Construct Validity and Case Validity in Assessment

Hedwig Teglasi
University of Maryland, College Park

Allison Joan Nebbergall
ICF International, Washington, District of Columbia

Daniel Newman
National-Louis University

Clinical assessment relies on both *construct validity*, which focuses on the accuracy of conclusions about a psychological phenomenon drawn from responses to a measure, and *case validity,* which focuses on the synthesis of the full range of psychological phenomena pertaining to the concern or question at hand. Whereas construct validity is grounded in understanding causal influences of a distinct phenomenon on responses to various measures and life contexts, case validity encompasses the joint influences of multiple phenomena on individuals' responses. Two sets of distinctions essential to understanding psychological phenomena, hence to understanding construct validity, are (a) implicit and explicit versions of personality constructs and (b) ability and personality as versions of constructs measured by performance tests presenting maximal and typical conditions, respectively. Since both implicit and explicit versions of constructs interface with maximal or typical performance conditions, case validity requires systematic inclusion of these distinctions in assessment protocols.

Keywords: case formulation, clinical assessment, explicit construct, implicit construct, performance test conditions

The assessment enterprise relies both upon *construct validity*, the accuracy of judgments about a psychological phenomenon on the basis of test scores (American Psychological Association, 1999), and on *case validity*, the accuracy of conclusions based on a synthesis of psychological phenomena. Whereas construct validity places emphasis on how well a psychological phenomenon (such as intelligence), as measured during the evaluation, explains responses (that are intelligent) in a real-world context, case validity focuses on how well the overall conceptualization, based on measures of multiple psychological phenomena, explains the concerns or questions prompting the evaluation. Although assessors' theoretical orientations, clients' ages, and presenting concerns influence the relative emphases on certain psychological phenomena as well as the selection of particular instruments and interpretive procedures, all case conceptualizations involve a two-pronged process of differentiating and measuring the relevant constructs in line with the familiar tenets of construct validity and of integrating the various constructs within the whole person, in line with case validity as detailed in this article.

Construct validity and case validity join up in clinical assessment. Case validity is predicated on the delineation of pertinent constructs, administration of protocols that measure the full range of psychological constructs influencing the individual's responses in relevant life contexts, accurate interpretation of the meaning of each measure in light of the others, and faithful synthesis of constructs to address the presenting concerns (see Figure 1). Although essential to construct validity, the well-documented distinctions between *explicit* and *implicit* versions of psychological constructs and between *maximal* and *typical* conditions of performance to assess those constructs are not systematically incorporated into paradigms for clinical case conceptualization.

Construct Validity

The primary consideration for maximizing the valid use of assessment tools is the relation of constructs to their measures. Constructs are abstractions that cannot be seen directly but are valued because they organize the myriad of potential observations in the real world (Eysenck, 1987). The idea of construct validity as a potential property of a test score or interpretation is applicable only if a causal link is assumed between the construct and responses to the measure in question (see Borsboom, Mellenbergh, & Van Heerden, 2003, 2004). Intelligence, for instance, is a construct that presumably exists in the real world, exerting its influence on responses regardless of whether it is measured. Because it has a reality that is not bound by test scores, the construct may be measured in multiple ways. Construct validity, according to Borsboom et al. (2003, 2004), is predicated on two conditions: (a) The construct refers to an existing phenomenon, independently of how it might be measured; and (b) the phenomenon causes
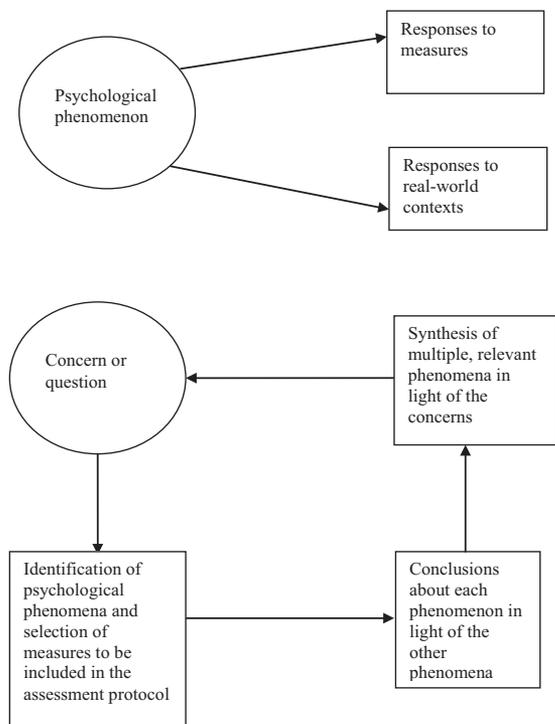
Figure 1. Comparison of construct validity (upper panel) and case validity (lower panel).

response variation both in the real world and in the phenomenon's measures.

The assumed independence between a construct and its measures enables researchers to take a dual focus: both to refine the construct itself and to improve its measures. By extension, practitioners are enabled to consider that the construct in question may be incorrectly or incompletely understood or that a particular measure (e.g., self-report or performance task) may not adequately capture the causal mechanisms of the construct. A metric that is not referenced to a real life phenomenon has been defined as arbitrary and is not considered useful because it does not generalize to real life functioning (see Blanton & Jaccard, 2006; Kazdin, 2006). An example from medicine is illustrative. The use of drugs to alter cholesterol levels is rooted in the assumption of a causal pathway, whereby reducing the level of "bad" cholesterol increases length and quality of life. Consider that cholesterol levels change in the desired direction in response to two medications, A

and B. However, the lowered cholesterol is associated with lower mortality for Drug A but not Drug B. In other words, the causal link between level of cholesterol and real life well-being depends on the mechanism of change (set into motion by the respective medications). In analogous fashion, it is necessary to link measures of progress due to psychosocial interventions to the mechanisms causing growth.

The manner in which a psychological phenomenon develops and changes is crucial to its influence on a person's transactions. Performance on an IQ test after an intervention involving practice on test items is easily recognized as arbitrary because the nonstandard administration condition attenuates the assumption that the cause of the score is the construct of intelligence. In other words, intelligence as measured with this nonstandard metric is not thought to correspond with intelligent real world functioning. Measures do not predict actual functioning - constructs do. It is the phenomenon (i.e., intelligence), not the measure, that connects responses to the test items with responses to real world conditions. Scores on measures are of interest if they generalize meaningfully to functioning in real life or are developmental precursors of such functioning. Meaningful change following an intervention occurs at the level of phenomena (i.e., intelligence), not scores on measures. In other words, for a change in a metric to have construct validity, a change in the relevant phenomenon must be the cause of the change in the measure.

Performance Conditions

Scores on performance tests forecast real world functioning only if both the measure and the life setting are similar in their functional requirements. Introduced in studies of human performance in employment settings, the distinction between maximal and typical performance conditions (Cronbach, 1990; Sackett, Zedeck, & Fogli, 1988) refers to well-defined and ill-defined performance contexts, respectively (see Table 1). Well-defined contexts present clear situational pulls to elicit and guide responses, whereas ill-defined contexts do not. Weak correlations have been documented between typical and maximal performances (Sackett et al., 1988). Although real life circumstances likely present along continua ranging from well-defined to ill-defined (Sackett, 2007), the maximal–typical dichotomy is a useful heuristic for thinking about the match between performance conditions of tasks in an assessment battery and in real world contexts.

A wide range of psychological phenomena would benefit from consideration of performance conditions under which they are assessed and observed in the real world. Accordingly, modest

Table 1
Maximal and Typical Performance Conditions

Maximal performance conditions	Typical performance conditions
Tasks are perceived as important, thereby promoting heightened level of effort and attention.	Lack of awareness of being observed or evaluated reduces the likelihood that the individuals are exerting their best effort.
Clear expectations and performance standards guide responses.	Unclear performance expectations require individuals to impose characteristic ways of responding.
Observations are restricted to short time span, allowing an uncharacteristic spurt of effort that cannot be sustained.	Responses are either monitored over a long period of time or require competencies learned over time through concerted effort that reflect a history of more typical exertions.

correlations between performance on executive attention tasks and classroom on-task behavior (e.g., Blair, 2003) point to the importance of performance conditions in reference to attention regulation. A child may receive high scores on structured tasks of executive attention (with clear performance expectations requiring working memory or inhibition) but may be unable to regulate behavior under typical classroom conditions in the face of uncertainty, distraction, or emotionality. Similarly, the construct of intelligence as measured by highly structured IQ tests predicts academic and other important outcomes in similarly well-defined contexts (see Sackett, Borneman, & Connelly, 2008) but does not fully capture problem solving in more ambiguous settings. Scores on IQ tests do not correspond well with intellectual efforts expended day to day (Ackerman & Heggestad, 1997) or with solutions to ill-defined problems (Pretz, Naples, & Sternberg, 2003). Even in the assessment of personality traits, one of the strongest situational moderators of the link between traits and behavior is the extent to which the situation is governed by rules and normative expectations for appropriate behavior as opposed to being unfamiliar and obscure as to the expected responses (for a discussion of strong and weak situations, see Snyder & Ickes, 1985).

Through vagaries in the history of test development, current techniques for assessing ability and personality, respectively, mirror the distinction between maximal and typical performance conditions. In clinical settings, tasks that measure intelligence tend to be clearly defined, with a limited range of correct solutions, whereas performance tasks that measure personality (e.g., Rorschach Inkblot Method [RIM; Exner & Erdberg, 2005]; Thematic Apperception Test [TAT; Teglasi, 2010]) allow wider options for responding appropriately and are often associated with social-emotional adjustment. The validity of conclusions based on tests of ability or personality requires consideration of the performance conditions of the measure (predictor environment) and of the relevant life context (predicted environment).

In recognition of the fact that all projective techniques have in common the presentation of a task, the term *personality performance test* has been suggested as a more parsimonious descriptor for this class of instruments (Meyer & Kurtz, 2006; Teglasi, 1998). The substitution of a new name opens conceptual doors for comparing measures that set different conditions for their accomplishment. Various tasks within the personality assessment domain may be placed at different points on the maximal-typical continuum based on four factors: clarity/ambiguity of the stimuli used to elicit responses; freedom to organize the response; clarity/obscurity of the criteria for evaluating the response; and the specificity of instructions. In other words, personality performance measures themselves differ in the extent to which conditions for responding are equivocal due to aspects of the performance that are dictated by the stimuli, response format, instructions, and obviousness of response expectations.

Currently, the constructs of ability and of personality are conflated with maximal and typical performance conditions inherent in their respective assessment methods. Ability tests offer maximal conditions because they include all of the required information, presenting clearly defined problems that have correct answers, whereas personality performance tasks provide typical conditions that call for the individual to decide if, when, or how to respond. From the perspective of construct validity, what is essential in the distinction between ability and personality is the manner in which

a particular construct is measured. A distinction between ability and disposition to reason based on performance conditions (Ritchhart, 2002), mirrors the contrast between ability and personality as linked to the method of measurement. Ability to reason emerges when an individual is presented with an unequivocal situation or problem (maximal conditions), whereas the disposition to reason comes to light when the person reasons spontaneously (typical conditions), enabled not only by ability but also by the sensitivity to recognize the moments that call for reasoning and the inclination to invest the necessary energy (Perkins & Ritchhart, 2004). Cognitive processes such as encoding and interpreting information to organize the stream of life events that are central to personality (Mischel & Shoda, 1995; Westen, 1996) are often assessed with performance tests of personality that highlight both abilities and dispositions (e.g., RIM, TAT).

Consideration of maximal and typical performance conditions to assess psychological phenomena is central to construct validity because it enables assessors to specify the real world contexts to which test responses are expected to generalize.

Implicit and Explicit Personality Constructs

Implicit and explicit versions of personality constructs are assessed with different techniques and are salient in different contexts. Implicit constructs are captured by personality performance tests that are relatively ill defined (e.g., inkblot method, storytelling, drawing), whereas explicit constructs are expressed by self-report. Accordingly, when attitudes or motives are measured by self-report, they are considered explicit, but when measured with a performance tasks such as telling stories about TAT-like pictures, they are regarded as implicit. Just as maximal and typical measures of constructs are situation specific, explicit and implicit versions of constructs, respectively, predict behavior under different conditions that correspond to some extent, with the maximal–typical distinction.

Information processing and responses driven by implicit motives are rooted in affective experiences (such as intrinsic enjoyment of the task or activity), guide responses in relatively ill-defined (typical) conditions, and predict spontaneous engagement in preferred activities. In contrast, self attributed or explicit motivation, based on social values that are important to one's identity, guides information processing and predicts behaviors in the presence of incentives that bring forth self-presentational concerns, including well-defined situations (maximal conditions) with clear behavioral expectations (see Burton, Lydon, D'Alessandro, & Koestner, 2006; McClelland, Koestner, & Weinberger, 1989; Spangler, 1992).[1]

Historically, self-report has been considered the more direct source of information (if you want to know something, it is best to ask directly), with projective methods viewed as indirect sources of evidence. However, Teglasi (1998) argued that direct evidence comes from the performance of a task (say a math test) rather than from self-report (of one's math ability). As McClelland et al.

[1] The historical question of what determines a person's level of aspiration (e.g., Lewin, Dembo, Festinger, & Sears, 1944) is clarified by research in achievement motivation addressing the incentives for the pursuit of various types of goals.

(1989) noted, stories told to pictures give a more direct read on motives than do self-reports because the unfolding narrative provides a relatively unedited record of the individual's synthesis of the inner worlds of emotions, motives, and intentions in relation to the outer world of events, actions, and outcomes, whereas the self-report is sifted through the lens of analytic thoughts. Debates about which method provides more or less direct evidence about a construct may be irrelevant in light of compelling evidence that self-report and personality performance tests reveal different phenomena and hence different constructs. Measures of different constructs are not interchangeable.

Subsequent to the introduction of implicit and explicit versions of the achievement motive (McClelland et al., 1989), dual versions have been proposed for numerous other constructs, including self-esteem (Bosson, Swann, & Pennebaker, 2000; Spalding & Hardin, 1999), dependency (Bornstein, 1998), anxiety (Egloff, Wilhelm, Neubauer, Mauss, & Gross, 2002), attitudes (Greenwald et al., 2002), and aggression (Frost, Ko, & James, 2007). This explicit–implicit distinction is an important conceptual advance in personality assessment, arguing against self-report and performance measures as alternative sources of evidence for the same construct.

Explicit and implicit versions of a particular construct unfold in different ways depending on the context. For instance, how a person reasons about hypothetical moral dilemmas assessed under maximal conditions (e.g., contrived vignettes) is not sufficient to account for actual responses in typical conditions. Individuals consider the moral implications of a particular decision only if they view the circumstance as residing within the moral domain (see Killen & Smetana, 2006). A philanthropist who takes pride (explicit) in making morally informed decisions and whose actions in many contexts are governed by (implicit) moral schemas may discount moral considerations as not being applicable to a particular business action.

Although research on implicit and explicit psychological constructs has demonstrated their relevance in different contexts, it is important to consider that every individual possesses both and that in particular contexts, these two sets of phenomena may join in harmony or subvert one another. An example of a harmonious blend is that of an individual who values his identity as first violinist in a prominent orchestra and enjoys the practice required. When motives are discrepant, explicit motives may influence the expression of implicit motives. A person who is implicitly motivated to undermine particular coworkers but explicitly endorses a self-image of a kind, cooperative, and reasonable individual may use covert means to express the implicit intent or find some justification for its open expression. In this case, the explicit motive (to maintain a certain self-image) drives the channels for expression of the implicit motive (see Frost, Ko, & James, 2007; Winter, John, Stewart, Klohnen, & Duncan, 1998). In some cases, a person's implicit motives may be overshadowed by strong external incentives (Rudman, 2004). The point is that all of the attributes of a single individual relevant to a particular encounter join together, each influencing the others as the individual faces real world conditions. Case conceptualizations account for the causal influences on responses of multiple interacting psychological constructs, including explicit and implicit versions.[2]

Case Validity

Clinical decision making, based on assessment of multiple constructs that coalesce to influence individuals' responses in various contexts, is not fully captured by the guiding principles of construct validity; we propose the term case validity as a distinct concept. As shown in Figure 1, construct validity centers on causal influences of a particular psychological phenomenon, a property of the person (P), on responses in a given environment (E), a property of the particular task in an assessment battery or life setting. Case validity, which subsumes construct validity, focuses on the convergence of all relevant psychological phenomena within a person in reference to the questions or concerns prompting the evaluation.

Lewin's (1935) classic formula, $B = f(P, E)$, crystallizes the view that current behavior is a function of both the person and the environment.[3] Yet, because psychological phenomena, as properties of persons, are not clearly separable from the pull of environments, it is necessary to consider $P \times E$ interactions. A challenging testing situation, for instance, differentially affects heart rate responses of children who differ in temperamental reactivity (Kagan & Snidman, 2004). In light of evidence of differential sensitivity to context (see Belsky & Pluess, 2009), it is not surprising that heritability estimates for perceptions of the environment are similar to those for personality traits; both are about 50% (see Plomin, 1994). Additively taking stock of attributes of persons and environments to account for behaviors or outcomes for all individuals, or even for a particular individual, is at odds with what is known. Currently dominant models explain behavioral patterns and developmental outcomes, including psychopathology (e.g., Bergman, Cairns, Nilsson, & Nystedt, 2000; South & Krueger, 2008), as products of interactions between persons and environments. Finally, because various psychological phenomena (P) relevant in a particular environment (E) interplay within persons ($P \times P$), it is necessary to consider their interactions. For example, as detailed earlier, not only are explicit and implicit versions of a psychological construct salient for different contexts, they also team up in their influences on responses in particular contexts.

Given complexities in the transactions between persons and environments, including reciprocal influences among the various

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[2] Validity of data-based judgment is threatened when extraneous factors (such as impression management) diffuse the causal influences of a given psychological construct on responses to its measure. Accordingly, assessors temper their conclusions to account for factors that undermine the causal impact of the intended construct on the measures used, as well as on real life responses.

[3] In the assessment of personality, trait theorists recognize that the pull of the situation may be inherent to the construct in question. For instance, shyness is more salient when meeting new people than when interacting in a familiar setting, and the influence of extraversion on behavior is more pronounced during a party than a structured class lesson. Traits may also be situation specific due to complex trait-related processes. For instance, the expression of empathy depends on processes such as regulation of emotion and attention (Eisenberg, 2010) that enable altruistic responding, but self-regulation varies by situation. Still another view of situational specificity of personality constructs is seen in the distinction between explicit and implicit versions of constructs, which emphasizes the conditions of measurement and of trait expression. Accordingly, empathy may be measured implicitly with performance tasks (maximal or typical) or explicitly with self-report.

psychological phenomena within persons, the utility of Lewin's formula as a heuristic to understand situation-specific behaviors is extended by the addition of two interaction terms, $B = f(P, E, P \times E, P \times P)$.[4]

Three Perspectives on Person–Environment Transactions

The extension of Lewin's formula encompasses three vantage points from which to view Person × Environment transactions in the conduct of clinical evaluations: (a) *person in context* accounts for the situational specificity of psychological phenomena; (b) *person as context* accounts for the interplay of multiple psychological phenomena within a single individual facing a particular situation; and (c) *person of context* accounts for the influences on current responses of schemas that mentally represent prior Person × Environment interactions.

Person in context (P, E). A particular psychological phenomenon, as a property of the person, plays out in specific contexts. For instance, as detailed above, maximal–typical performance conditions set prototypical functional demands such that the conditions of performance and the construct measured are intertwined. To understand a phenomenon such as attention-deployment patterns, it is necessary to include performance tasks in a protocol that approximate the range of real life challenges for attention regulation. Children with attention-deficit/hyperactivity disorder often persist on activities that present strong stimuli (such as computer games, novelty), including external sources of motivation (such as incentives or presence of supervision) but give up easily on tasks that require self-directed effort (independently of feedback or ongoing reinforcement). Barkley's (1997) distinction between contingency shaped attention and goal directed persistence reflects responses to strong and weak situational stimuli, respectively.

Person as context (P × P). A single individual is the context in which multiple psychological phenomena converge, each influencing and influenced by the others. For instance, the adverse impact on adjustment of high negative emotional reactivity, a temperamental disposition, is mitigated by another temperamental disposition, high attention regulation (Belsky, Friedman, & Hsieh, 2001). Person as context expands the focus from construct validity as pertaining to a single psychological phenomenon to case validity, which encompasses the confluence of psychological phenomena. Whereas viewing persons in context relies on distinctions between psychological phenomena, such as explicit and implicit versions of constructs, as active in specific conditions, such as maximal or typical (construct validity), viewing persons as context emphasizes the interplay of various constructs, such as discord or harmony between explicit and implicit phenomena, within a single individual (case validity) responding under a particular set of conditions.

Person of context (P × E). As persons of context, individuals' current transactions in various environments are informed by what they have learned cumulatively from prior encounters. Individuals notice patterns in their experiences with or without deliberate effort or awareness of doing so (Dowd & Courchaine, 2002; Lewicki, Czyzewska, & Hill, 1997; Lewicki, Hill, & Czyzewska, 1992); these regularities are mentally represented as schemas about the self, others, and the world. Through this process of organizing perceived regularities, individuals learn to anticipate what actions bring about desired outcomes in certain contexts and how the ebb and flow of their own and others' emotions relate to the stream of life events. Once the schemas have developed, they take on a life of their own as properties of the person (P), providing categories for appraising ongoing events, and these interpretations, not the actual events (E), are the drivers of emotions, decisions, and actions (e.g., Cervone, 2004; Lazarus, 1991).

Schemas and the Case Conceptualization

Case conceptualizations that clarify the influences of previously consolidated mental sets or schemas on the individual's current transactions address the person of context. Schemas are akin to theories that impose patterns on the stream of ongoing experiences, guiding interpretation of available information, pointing to what is salient, filling in what is missing, and connecting ideas to draw inferences such as about causes or intentions. To demonstrate these functions of the schema, consider how a baseball game is viewed differently by a long-time fan as opposed to a casual watcher. For instance, the fan understands the constant movement of the defensive players, whereas the casual watcher sees the execution of each "out" as an isolated event. Both types of partisans of the same team may be happy with the result, but by having schemas that provide a more complex set of categories, the fan is able to process the unfolding actions more quickly, appreciate a wider range of nuances, and anticipate what may happen next. Schemas differ from behavioral skills or factual knowledge in that the schema is a structure that enables individuals to organize otherwise piecemeal information. Assessment of schemas clarifies the categories that guide what is noticed in particular contexts, how that information is organized and interpreted, and how the interpretation generates emotions and promotes options to bring about desired ends.

Forming and revising schemas through the synthesis of ongoing experiences is a continuous process of self-correction requiring flexibility to note potential regularities (generalization) and alertness to cues that call for distinctions (specification). To cite a simple example, a 2-year-old asks her mother to help her find her "navy brown" sweater. Having previously learned the color of a blanket as "navy blue," she may understand the term *navy* as referring to a particular shade of blue or to a dark version of any color. When she coined the term *navy brown*, she synthesized two schemas—*navy* as adjective applying to *blue* and *navy* as adjective applying to dark colors in general. Her use of the term *navy* as a modifier for the very dark brown color of her sweater represents a synthesis of prior experience to create a new schema as a template for organizing subsequent observations. Eventually, she will notice (or be told) that *navy blue* refers to a specific hue and will stop using the term *navy* to modify dark colors in general. Case formulations address the question of how the individual uses schemas to appraise experiences in well-defined and ill-defined contexts, both social and nonsocial, and also to unpack the pathways to schema development and continued maintenance.

Appraisal theorists (Cervone, 2004; Frijda, 1986; Lazarus, 1991) explain that responses are not evoked directly by the sche-

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[4] We thank Auke Tellegen for comments that informed our addition of these interaction terms.

mas but by the use of schemas to interpret the meaning of events. Schema-guided categories for information processing influence self-regulation of attention, emotion, and behavior (for details, see Teglasi, 2010). Accordingly, if an individual's schemas are devoid of categories to enable distinctions between the intent and impact of actions, that person is apt to equate intent with behavior, perhaps assuming that an inadvertent bump by a peer is a deliberate act of hostility. This tendency to attribute hostile intent when cues are ambiguous has been linked with anger and aggressive behavior (e.g., Crain, Finch, & Foster, 2005; Hubbard, Dodge, Cillessen, Coie, & Schwartz, 2001). Schemas that give salience to intent promote information processing that may preempt anger, because they alert the perceiver to the possibility that the bump may have been accidental. Moreover, availability of the intent category enables moderation of the emotion after it is evoked by subsequent reflection. Self-regulation of emotion and behavior occurs at different points in time (see Gross, 1998), before (automatic, schema-driven appraisal), during (search for information or reflection), or after onset of the emotion (schema guided reappraisal). In similar fashion, schemas that include categories to process immediate events in reference to a bigger picture allow persons to transcend the pull of momentary provocations in their emotional and behavioral responses. Individuals vary in the accuracy, complexity, and organization of the categories that are salient in their schemas. Accordingly, for some the intent category may be dichotomous, guiding appraisals of intent as either all good or all bad, whereas for others this category may be richly nuanced to allow appraisals to consider the interplay of multiple intentions.

Although a comprehensive explication of schema-guided information processing and self-regulation is beyond the scope of this article, some basic distinctions between types of schemas are briefly described.

Public and Personal Schemas

The contrast between public schemas and personal schemas (as shown in Table 2 and further detailed in Teglasi, 2010) is relevant to the case conceptualization. Public schemas capture the regularities of the external world, whereas personal schemas organize patterns at the intersection between the inner (attention, emotion, intention) and outer worlds (events, actions, outcomes). Public schemas (e.g., rules governing baseball) are not altered by individualistic experience and are therefore amenable to confirmation by logical analysis or social consensus. In contrast, personal schemas such as *internal locus of control*, the belief that one is able to act in ways that bring about desired ends, are not supported by logic or wide agreement but by experience, which may be confirmed by like-minded others.

Personal schemas are unique to individuals, shaped by the ongoing transactions between persons and environments as influenced by variations in basic psychological processes such as self-regulation of attention, emotion, and behavior (Bassan-Diamond, Teglasi, & Schmitt, 1995; Lohr, Teglasi, & French, 2004; Teglasi & Epstein, 1998). Accordingly, internal locus of control relates to the capacity to orchestrate flexible and adaptive responses. In time, impediments to adaptive responses likely contribute to uncertainty about one's capacity to control important outcomes (low internal locus of control), but the specific impediments vary with the individual and with the context. For instance, given the disruptive influence of attentional deficits, it is not surprising that problems regulating attention have been linked to low internal locus of control (e.g., Declerck, Boone, & De Brabander, 2006). Yet, to the extent that situations vary in their demands for attentional regulation, locus of control beliefs should be situation specific. For any given individual, difficulties with regulation of attention may or may not be accompanied by dysregulation of other basic psychological processes such as emotion or behavior.

All relevant attributes team together to influence growth of competencies to enable adaptive responses, hence locus of control beliefs. Nevertheless, locus of control beliefs may be further unbundled by understanding the influences of attentional processes on the development of various competencies needed to master

Table 2
Public and Personal Schemas

Type of schema	Broad category	Definition	Example	Function
Social	Public	Organizes ideas in the external world that are confirmed by consensus of the social group.	Routine situations such as ordering a meal in a restaurant or navigating an airport	Operates in structured, routine contexts to provide information about what to expect.
Logical	Public	Organizes relations among ideas that may be confirmed by logic or evidence; akin to theories/frameworks that organize knowledge in a content area.	Formula to calculate the circumference of a circle or law of gravity	Operates in a wide range of task-related conditions to inform understanding and facilitate solutions to problems.
Implicit	Personal	Affective–cognitive knowledge structure that operates automatically, often outside of awareness. Difficult to verbalize.	Viewing others dichotomously as either good or bad	Guides decisions or actions in open-ended situations or less structured tasks by guiding information processing.
Explicit	Personal	Knowledge structure that operates deliberately, often subject to awareness. Amenable to being verbalized (if the person wants to).	Wanting good grades (on self-report) but not enjoying studying	Guides decisions or actions in tasks or situations that cue the schema or provide incentives or structures.

Note. Public schemas are collective conceptions; personal schemas are individualistic conceptions.

adaptive requirements. For, example, boys with attentional difficulties in Grades 3 and 4 are also more likely to misrecognize emotions; in turn, their less accurate emotion recognition predicts problems in social functioning (Kats-Gold, Besser, & Priel, 2007). Interpersonal encounters between persons and environments are reciprocal in nature, with each person responding to their perceptions of the other's responses. Misrecognition of emotions likely biases subsequent processing of socioemotional information, reinforcing misunderstandings and contributing to the link between lower attention regulation and lower internal locus of control. A history of faulty information processing, regardless of its causes, reinforces incomplete or distorted sets or schemas that, in turn, bias subsequent information processing. Influences of locus of control beliefs on responses are understood as outgrowths of prior encounters (person of context), under various conditions of performance (person in context) in which multiple psychological phenomena jointly shape responses (person as context).

Personal schemas, including locus of control beliefs, come in two forms, mirroring the distinction between explicit and implicit versions of psychological constructs detailed earlier. Accordingly, the explicit version of internal locus of control may be high (e.g., endorsing questionnaire items or responding to interview questions), even if typical behavior or responses to performance measures are devoid of a sense of personal agency (inaction in the face of stress, lack of initiative).

The Case of Jan

Although it is not intended as a comprehensive clinical evaluation, this case example demonstrates (a) the importance of assessing both implicit and explicit stances on life and performance under maximal and typical performance conditions, in both social and nonsocial arenas; and (b) synthesis of information relevant to the presenting concerns by using the extension of Lewin's formula.

Jan, a fifth grader, was described by her parents as having been a stellar student until the previous year, when her academic work and her motivation began to slide. Increasingly, Jan put off doing homework assignments until a parent was available to provide guidance; manifested anxiety about school, including stomach pains, and wanted to avoid going; and had difficulty sleeping the night before a test she perceived as consequential to her grades or placement decisions. A psychological and educational evaluation showed a contrast between Jan's performance under maximal and typical conditions, as well as discord between her explicit and implicit achievement motivation. Jan performed quite well (high average) under maximal conditions, such as on IQ tests and on structured measures of memory and attention. However, Jan faltered under typical conditions that required her to anticipate, plan ahead, and organize her responses, such as telling stories about TAT cards or facing day-to-day challenges of academic tasks that require sustained independent effort. Likewise, in social interactions with peers, Jan was more comfortable with structured games or activities than with unscheduled time.

A split between explicit and implicit aspects of Jan's motivational schemas is relevant to the referral concerns. Through her responses to the clinical interview and incomplete sentences, Jan explicitly stated her desire to get As in school and to get a good education, describing herself as an excellent student and as making mature choices such as persisting on tasks over fun activities. Jan expressed admiration of her parents, particularly of their high level of education, and appreciation of their help in steering her to set proper goals. In contrast, the characters in Jan's stories told to TAT pictures were preoccupied with achievement outcomes and with meeting others' expectations but regarded the work involved as onerous. Rather than setting alternative goals, seeking support, or devising strategies to manage the demands, story characters remained stuck, either resolving to do better with no plan, giving up their current happiness to meet others' demands, or deciding to abandon obligations in favor of having fun. The difficulties Jan's characters face in sizing up and balancing the internal and external roots of a dilemma and resolving the issues set before them are paralleled by Jan's avoidance of conflict, evident in her ignoring the tensions portrayed in some of the TAT pictures. Jan's tendency to think dichotomously (either–or) and reluctance to face sources of tension (e.g., ignoring conflict portrayed through facial expression and body language on TAT Card 4, instead describing characters in cooperative give and take) limit her problem solving, particularly in contexts she perceives as ambiguous.

The gap between Jan's low implicit and high explicit motivational schemas, evident in the contrast between her coded stories (see Teglasi, 2010, for coding system) and her self-report, may be traced to Jan's developmental history. In her early schooling, Jan was a very successful student, due in part to her strong memory. She basked in her family's praise and obvious pride in her accomplishments. However, her continued emphasis on rote learning has not been sufficient to meet growing expectations in her school setting to organize what she learns to solve complex, multistep problems and complete writing assignments, ranging from short essays to book reports. A number of other factors impede Jan's academic progress and contribute to her sense of frustration, which undermines her implicit motivation. During the evaluation, for instance, Jan had difficulty distinguishing important information from what was not central when reading a passage (despite her high vocabulary scores), and her problem solving was based on inflexible either–or mental sets. Her reluctance to tackle homework independently likely stems from not knowing how to approach the tasks and not knowing what questions to ask to move forward independently. Jan relies on sources of regulation that are extrinsic to the activity, such as incentives (i.e., approval, good grades, and support for her identity) and structure (i.e., specific guidance for how to do the school work).

The psychological distress associated with the rift between Jan's explicit and implicit achievement motivation is exacerbated by the widening gap between them. She is becoming increasingly insecure about meeting day-to-day demands and experiencing frustration, somatic symptoms, and negative feelings about school. The discord between Jan's explicit and implicit achievement motives is so salient that it infuses her sense of relatedness to others. Although Jan explicitly understands her parents' affection as a given, she implicitly experiences their approval as conditioned on high academic achievement. Her implicit schemas about relationships dichotomize individuals as providing or not providing what is wanted or as placing or not placing inordinate burdens. As Jan applies these schemas to the appraisal of interactions, she evaluates others in these dichotomous categories rather than as having individualistic, psychological processes. In contrast, her explicit schemas of relationships show a positive view of others and appreciation of the help and good advice they provide.

The issue for Jan is one of sustainability of the status quo. Currently, she is receiving good grades with a great deal of parental and teacher support, but at some point her positive motivations at the explicit level may be undermined by her implicit sense of self as burdened by tasks that hold little meaning. There is a widening gap between her explicit self-definition and her schemas capturing the realities of her day-to-day experiences. In her self-report, Jan explicitly expressed a far greater degree of agency to take initiative and to solve problems (the conventional attitude, more consistent with her performance under maximal conditions) than she displayed in her daily life and in her performance during measures that required her to generate and organize ideas.

Table 3 summarizes the functions of schemas and specifies how each is related to Jan's information processing under maximal and typical performance conditions. When faced with complexity or ambiguity, Jan tends to rely more on intact schemas than on a synthesis of ideas drawn from her storehouse of knowledge. She imposes simplified, either–or categories to interpret information (things are easy or burdensome). These all-or-none schema categories leave Jan stuck in the here and now, experiencing frustration and other negative emotions without being able to get beyond this rut. The dualistic schema categories are consistent with the content of her schemas, particularly her working assumption that the world either imposes undue burdens that she is unable to manage (hence her insecurity, anxiety, and avoidant behaviors) or lets her have fun.

Summary and Conclusions

Lewin's formula, extended by adding two interaction terms, provides a general framework to express relations between ideas, akin to the structure of a simple sentence made up of a noun and a verb. To use the elements of the sentence, one selects the appropriate words to stand in for the noun and verb, introducing complexities such as modifiers and subordinate clauses as needed. To use the elements of the formula, one selects the relevant psychological constructs (P), obtains information from various informants and from performance measures that set demands analogous to real world contexts (E),[5] and specifies relevant interactions (P × E; P × P). One also adds complexities as needed, such as the potential impact on performance of the examinee's state (upset, fatigued).

Factors to consider when synthesizing assessment data from multiple measures, informants, and time frames (current and historical) are presented in Table 4, which includes implicit and explicit versions of constructs under maximal and typical performance conditions, in both social and nonsocial contexts. Case validity depends on delineating the relevant P and E variables and of the P × E and P × P interactions, selecting appropriate measures, and synthesizing conclusions based on accurate context-specific interpretation of each measure, in light of the others.

On a case by case basis, assessors choose the particular constructs to be addressed. We specify the following in Table 4 because of their relevance to our case example: thinking and reasoning; attainment in educational or other life settings; self-regulation of attention, emotion, and behavior; motivation; and interpersonal relatedness. The template suggested in Table 4 may

be used to generate a working model of the person in, as, and of context to address the concerns prompting the evaluation.

Person in Context

Tests are analogs to real life conditions, providing occasions to observe the causal influences of phenomena on responses that are relevant to specific contexts. Assessors take stock of constructs such as those listed in Table 4, using measures that set performance demands that are analogous to those of the life conditions to which the constructs are expected to generalize. In so doing, each construct is referenced to maximal and typical performance conditions of settings or tasks such as structure, novelty, ambiguity, complexity, incentives, prompts, or predictability, with due consideration given to temporary states that influence performance (e.g., fatigue, emotional distress). Agreement among various informants observing an individual tends to be low, and one explanation may be that their ratings pertain to different conditions.[6] In the case example, Jan's performance varied dramatically across maximal and typical conditions.

Person as Context

Within an individual, each of the various attributes derives its significance in reference to the whole person. How an individual meets day-to-day demands depends not only on having the requisite skill and knowledge to tackle a given task under maximal conditions but also on motivation, tolerance for frustrations, recovery from setbacks, and other self-regulatory assets that are often more salient in typical conditions. Therefore, all of the constructs listed in Table 4, including their explicit and implicit versions, are viewed as interacting within the person as the context for their interplay. Assessors consider the joint implications of all of the relevant psychological constructs to understand the responses of an individual under specified circumstances. The discord between Jan's explicit and implicit personal schemas mirrors the discrepancies in her performance across maximal and typical contexts and gives rise to tensions that are likely to escalate, particularly in light of increasing expectations to handle academic and social challenges more independently. Other psychological phenomena impede Jan's academic progress and social adjustment, thereby contributing to her sense of frustration and undermining her implicit motivation. Despite high vocabulary scores, Jan's comprehension of reading passages suffers due to her difficulty differentiating what is more from what is less central to the overall theme.

Person of Context

Psychological constructs, as measured by tests and observed in current life contexts, have a developmental history, and influence future development. The schemas are essential to assessment of the person of context because they comprise the individual's repertoire

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[5] These include behavioral observations in specific settings and observations about the qualities of responses when performing assessment tasks or interacting with the examiner.

[6] Informant agreement is low for a variety of reasons (for a review, see De Los Reyes & Kazdin, 2005).

Table 3

Function of Schemas and Their Applications to Jan's Case

Function of schema	Description	Application to Jan's case
Tells us what to expect.	Observations of regularities of prior experience provide mental models of ongoing situations to inform what is expected (Schank, 1990).	Because Jan has experienced more frustration and less success in open ended situations, her schemas for what to expect vary across these two contexts. Her default schemas under conditions of uncertainty, assessed with the Thematic Apperception Test (TAT; Teglasi, 2010), reflect her problem-solving limitations, which contribute to differential experiences across contexts (e.g., poor planning and monitoring of the cause–effect sequences of the narrative and characters' failure to use appropriate means to attain desired ends).
Fills in what is missing.	Mental models include categories for information processing (Srull & Wyer, 1979) that are place holders for missing information, allowing individuals to detect gaps and raise questions or to make assumptions, automatically filling in what is missing (e.g., linking causes with effects).	Jan's default schemas in ambiguous situations are not sufficiently developed to include categories for coping with uncertainty or to point her to specific information that is missing. In the absence of such categories, she is unable to generate plans to accomplish complex, multi-step academic tasks or to formulate questions to seek assistance. In her TAT stories, her ideas are organized by known scripts or as either–or dualities (being reminded of an opposite idea).
Guides attention.	Categories built into schemas point to salience of information, enabling selective attention/inattention to process what is important (foreground) and to ignore what is not (background).	Jan's overreliance on her memory, without gaining the flexibility to adapt what she knows to new situations, leaves her unsure of what is important as the focus of attention unless the task/situation is well defined or external guidance is provided.
Speeds processing.	Schema operations such as filling in what is missing and selective attention often occur automatically, freeing up resources to expend effort on new learning. Individuals are limited in the exertion of concentrated effort (Hagger, Wood, Stiff, & Chatzisarantis, 2010). Accurate schemas that automate the use of prior knowledge not only speed information processing but save energy for new learning. However, if schemas are not accurate, effort is required to override automatic tendencies (MacDonald, 2008).	Jan's processing is quick and efficient in unequivocal contexts where she can rely on her well-learned scripts but falters in contexts that require her to interpret new information. One of the presenting concerns involves Jan's difficulty in completing tasks/tests within the allotted time. However, in the absence of a strategy for approaching the task, extra time and effort have not been effective, leaving her feeling burdened and tired, without understanding how her efforts can bring about desired outcomes.
Moderates emotions.	The emotional reaction evoked by an experience depends on how that experience is appraised, and appraisals are guided by schemas (Lazarus, 1991). To the extent that schemas provide the big picture for framing an adverse situation, including possibilities for coping, the emotional reaction is moderated or even preempted (Gross, 1998).	In processing day-to-day experiences, Jan imposes dichotomies that are salient to her (such as success vs. failure and having fun vs. being burdened). The dichotomous categories of Jan's schemas evident in her TAT stories are, in part, products of her contrasting experiences of well-defined and ill-defined contexts. Her schema guided appraisals impose either–or categories without encompassing intermediate possibilities, such as overcoming uncertainty/distress by strategies that include planning or seeking assistance. The result is that Jan's emotions shift back and forth according to immediate presses (happy when receiving positive feedback and stymied/helpless when she is uncertain). Parallel to those of TAT story characters, Jan's coping strategies are geared to relieving tension in the moment (e.g., hoping for a change in external circumstances, resolving to do better but without knowing how, deciding to reject the imposed burdens but without any alternatives).
Facilitates communication.	Tacit understandings (similar mind-sets; shared assumptions) about what to expect, housed in the schemas (social/cultural or personal), ease communication, reducing the need for explicit explanations. On the other hand, communication among individuals with different schemas about a situation requires care and patience to clarify tacit assumptions and avoid misunderstandings. Communication involves both explicit and implicit schemas.	The discord between Jan's implicit and explicit schemas complicates communication. Jan's explicit schemas at the time of the evaluation were in accord with her desire to meet her family's expectations that she work hard and show responsibility by taking initiative rather than merely following instructions. She openly shared her explicit but not her implicit motivational schemas with her parents and with the assessor.

Table 4
Template for Organizing Assessment Data

Construct	Person	Environment
Cognition/information processing	Working memory, reasoning, attention, decision making, insight, flexibility	Cognitive processes under conditions that present well-defined problems with a limited number of correct solutions (e.g., IQ tests, SATs) are compared with cognitive processes under conditions that are equivocal as to the correct solution with many possible approaches (e.g., personality performance tests, many real-life situations).
Accomplishments	Skills/knowledge, educational/occupational attainments	Historical data about accomplishments and current attainment are differentiated according to relevance to maximal and typical performance conditions or to nonsocial and social contexts.
Self-regulatory schemas	Attention, emotion, behavior, physiological states such as sleep	Patterns of self-regulation of attention, emotion, behavior, and physiological states are differentiated according to settings/tasks that vary in availability of external sources of self-regulation. Implicit and explicit versions of self-regulatory schemas are similarly viewed in context. Reference points of informants with respect to maximal–typical conditions are taken into account.
Motivational schemas that drive actions	Achievement, affiliation, aggression, self-esteem maintenance	Influences of both implicit and explicit versions of motivational schemas are considered in accord with maximal and typical conditions in nonsocial and social contexts.
Relatedness to others	Mental models of relationships	Explicit, verbally constructed views of the self and others are compared with implicit mental models of relatedness.

Note. Person refers to inherent psychological constructs at play. Environment refers to contexts relevant to both testing and the real world (i.e., typical–maximal, implicit–explicit, social–nonsocial, and emotional–neutral stimulus, or client's inner states such as fatigue, upset).

of knowledge structures as products of prior synthesis of P × E encounters that drive current P × E interactions, thereby setting the path of future development. Jan's problem-solving schemas are not sufficient in complexity and organization to enable her to apply her knowledge to complete school assignments or even to formulate specific questions to seek direction. She sizes up each experience as imposing harsh demands or as permitting fun and relaxation.

Individuals are not referred for a psychological evaluation because of maladaptive schema qualities but because of the four *D*s characterizing dysfunction: *discrepancy* from expectations, evident in performance falling short of standards in various domains such as academic, employment, or interpersonal arenas; *dysregulation* of behavior, emotional expression, or attention (such as intense, inappropriate emotion to minor irritation or inattention that impedes functioning); *distress*, as evident in negative emotions, somatic symptoms, or self-harm*;* and *disruption/disturbance* caused to society by behaviors such as the violation of social norms, including disregard of the rights or property of others (bullying, stealing). Jan was not referred because of concerns about her schemas but because her test scores fell short of parental expectations (discrepancy); she did not complete homework independently (dysregulation), and she was experiencing somatic symptoms, test anxiety, and frustration with school work (distress). Yet, to understand Jan as a whole person in, as, and of contexts, it is necessary to delve beyond the *D*s to consider her schemas in

reference to the presenting concerns, keeping in mind that implicit and explicit schemas differ in their developmental pathways and in how they are maintained or changed through ongoing exchanges with various contexts, ranging from well defined (maximal) to ill defined (typical).

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