strong developmental dimension, and having noticed in responses to the LDMA that some perspectives seemed to be "easier" to take and/or seek than others, we hypothesized that the perspective data could be treated as a scale, thus simplifying analysis. To test this hypothesis, the data were submitted to a Rasch analysis using Winsteps software (Linacre & Wright, 2007). Although the person separation reliability was disappointing (.62), with a person performance estimate range of 81.6 and confidence intervals around individual person estimates of ± 17.4, the item separation reliability was robust (.96), with a range of 48.4 and confidence intervals around individual items of ± 6.0, providing a clear picture of differences in the difficulty of taking and seeking increasingly broad perspectives. Taken as a whole, these values are acceptable for the examination of sample trends, although they suggest that the perspective "scale" must be improved if we would like to have confidence in individual person estimates.

Sample <H2>

The sample consists of the 254 individuals who took the LDMA (as of April 14, 2010) after the coding scheme was last updated in early 2009. The sample is in every respect a convenience

sample, made up of 120 females and 134 males between the ages of 20 and 63. Tables 1-4

show the distribution of ethnic groups, countries of residence, educational levels, and

management levels. The distribution of Lectical® levels is shown in Figure 4.

Table 1: Distribution of ethnicity

Ethnicity	N	Percent
Caucasian	220	86.6
Latin	34	13.4
Total	254	100.0

Table 2: Distribution of countries of residence

Country	N	Percent
Australia	82	32.3
Canada	36	14.2
Russia	68	26.8
Other	12	4.7
Total	254	100.0

Table 3: Distribution of educational level

| Educational level	N	Percent
High school	1	.4
1-3 years of college	17	6.7
BA or equivalent	94	37.0
Masters or equivalent	73	28.8
More than 1 year of doctoral study	65	25.6
Total	254	100.0

Table 4: Distribution of management levels

Management level	N	Percent
Pre-manager/single team leader	14	5.5
First line supervisor/multiple team leader	22	8.7
Mid-level manager	106	41.7
Upper level manager	5	2.0
Senior manager/small business CEO	75	29.5
Big business CEO	12	4.7
Not a manager	20	7.9
Total	254	100.0

Results <H1>

Perspectives <H2>

Figure 3 shows the distribution of person estimates and item difficulties ordered along the

Rasch logit scale. Difficulties increase from the bottom to the top of the figure. Item difficulty

estimates are on the right. The person estimates, which are roughly normally distributed—with

the exception of a group of persons at the very bottom, all of whom considered no perspective

other than the protagonist's—shows the point on the logit scale at which each person has a

50% likelihood of taking (or seeking) the perspective(s) immediately to the right of that

estimate, about a 77% likelihood of taking (or seeking) the perspectives 10 points below that

estimate, and about a 33% likelihood of taking (or seeking) the perspectives 10 points above

that estimate (Iramaneerat, Smith, & Smith, 2008). The difficulty of taking or seeking

perspectives increases as perspectives become broader in scope, and seeking a perspective is

more difficult than taking that same perspective. However, this trend dissipates as perspectives

become broader (going from individual perspectives to higher level perspectives like the

strategic perspective of senior management), suggesting that there is a relation between the

ability (or inclination) to take more and broader perspectives and an understanding of the

importance of clarifying these perspectives.

None of the variance in perspective-taking/seeking can be accounted for by any of the

demographic variables.

Figure 3: Person and item map, perspective taking and perspective seeking
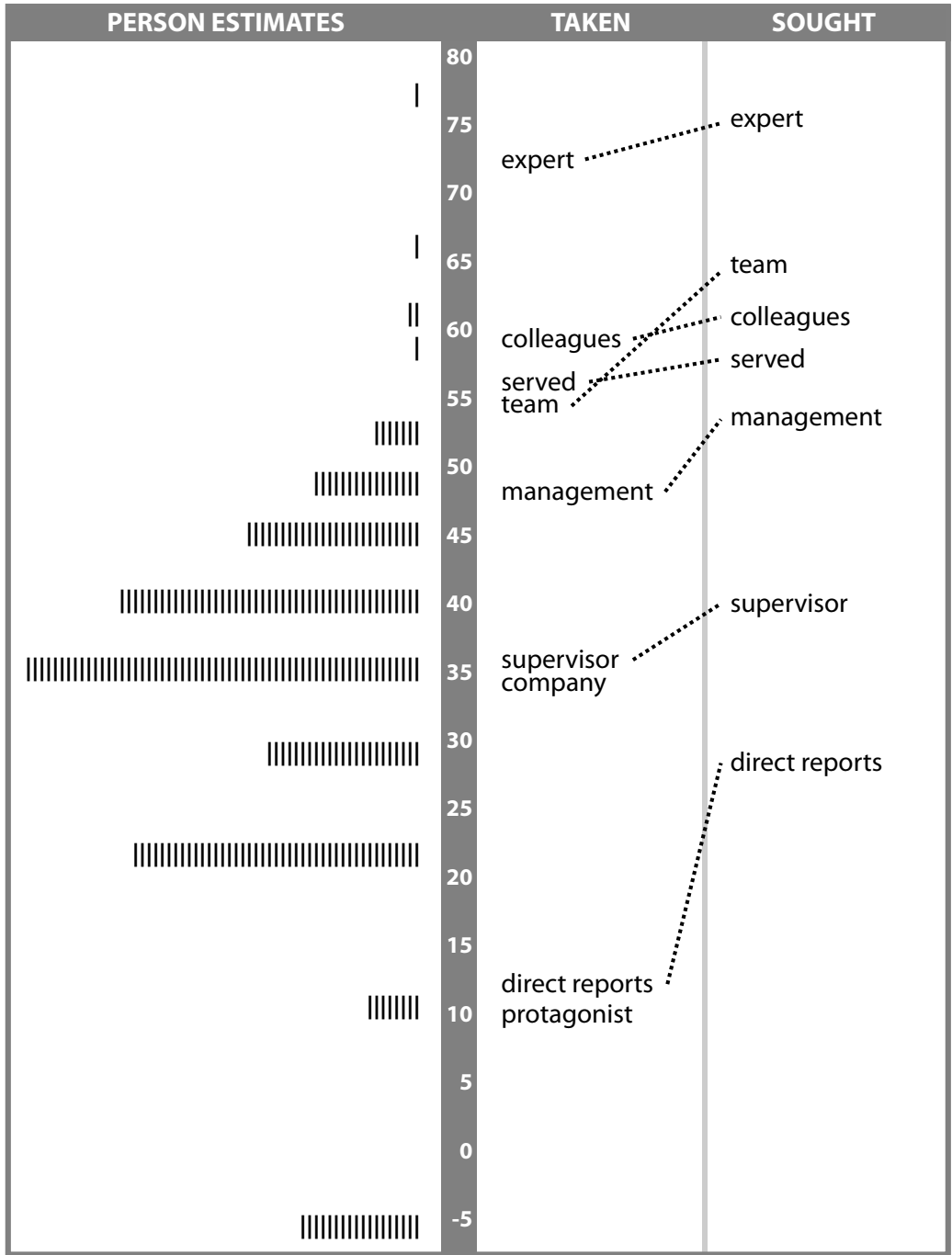
254 persons, 16 items, average standard error for item estimates = 3.0

Figure 4: The relation between perspective-taking/seeking and lectical phase

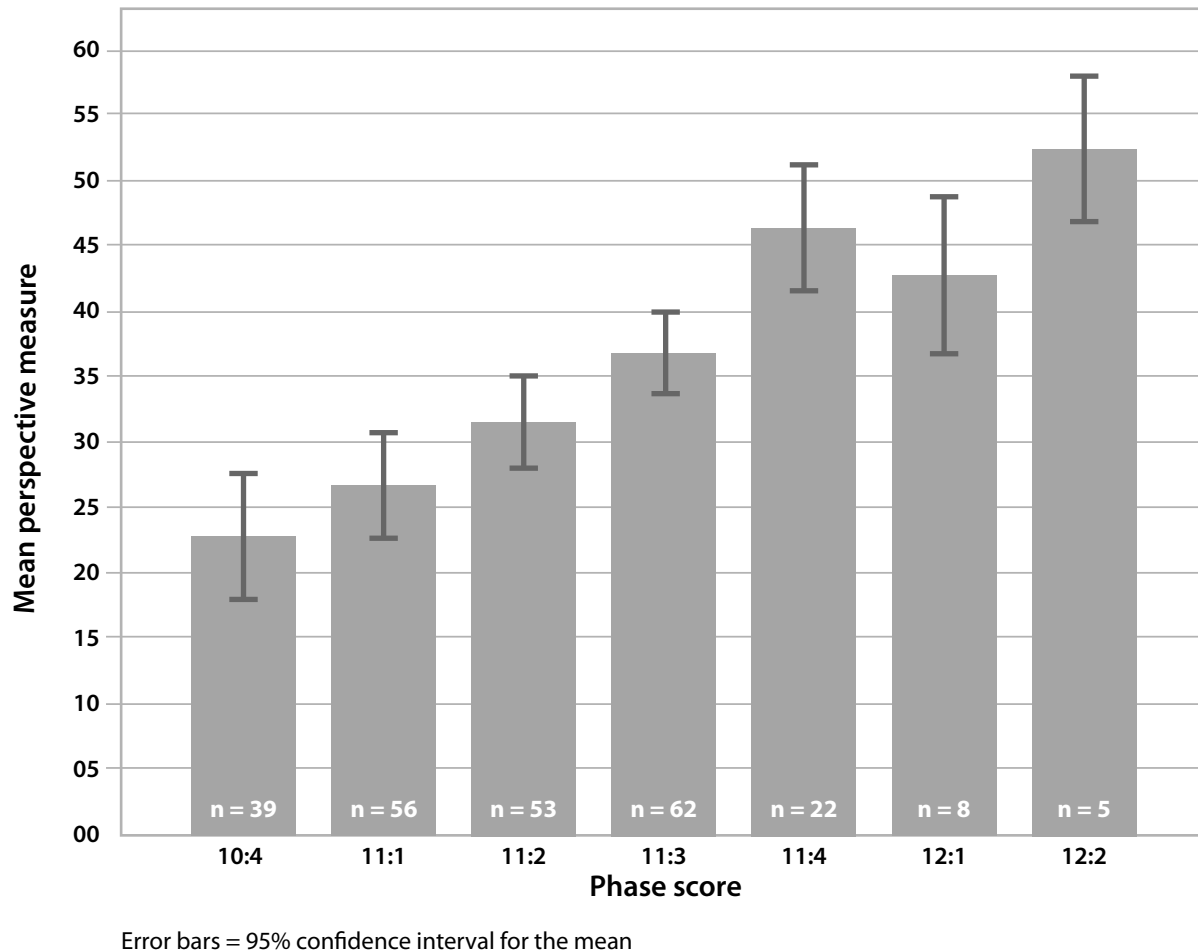Error bars = 95% confidence interval for the mean

Figure 4 shows the relation between perspective taking/seeking and Lectical phase, revealing a clear pattern of growth in perspective taking/seeking estimates over the course of development.

Correlation of the Rasch estimates from the analysis of LAS scores and the analysis of perspective-taking/seeking revealed a moderate relation between the two variables (r = .53, p < .05). After disattenuation for error (square root [.62 * .97]), the correlation was .78. This means that the percentage of variance in perspective taking/seeking accounted for by Lectical phase is somewhere in the range of 28% ($.53^2$) to 61% ($.78^2$).

So far, the results replicate patterns found in previous research, showing a clear relation between cognitive development and perspective taking and seeking. But there is another story to tell—a story about the difference between what is possible at a given developmental level and what individuals actually do when presented with a real-world scenario. There is a significant gap between the Lectical level at which individuals are capable—from a developmental perspective—of taking a particular perspective and the average Lectical level at which that perspective is commonly taken into account. An examination of the raw data shows that each perspective was sought and taken by at least one person performing in level 10, and we know from research in childhood that even elementary school children are capable of considering and seeking the perspectives of other individuals, and pre-adolescents clearly recognize that groups have a perspective, illustrated, for example, by their ability to form and differentiate between the values and attributes of "clubs" or cliques.

Discussion: the possible and the preferable <H1>

During the above review of existing literature about perspective taking and seeking in adulthood, we raised several themes relevant to our findings here. Many models present perspective taking as a capability that reliably varies as a function of development, with higher stages involving more complex and adequate forms of perspective taking. Our findings confirm this to some extent. Figures 3 and 4 above both suggest that the task-demands of some perspective-taking types are greater than others. The ability to take increasingly broad and complex perspectives is the result of large-scale reorganization of thought and action— perspective taking does vary as a function of developmental level.

However, most of the variability in perspective taking is not accounted for by developmental level. Not one respondent took up all the relevant perspectives; many took only the most basic

individual perspectives (or the "company" perspective, which usually consisted of considering productivity or profitability), thus underperforming relative to their overall score. Some focused exclusively on the perspective of the protagonist, despite thinking through other aspects of the dilemma in reasonable and relatively complex ways.

Given that the LDMA always features dilemmas that involve hierarchically nested relations and tensions between different perspectives, the paucity of perspective taking in the sample is of particular interest. One interpretation is that, for whatever reason, the perspectival aspects of the dilemma were not salient to the respondents in our sample. This is not to suggest a flaw in dilemma design, although it is likely that explicitly prompting respondents to discuss the perspective relevant to the dilemma would yield different results. Rather, we suggest that the irrelevance of perspective taking for the respondents in our sample may be due to these managers' educational histories and their environmental contexts (Basseches, 1986; Higgins & Gordon, 1985; Higgins, Power, & Kohlberg, 1994; Sinnott, 1993).

This is a hypothesis worth testing, and one ideally suited to the tools of developmental maieutics. The educational feedback provided to those taking the LDMA has already been tailored in light of these findings to address perspective taking and seeking. A variety of research designs for testing the effect of various kinds of feedback or learning interventions on perspective taking are possible. For example, it would be possible to compare the effects of attempting to raise the cognitive complexity of managers with the effects of making institutional changes that raise the salience of perspective-taking and seeking.

We found that several people did not consider taking the perspectives of others at all. However, even when they did, they often seemed to think that there was no need to seek clarification of these perspectives. Consequently, perspective seeking was less prevalent than

perspective taking. This, again, is somewhat surprising, given the perspectival complexity of the dilemmas, the clear relevance and possibility of seeking perspectives as an aspect of related decision-making processes, and the demonstration by respondents of the ostensibly requisite capabilities for taking those perspectives. We think these findings suggest that perspective seeking is an aspect of decision-making that should be explicitly addressed in educational contexts and in the workplace. Furthermore, we argue that the skill of perspective seeking in particular is a critical aspect of adult development. As complex communications infrastructures increasingly characterize post-industrial democracies, citizens and workers face unprecedented interpersonal problem-spaces. Effective and fair decision making requires not just that we simulate the perspectives of others, but also that we engage others in actual dialogue through perspective seeking (Habermas, 1990, 1999).

Conclusion: Bridging research and practice and considering future directions <H1>

We began this paper by noting that the history of psychology has been in part a history of attempts to bridge research and practice. This paper has provided an overview and demonstration of a broad methodology that systematically integrates developmental research with educational practice. The findings about perspective taking and seeking in adult decision-making were generated as a by-product of educational practices involving the LDMA. These findings have already been fed back into the educational affordances of the LDMA, by improving the developmentally appropriate feedback delivered to test-takers. We feel that is kind of relationship between research and practice has important bearings on directions for future research.

This iterative inter-animation of research and practice, revolving around reciprocally educative relations between test-developers, developmental researchers, and test-takers, is where new

innovative approaches to adult development are emerging. For example, the perspective-scale

discussed above is one among a set of scales being developed using the developmental

maieutic approach. Scales for *coherence* and *relativism* are also under development, and are

being used as indexes of within-level content variability. These scales, like the perspective

taking scale, are constructed to hone the delivery of customized educative feedback. They are

also continually being refined in light of a burgeoning research base.

So the broad questions that frame our future endeavors revolve around the unique affordances

of knowledge that is built at the interface of research and practice. How can we better facilitate

the feedback-loop between building new knowledge and delivering richly educative feedback

based in that knowledge, the effects of which can themselves be studied to test the veracity of

the knowledge they instantiate? What are the limitations of such a complex endeavor, what are

the trade-offs, for example, might we be guilty of a kind of *instrumentalism* that

inappropriately rejects the value of "pure" research? And finally, how might the LAS and its

analytical accouterments be used in conjunction and collaboration with other scoring systems

and research methods in building a comprehensive research and development infrastructure for

education at multiple levels?

Development maieutics is a methodology aimed at catalyzing educational initiatives that are

configured to ensure their own continued improvement. This is exactly the kind of cumulative

progress characteristic of scientific endeavors that has been so elusive in educational research

(Lagemann, 2000). The value of approaches that merge developmental research and

educational practice have been understood at least since Dewey (1929), who argued that the

prospect of building a genuine science of education hinges on our ability to get psychology out

of the laboratory and into real world educational contexts. The developmental maieutic

approach is the latest in a long tradition of methodological innovations at the interface of

research and practice. The key innovation is the idea-building collaborative relationships

around assessments that are useful for both practitioners and researchers. This involves setting

up relationships in which we are all learning.

References <H1>

Armon, C. (1993). Moral complexity of the workplace.

Baldwin, J. M. (1906). *Mental development in the child and the race: Methods and processes*. New York: The Macmillan Company.

Basseches, M. (1986). Cognitive-structural development and the conditions of employment. *Human Development, 29*, 101-112.

Boring, E., G. (1929). *A history of experimental psychology*. New York: Appleton-Century Company.

Brainerd, C. J. (1993). Cognitive development is abrupt (but not stage-like). In H. Thomas & A. Lohaus (Eds.), *Modeling growth and individual differences in spatial tasks* (Vol. 58(9), pp. 170-190).

Bruner, J. S. (1960). *The process of education*. Cambridge: Harvard University Press.

Colby, A., & Kohlberg, L. (1987). *The measurement of moral judgment: Standard issue scoring manual* (Vol. 1). New York: Cambridge University Press.

Commons, M. L., Straughn, J., Meaney, M., Johnstone, J., Weaver, J. H., Lichtenbaum, E., et al. (1995, November). *Measuring stage of development across domains: A universal scoring scheme.* Paper presented at the Annual meeting of the Association for Moral Education, New York.

Dawson, T. L. (2002). A comparison of three developmental stage scoring systems. *Journal of Applied Measurement, 3*, 146-189.

Dawson, T. L. (2010). The Lectical™ Assessment System.   Retrieved March 30, 2010, from http://lectica.info

Dawson, T. L., & Stein, Z. (2004a). *Critical thinking seminar pre and post assessment results*. Hatfield, MA: Developmental Testing Service, LLC.

Dawson, T. L., & Stein, Z. (2004b). *National Leadership Study results*. Hatfield, MA: Developmental Testing Service, LLC.

Dawson, T. L., & Stein, Z. (2006). *Decision-making curriculum. Results of the pre- and post-instruction developmental assessments*. Northampton, MA: Developmental Testing Service.

Dawson, T. L., & Stein, Z. (2008). Cycles of research and application in education: Learning pathways for energy concepts. *Mind, Brain, & Education, 2*(2), 90-103.

Dawson, T. L., & Wilson, M. (2004). The LAAS: A computerized developmental scoring system for small- and large-scale assessments. *Educational Assessment, 9*, 153-191.

Dawson-Tunik, T. L. (2004). "A good education is…" The development of evaluative thought across the life-span. *Genetic, Social, and General Psychology Monographs, 130*(1), 4-112.

Dawson-Tunik, T. L. (2006). The meaning and measurement of conceptual development in adulthood. In C. Hoare (Ed.), *The intersection of adult development and learning: A handbook of theory, research, and practice* (pp. 433-454). London: Oxford.

Dawson-Tunik, T. L., Commons, M. L., Wilson, M., & Fischer, K. W. (2005). The shape of development. *The European Journal of Developmental Psychology, 2*(2), 163-196.

Dewey, J. (1929). *Sources of a science of education*. New York: Liveright.

Enright, R. D., & Lapsley, D. K. (1980). Social role-taking: A review of the constructs, measures, and measurement properties. *Review of Educational Research, 50*, 647-674.

Fischer, K. W. (1980). A theory of cognitive development: The control and construction of hierarchies of skills. *Psychological Review, 87*, 477-531.

Fischer, K. W. (2009). Mind, brain, and education: Building a scientific groundwork for learning and teaching. *Mind, Brain, and Education, 3*(1), 3-16.

Fischer, K. W., & Bidell, T. R. (2006). Dynamic development of action, thought, and emotion. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (6 ed., Vol. 1, pp. 313-399). New York: Wiley.

Fischer, K. W., & Dawson-Tunik, T. L. (2006, April). *Applying cognitive science to curricular design and analysis of concept learning & development.* Paper presented at the Learning and the Brain, Cambridge, MA.

Gaudine, A., & Thorne, L. (2001). Emotion and ethical decision-making in organizations. *Journal of Business Ethics, 31*(2), 175-187.

Gurucharri, C., & Selman, R. L. (1982). The development of interpersonal understanding during childhood, preadolescence, and adolescence: A longitudinal follow-up study. *Child Development, 53*, 924-927.

Habermas, J. (1975). *Legitimation Crisis* (T. McCarthy, Trans.). Boston: Beacon press.

Habermas, J. (1990). *Moral consciousness and communicaive action* (C. Lenhardt & S. W. Nicholsen, Trans.). Cambridge, MA: MIT Press.

Habermas, J. (1999). *The inclusion of the other*. Cambridge: MIT Press.

Higgins, A., & Gordon, F. (1985). Work climate and socio-moral development in two worker-owned companies. In M. Berkowitz & F. Oser (Eds.), *Moral education: Theory and practice* (pp. 241-268). Hillsdale, New Jersey: Erlbaum.

Higgins, A., Power, C., & Kohlberg, L. (1994). The relationship of moral atmosphere to judgments of responsibility. In B. Puka (Ed.), *New research in moral development. Moral development: A compendium, Vol. 5.* (pp. 190-222). New York: Garland Publishing.

Iramaneerat, C., Smith, E. V., Jr., & Smith, R. M. (2008). An introduction to Rasch measurement *Best practices in quantitative methods* (pp. 50-70). Los Angeles: Sage.

Jaques, E. (1976). *A general theory of bureaucracy*. New York: Halsted Press.

Jarvela, S., & Hakkinen, P. (2002). Web-based cases in teaching and learning—the quality of discussions and a stage of perspective taking in asynchronous communication. *Interactive learning environments, 10*(1), 1-22.

Kegan, R. (1982). *The evolving self: Problem and process in human development*. Cambridge, Massachusetts: Harvard University Press.

Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.

Kegan, R., & Lahey, L. (2002). *How the way we talk can change the way we work: Seven languages for transformation*. San Francisco: Jossey-Bass.

Keller, M., & Edelstein, W. (1991). The development of socio-moral meaning making: Domains, categories, and perspective-taking. In W. M. Kurtines & J. L. Gewirtz (Eds.), *Handbook of moral behavior and development, Vol. 2: Research* (pp. 89-114). Hillsdale, NJ: Lawrence Erlbaum.

King, P. M., & Kitchener, K. S. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey Bass.

Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 347-480). Chicago: Rand McNally.

Kohlberg, L. (1977). The implications of moral stages for adult education. *Religious Education, 72*(2), 183-201.

Lagemann, E. (2000). *An elusive science: The troubling history of educational research*. Chicago: University of Chicago Press.

Lahey, L., Souvaine, E., Kegan, R., Goodman, R., & Felix, S. (2002). A guide to the Subject-Object interview: Its administration and interpretation. Unpublished Scoring manual. Harvard Graduate School of Education, Subject-Object Reserch Group.

Linacre, J. M., & Wright, B. D. (2007). Winsteps. Chicago: MESA Press.

Mead, G. H. (1981). *Selected writings*. Chicago University of Chicago press.

O'Donnell, J. M. (1985). *The origins of behaviorism: American psychology 1870-1920*. New York: New York University Press.

Perry, W. G. (1970). *Forms of intellectual and ethical development in the college years*. New York: Holt, Rinehart, & Winston.

Piaget, J. (1932). *The moral judgment of the child*. London: Routledge and Kegan Paul.

Piaget, J. (Ed.). (1977). *The essential Piaget: An interpretive reference guide. Ed. H.E. Gruber & J.J. Voneche* New York: Basic Books.

Rose, S. P., & Fischer, K. W. (1989). *Constructing task sequences: A structured approach to skill theory* (Instructional Manual). Cambridge, MA: Harvard.

Rose, T., & Fischer, K. W. (2009). Dynamic development: A Neo-Piagetian approach. In U. Muller, J. I. M. Carpendale & L. Smith (Eds.), *The Cambridge Companion to Piaget*. New York: Cambridge University Press.

Selman, R. L. (1977). A structural-developmental model of social cognition: Implications for intervention research. *Counseling Psychologist, 6*, 3-6.

Selman, R. L. (1979). Assessing interpersonal understanding: an interview and scoring manual in five parts constructed by the harvard-judge baker social reasoning project.

Simonneaux, L. (2007). Argumentation in socio-scientific contexts. In S. Erduran & M. P. Jimenez-Aleixandre (Eds.), *Argumentation in Science Education*. New York: Springer.

Sinnott, J. D. (1993). Use of complex thought and resolving intragroup conflicts: A means to conscious adult development in the workplace *Development in the workplace.* (pp. 155-175). Hillsdale: Lawrence Erlbaum.

Skinner, B. F. (1971). *Beyond freedom and dignity*. New York: Knopf.

Snarey, J., Kohlberg, L., & Noam, G. (1983). Ego development in perspective: Structural stage, functional phase, and cultural age-period models. *Developmental Review, 3*, 303-338.

Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.

Torbert, W. R. (2004). *Action inquiry: The secret of timely and transforming leadership*. San Francisco: Berrett-Koehler.

---

[i] In other words, 90% of what is going on in these data (the scores), can be explained by the measures, which delineate the developmental dimension.