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Getting Explicit About the Implicit: A Taxonomy of Implicit Measures and Guide for Their Use in Organizational Research

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Abstract

Accumulated evidence from social and cognitive psychology suggests that many behaviors are driven by processes operating outside of awareness, and an array of implicit measures to capture such processes have been developed. Despite their potential application, implicit measures have received relatively modest attention within the organizational sciences, due in part to barriers to entry and uncertainty about appropriate use of available measures. The current article is intended to serve as an implicit measurement "toolkit" for organizational scholars, and as such our goals are fourfold. First, we present theory critical to implicit measures, highlighting advantages of capturing implicit processes in organizational research. Second, we present a functional taxonomy of implicit measures (i.e., *accessibility-based*, *association-based*, and *interpretation-based* measures) and explicate assumptions and appropriate use of each. Third, we discuss key criteria to help researchers identify specific implicit measures most appropriate for their own work, including a discussion of principles for the psychometric validation of implicit measures. Fourth, we conclude by identifying avenues for impactful "next-generation" research within the organizational sciences that would benefit from the use of implicit measures.

Keywords

implicit measures, indirect measures, nonconscious processes, automaticity

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One strength of organizational scholarship is its openness to adopting method and theory from other disciplines (as evidenced by this special issue). In particular, the fields of organizational behavior (OB) and industrial/organizational psychology (I/O) have benefitted greatly from social and cognitive psychology. Yet organizational scholars have largely underutilized a highly impactful discovery in those two areas: nonconscious processes and the implicit measures developed to capture them.[1] Despite their limited use, implicit measures hold great promise for organizational research because many phenomena of interest operate outside employees' complete awareness and control. Research shows that people have difficulty accurately identifying the influences on their attitudes and decisions, indicating severe limits to the accuracy of conscious introspection (Nisbett & Wilson, 1977; Wilson, 2002; Wilson & Brekke, 1994; Wilson, Dunn, Kraft, & Lisle, 1989). At the same time, the nonconscious activation of concepts has powerful downstream effects on behavior, suggesting that much of human action is triggered automatically (Dijksterhuis & Bargh, 2001). As examples, implicitly activated achievement goals elicit higher levels of job performance (Shantz & Latham, 2009), and implicitly activating imagery related to business (e.g., briefcases) leads to diminished cooperation in economic games (Kay, Wheeler, Bargh, & Ross, 2004). Thus, it is not surprising that measures of implicit attitudes predict a wide range of social judgments and behaviors, in some cases more effectively than consciously self-reported attitudes do (Fazio & Olson, 2003; Greenwald, Poehlman, Uhlmann, & Banaji, 2009).

Failure to use implicit measures therefore creates a disconnect between theory and methods when variables theorized to operate partly at nonconscious levels are assessed using measures that require effortful and introspective thought, such as traditional self-report surveys with Likert-type response scales (Johnson & Tan, 2009). Such a disconnect may lead to incomplete, biased, or even misleading conclusions. The use of implicit measures also has specific advantages. For example, the lack of transparency or controllability inherent in such measures lessens the ability of participants to intentionally distort their responses due to social desirability or other motives. These and other advantages are discussed later in this article.

Interest in the unconscious can be traced back to Sigmund Freud and the psychodynamic paradigm, which inspired projective measures such as the Rorschach inkblot test (Rorschach, 1927) and Thematic Apperception Test (TAT; Morgan & Murray, 1935). These measures (which are likely familiar to the reader) rely on a subject's attempt to impose structure on ambiguous stimuli (Anastasi & Urbina, 1997). Organizational scholars have some history of studying implicit traits using projective measures such as the TAT (e.g., McClelland & Boyatzis, 1982), but that interest has been limited due to controversies about the psychometric properties and validity of the measures (Lilienfeld, Wood, & Garb, 2000). Although our review addresses these traditional projective measures, we focus primarily on more modern and better validated approaches to capturing implicit processes, with roots established in social cognition (Fiske & Taylor, 1991). As such, this new paradigm is grounded in the need to maintain positive self-regard, identification with social groups, and evaluations of social targets. For example, when classic psychodynamic constructs are revisited under this new paradigm, they are invoked through a social cognitive lens; new implicit measures that implicate defense mechanisms highlight their role in protecting one's self-concept, rather than subordinating sexual impulses. Furthermore, scholars have rejuvenated the study of the nonconscious with heightened methodological rigor. The majority of modern implicit measures rely upon behavioral response-time indices or items with standardized (i.e., quantitative) measurement, rather than subjective codings with questionable psychometric properties. Thus, with a firmer theoretical grounding and improved tools in place, organizational scholars are well positioned to benefit from ''rediscovering'' the nonconscious.

Although many organizational scholars are likely familiar with some contemporary implicit measures, we believe that uncertainty about the appropriateness of their use, questions about start-up costs, misconceptions about their theoretical lineage, and mistaken assumptions about the domains

for which they are appropriate (e.g., biases of social judgment only, such as race or gender stereotypes) may have limited their use in organizational research. In this article, we seek to change these assumptions and reduce these barriers to entry.

Like others (e.g., Bing, LeBreton, Davison, Migetz, & James, 2007; Haines & Sumner, 2006; James & LeBreton, 2011), we believe implicit measures hold great promise for research in organizations. Indeed, recent applications of implicit measures toward novel ends within organizational research (e.g., Bing, Stewart, et al., 2007; Johnson & Lord, 2010; Reynolds, Leavitt, & Decelles, 2010) have raised new opportunities and avenues not considered in prior reviews. The aim of this article is to produce actionable knowledge for organizational scholars to incorporate such measures in their work. To this end, we begin our article with a brief introduction to implicit processes and measures and suggest practical advantages for including them within organizational research. We then present a comprehensive taxonomy of implicit measures and further evaluate each measure based on its strengths, weaknesses, and degree of flexibility.

Although prior reviews have focused on issues related to implicit/explicit measurement (e.g., Bing, LeBreton, et al., 2007; Haines & Sumner, 2006), we expand on this earlier work in key ways. First, we evaluate a far larger number of implicit measures along a wider range of criteria. For instance, Haines and Sumner (2006) focused primarily on the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) whereas Bing, LeBreton, et al. (2007) reviewed four well-known measures, which included conditional reasoning tests (James & LeBreton, 2011; James, McIntyre, Glisson, Bowler, & Mitchell, 2004), the IAT, and Thematic Apperception Test (McClelland & Boyatzis, 1982; Morgan & Murray, 1935). In contrast, we cover nearly two dozen implicit measures, including less familiar measures like partially structured self-concept measures (Vargas, Von Hippel, & Petty, 2004) and lexical decision tasks (Duchek & Neely, 1989; Kunda, Davies, Adams, & Spencer, 2002). Unlike prior reviews, we present principles for the psychometric validation of implicit measures and discuss the psychometric properties of an array of such measures. Furthermore, we discuss key theoretical and practical considerations that can be used by researchers to determine which specific measures are most appropriate for their respective research questions and how they might be best applied. To this end, we present a functional taxonomy that distinguishes implicit measures that are accessibility-based, association-based, and interpretation-based and outline when each is most useful for organizational research.

In addition, we cover a broader range of research questions that can be addressed using implicit measures. These issues range from existing paradigms (e.g., improving prediction by explaining variance in relevant outcomes above and beyond explicit measures; Johnson, Tolentino, Rodopman, & Cho, 2010) to impactful "next-generation" ideas (e.g., interactions and dissociations between implicit and explicit phenomena; Leavitt, Fong, & Greenwald, 2011). If implicit and explicit cognitions operate in an additive fashion, then one's model of organizational behavior is underspecified when implicit processes are omitted. But just as importantly, if implicit and explicit processes operate in an interactive fashion, then it is inappropriate to even interpret a main effect for either explicit or implicit variables without considering their effects in tandem. It is only by including and integrating both implicit and explicit processes that we obtain a complete picture. Although implicit-explicit interactions have received some attention in the organizational literature (Bing, Stewart, et al., 2007; Leavitt, Fong, et al., 2011), the present review outlines a far broader range of ways in which implicit and explicit cognitions can interact with one another to influence organizationally relevant outcomes, among these iterative processes that play out over time.

Critically, employing implicit measures is not appropriate for every construct in organizational research, and constructs that are theorized to operate through conscious deliberation should still be measured through self-report methodologies. Implicit measures are neither a panacea nor a suitable substitute for appropriately used explicit measures. However, there is accumulated evidence that for many domains of inquiry, among these attitudes (Leavitt, Fong, et al., 2011), personality and

self-concept (Bing, Stewart, et al., 2007; Johnson & Saboe, 2011), beliefs (Reynolds et al., 2010), and affect (Johnson et al., 2010), including both implicit and explicit measures yields better prediction and understanding of important work outcomes. With our criteria and recommendations in hand, scholars can readily respond to calls for research on implicit processes in organizations (e.g., Barsade, Ramarajan, & Westen, 2009; George, 2009; Latham, Stajkovic, & Locke, 2010).

A Primer on Implicit Processes and Measures

The Implicit/Explicit Process Distinction

Organizational researchers have largely worked under the assumption that the attitudes and behaviors of organizational actors are deliberate enough to be reportable and bound to conscious control. In recent years, however, social and cognitive psychologists have shown that many behaviors result from processes that operate with limited conscious control and in some cases entirely outside conscious awareness (for reviews, see Dijksterhuis & Bargh, 2001; Greenwald & Banaji, 1995). These *implicit processes* are intuitive, spontaneous, unintentional, and in some cases even unconscious (Bargh, 1994; Greenwald & Banaji, 1995; Shiffrin & Schneider, 1977; Wegner & Bargh, 1998; Wilson, 2002). They generally pertain to a broad set of attitudes (Greenwald & Banaji, 1995), stereotypes (Rudman, Greenwald, & McGhee, 2001), motivations (Bargh & Chartrand, 1999; James & LeBreton, 2011), and assumptions (Von Hippel, Sekaquaptewa, & Vargas, 1997) that cannot be captured through traditional self-report methodologies. To give one example of an illustrative study, Hofmann, Rauch, and Gawronski (2007) show that positive automatic associations with candy predict consumption behavior best when consumers' capacity to consciously control their behavior is depleted (i.e., they are mentally exhausted). Many characteristics of typical jobs (e.g., routine tasks, high cognitive load) exacerbate the likelihood that implicit processing is pervasive in organizational life (Johnson & Steinman, 2009).

Implicit processes have been theorized to reflect an underlying experiential system that incrementally accumulates statistical regularities over time (Epstein & Pacini, 1999). Although the implicit system is slow learning (i.e., requiring numerous experiences to produce an "on average" knowledge base; McClelland, McNaughton, & O'Reilly, 1995), it has the advantages of being fast acting (i.e., processing occurs in parallel and in millisecond cycles; Lord, Diefendorff, Schmidt, & Hall, 2010) and requiring few cognitive resources to function. Extant work supports such a "dual process" model of explicit and implicit cognition, wherein the two sets of processes operate in parallel to one another (Fazio & Olson, 2003; Strack & Deutsch, 2004).

Further evidence of implicit/explicit independence is demonstrated by the fact that implicit and explicit processes are associated with different underlying neurocognitive systems. Neurological research (using techniques like functional magnetic resonance imaging [fMRI]) shows that implicit cognitions are generally processed in cortical areas associated with automatic somatic and affective systems (e.g., the basal ganglia, amygdala, and lateral temporal cortex), whereas explicit cognitions are processed in areas associated with deliberation and executive control (e.g., medial and lateral prefrontal cortex, medial and lateral parietal cortex, medial temporal lobe; Lieberman, 2007; Lieberman, Gaunt, Gilbert, & Trope, 2002).

Although the neurological data support the hypothesis that implicit and explicit cognitions are based in different brain areas and underlying psychological processes, it does not constitute direct evidence that implicit processes operate outside of conscious control. Stronger evidence of this is provided by studies showing that while explicit cognitions are influenced by cognitive and motivational forces like social desirability and evaluation apprehension, implicit processes are far less subject to deliberative influences (for reviews, see Fazio & Olson, 2003; Gawronski & Strack, 2004; Greenwald & Banaji, 1995; Greenwald & Nosek, 2008). Furthermore, implicit measures

generally predict variance in their respective criteria above and beyond that explained by parallel self-report measures (Fazio & Olson, 2003; Greenwald, Poehlman, et al., 2009; James & LeBreton, 2011; Johnson et al., 2010).

Given that processing at implicit and explicit levels is distinct, novel insights are likely to emerge by investigating implicit processing in organizational domains. Thus, with an understanding of the unique properties of implicit processes in mind, we now turn our focus to the implicit measures that have been developed to capture them.

Characteristics and Advantages of Implicit Measures

All implicit measures minimize people's awareness of what is being measured, or their ability to control their responses, or both. Thus, the goal in designing implicit measures is to obviate high levels of conscious processing and obtain information on intuitive, spontaneous, unintentional, and/or unconscious processes that influence judgments and behavior (Barsade et al., 2009; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; James, 1998; James & LeBreton, 2011). Responses on implicit and explicit measures are themselves, of course, both constrained by implicit and explicit processes, prohibiting "process pure" measures (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005). For example, insofar as all measures have to go through some kind of conscious attentional filter (e.g., reading the word stimuli), there is an explicit aspect to the processing that occurs, and individuals can in some cases attempt to override their automatic responses. However, implicit measures capture a far greater proportion of implicit processing compared to explicit measures.

Implicit measures are most useful (and may in fact be necessary) when the phenomena under investigation are believed to operate partly or primarily at nonconscious levels, or are so fundamental that they do not lend themselves easily to introspection (e.g., power motives, taken-for-granted assumptions). In these cases, people lack accurate insight about such phenomena. The use of implicit measures, then, overcomes the disconnect between theory and methods that occurs when measures designed to capture explicit processes are applied to implicit phenomena.

Use of implicit measures is also critical when participants are unwilling to admit their attitudes to others, or even to themselves. Some implicit measures have been shown to resist attempts at deliberate faking, in part because they are designed to capture processes that are difficult to consciously control (Asendorpf, Banse, & Mücke, 2002; LeBreton, Barksdale, Robin, & James, 2007; Steffens, 2004). As such, they are especially useful in situations where evaluation apprehension is likely, such as measuring satisfaction with one's job or supervisor in a study sponsored by the organization (Leavitt, Fong, et al., 2011), when assessing personality in selection settings (James, 1998), or when reporting race and gender attitudes (Scott & Brown, 2006). Furthermore, implicit measures would also be useful under conditions where self-deception is likely to influence self-reports. For example, employees who are highly embedded (i.e., feel "stuck") in their jobs may adjust their job attitudes for the sake of self-protection and relieving any experience of dissonance. Thus, sensitive domains would especially benefit from the inclusion of implicit measures.

In addition, implicit measures are useful in domains where any unique variance explained in the criterion is critical, as is the case with job performance, which can translate to revenues generated or lives saved. Implicit attitudes frequently predict unique variance in their respective criteria above and beyond their explicit counterparts (Greenwald, Poehlman, et al., 2009). Although predicting incremental variance may be less theoretically satisfying than pursuing new areas of inquiry, organizations benefit greatly when absenteeism, turnover, and counterproductive work behavior are reduced and performance, identification, and well-being are enhanced. There is also evidence that implicit measures predict incremental variance in criteria data collected from different sources (e.g., performance data provided by supervisors; Johnson et al., 2010; Johnson & Saboe, 2011), implying that implicit processes drive behavior observable to others as well.

Still other reasons for using implicit measures are more methodological in nature, among them an increased ability to detect disengaged respondents. Many implicit measures offer built-in disqualification criteria useful for discarding data from participants who do not understand or are not sufficiently engaged in the study, which is likely when using paid online or student subject pools. For example, haphazard responding on implicit measures that collect reaction time data can be identified by extremely fast or slow response latencies. By contrast, if a respondent has low variance on an explicit measure (e.g., answering close to the midpoint across all Likert-type scale items), it is not clear whether the respondent "pencil-whipped" the task or simply had genuinely consistent responses to all of the items. Many implicit measures allow for clear a priori disqualification criteria, which can be extended to remove poor data from all analyses in a study. For example, error rates above 40% on dichotomous rapid response tasks (e.g., the IAT and lexical decision task) suggest a lack of engagement or a failure to understand the instructions (chance responding alone would produce an error rate of 50%). Similarly, scores below 15% correct on word completion tasks are often discarded due to low engagement or insufficient language ability (Johnson & Saboe, 2011; Koopman, Howe, Johnson, Tan, & Chang, in press). Also, conditional reasoning tests (James et al., 2004; James & LeBreton, 2011) have a validity check in the form of distractor response analyses. If respondents regularly select illogical answers, then their test is not used because it is inferred they either were failing to take the test seriously (i.e., were disengaged) or had difficulty reading the English language. As such, simply including an implicit measure in a study can reduce analytic noise by providing a standard and objective criterion to identify and exclude disengaged participants.

The combination of these strengths suggests that implicit measures may often be extremely useful in organizational settings, and a handful of studies to date have made effective demonstrations of implicit effects in organizational research. Listed in Table 1 are studies published as of July 2011 in common organizational behavior and applied psychology journals that examine organizationally relevant phenomena using implicit measures. As can be seen in the table, the majority of recent studies have used the IAT (Greenwald et al., 1998) and conditional reasoning tests (James et al., 2004; James & LeBreton, 2011), yet these are but two examples of the many options that are available. In the next section, we present a new functional taxonomy of implicit measures, focusing on the most commonly used, valid, and/or feasible measures from each category.

A Functional Taxonomy of Implicit Measures

A plethora of implicit measures have been developed over recent years, and so one of the challenges for organizational researchers is to navigate the differences between them. We have developed a functional taxonomy that clusters the available implicit measures into three categories, based on what specific implicit content they are intended to tap. *Accessibility-based measures* assess the extent to which an individual target concept is spontaneously activated in a person's mind (i.e., whether a *single* concept is currently activated in memory). *Association-based measures* ascertain whether several targets are linked in stored memory (i.e., whether *multiple* concepts are connected as part of a cognitive schema). Finally, *interpretation-based measures* assess reactions to and inferences drawn from complex and ambiguous information. Although interpretations of complex information are based partly in accessible concepts and associations, in theory such measures are capable of capturing deeper motives that are not fully reducible to such simple cognitive structures. In theory, fundamental motives and complex worldviews are "projected" onto the ambiguous stimuli (which can be written vignettes or images), profoundly shaping the interpretations drawn about them.[2]

We present the available implicit measures in each category in Table 2, along with overview information (source citations, a brief description of the procedure, presumed theoretical mechanism underlying responses), psychometric criteria (reliability, predictive validity, correlations with

Table 1. Examples of Organizationally Relevant Empirical Research That Utilizes Implicit Measures

Authors	Journal	Implicit Measure	Implicit Construct	Criterion
Bing, LeBreton, Davison, Migetz, and James (2007)	*Organizational Research Methods*	Conditional Reasoning Test	Achievement motivation	Task performance
Bing, Stewart, et al. (2007)	*Journal of Applied Psychology*	Conditional Reasoning Test	Aggression	Workplace deviance Organizational citizenship behavior
Brunstein and Maier (2005)	*Journal of Personality and Social Psychology*	Thematic Apperception Test	Achievement motivation	Task performance Task continuation
Derous, Nguyen, and Ryan (2009)	*Human Performance*	Implicit Association Test	Racial attitudes	Racial discrimination in selection context
Frost, Ko, and James (2007)	*Journal of Applied Psychology*	Conditional Reasoning Test	Aggression	Overt and passive aggressive behavior
Hekman et al. (2010)	*Academy of Management Journal*	Implicit Association Test	Gender and racial prejudices	Customer satisfaction
James et al. (2005)	*Organizational Research Methods*	Conditional Reasoning Test	Aggression	Job performance Counterproductive work behavior Absenteeism Voluntary turnover
James, McIntyre, Glisson, Bowler, and Mitchell (2004)	*Human Performance*	Conditional Reasoning Test	Aggression	Job performance Absenteeism Attrition
Johnson and Lord (2010)	*Journal of Applied Psychology*	Word Completion Task (WCT) Letter Identification Task	Self-identity	Trust Cooperation Theft
Johnson and Saboe (2011)	*Organizational Research Methods*	Word Completion Task	Self-identity	Task performance Organizational citizenship behavior Counterproductive work behavior Leader-member exchange
Johnson and Steinman (2009)	*Canadian Journal of Behavioural Science*	Word Completion Task	Regulatory focus	WCT was the dependent measure
Johnson, Tolentino, Rodopman, and Cho (2010)	*Personnel Psychology*	Word Completion Task	Trait affectivity	Task performance Organizational citizenship behavior Counterproductive work behavior
Kay and Jost (2003)	*Journal of Personality and Social Psychology*	Lexical Decision Task (LDT)	Justice	LDT was the dependent measure
Leavitt, Fong, and Greenwald (2011)	*Journal of Organizational Behavior*	Implicit Association Test	Job satisfaction	Task performance Organizational citizenship behavior

(continued)

Table 1. (continued)

Authors	Journal	Implicit Measure	Implicit Construct	Criterion
Leroy (2009)	*Organizational Behavior and Human Decision Processes*	Lexical Decision Task	Residual attention to interrupted work task	LDT was the dependent measure
McClelland and Boyatzis (1982)	*Journal of Applied Psychology*	Thematic Apperception Test	Achievement motivation	Managerial advancement
Miner, Chen, and Yu (1991)	*Journal of Applied Psychology*	Sentence Completion Task	Motivation to manage	Career success
Miner and Raju (2004)	*Journal of Applied Psychology*	Sentence Completion Task	Risk propensity	Entrepreneurial employment Growth strategy
Miner, Smith, and Bracker (1989, 1994)	*Journal of Applied Psychology*	Sentence Completion Task	Task motivation	Firm growth
Reynolds, Leavitt, and DeCelles (2010)	*Journal of Applied Psychology*	Implicit Association Test	Morality of business	Unethical behavior
Ritter, Fischbein, and Lord (2006)	*Human Relations*	Stroop Task	Injustice	Expectations for unfair treatment
Rooth (2010)	*Labour Economics*	Implicit Association Test	Racial attitudes	Racial discrimination in selection context
Rudman and Glick (2001)	*Journal of Social Issues*	Implicit Association Test	Gender stereotypes	Gender discrimination in selection context
Rudman and Heppen (2003)	*Personality and Social Psychology Bulletin*	Implicit Association Test	Romantic ideals	Income and occupational preferences
Scott and Brown (2006)	*Organizational Behavior and Human Decision Processes*	Lexical Decision Task	Leadership prototype	Gender bias in leadership prototypes
Von Hippel, Brener, and Von Hippel (2008)	*Psychological Science*	Implicit Association Test	Drug-use prejudice	Turnover intentions
Yogeeswaran and Dasgupta (2010)	*Personality and Social Psychology Bulletin*	Implicit Association Test	Racial attitudes	Racial discrimination in selection context
Ziegert and Hanges (2005)	*Journal of Applied Psychology*	Implicit Association Test	Racial attitudes	Racial discrimination in selection context

Table 2. Taxonomy of Implicit Measures

	Accessibility-based Measures		
Criteria	Lexical Decision Task	Word Fragment Completion Task	Modified Stroop Task
Reference	Martin and Tesser (1996); Meyer and Schvaneveldt (1971)	Warrington and Weiskrantz (1970, 1974)	Mathews and MacLeod (1985); Stroop (1935)
Description	Participants indicate whether a letter string is a word or non-word. Faster reaction times indicate that content is more accessible at implicit levels.	Participants generate words (e.g., "WE") from list of word fragments (e.g., "_E"). The number of target words generated indicates the accessibility of implicit content.	Participants identify the font color of words (e.g., "TEAM" printed in blue ink). Slower reaction times when naming font color indicate that word content is more accessible at implicit levels.
Theoretical mechanism	Social cognition; spreading activation	Social cognition; spreading activation	Social cognition; spreading activation
Reliability	Internal consistency <.50 (Borkenau, Paelecke, & Yu, 2009)	Internal consistency .82 to .89; test-retest reliability .64 to .72 (affectivity; Johnson, Tolentino, Rodopman, & Cho, 2010)	Internal consistency extremely variable across studies: –.12 to .93 (Eide, Kemp, Silberstein, Nathan, & Stough, 2002; Kindt, Bierman, & Brosschot, 1996; Siegrist, 1997; Strauss, Allen, Jorgensen, & Cramer, 2005)
Predictive validity	Validated by several research teams and shown to predict outcomes including mental health problems (Manschreck et al., 1988; Rikers, Loyens, Winkel, Schmidt, & Sins, 2005)	Validated by several research teams and shown to predict outcomes including task performance, organizational citizenship behavior, and counterproductive work behavior (Johnson et al., 2010; Johnson & Lord, 2010; Steele & Aronson, 1995)	Validated by several research teams and shown to predict outcomes including expectations for unfair treatment and mental health problems (Ritter, Fischbein, & Lord, 2006; Williams, Mathews, & MacLeod, 1996)
Correlations with explicit measures	Low (Rudman & Borgida, 1995)	Moderate (Johnson et al., 2010)	Low (Egloff & Schmukle, 2004; Payne, Binik, Amsel, & Khalife, 2004)
Vulnerability to faking and response distortion	No data available	No data available	No data available
Flexibility	High	High	High
Adaptability across languages	Low	Low	Low
Standardized administration and scoring	Yes	Yes	Yes

(continued)

Table 2. (continued)

	Accessibility-based Measures		
Criteria	Lexical Decision Task	Word Fragment Completion Task	Modified Stroop Task
Use of complex stimuli	Yes	Yes	Yes
Content domain	Personality, affect	Personality, affect (for a review of prior uses, see Koopman, Howe, Johnson, Tan, & Chang, in press)	Personality, affect (for reviews of prior uses, see MacLeod, 1991; Williams et al., 1996)
Mode of administration	Requires computer	Paper-pencil	Requires computer and normal color vision
Cost	$450 software + computer	Cost of paper copies	$450 software + computer
Resources	http://www.millisecond.com/download/samples/v3/LexicalDecisionTask/	Koopman et al. (in press); Tiggemanna, Hargreavesa, Polivyb, and McFarlane (2004)	MacLeod (1991); http://www.xavier-educational-software.co.uk/multistroop.shtml; http://www.millisecond.com/download/samples/v3/Stroop/
	Association-based Measures		
Criteria	Implicit Association Test (IAT)	Brief IAT	Single Target IAT
Reference	Greenwald, McGhee, and Schwartz (1998)	Sriram and Greenwald (2009)	Karpinski and Steinman (2006)
Description	Participants do a computer-based rapid sorting task wherein items from two categories share common responses with two attributes. Differences in response latencies when pairing are switched show strength of category-attribute association.	Similar to the IAT, but shorter	Similar to the IAT, but does not require a comparison category
Theoretical mechanism	Social cognition; associative networks	Social cognition; associative networks	Social cognition; associative networks
Reliability	Internal consistency .60 to .90 (Gawronski, Deutsch, & Banse, 2011); test-retest reliability .56 (Nosek, Greenwald, & Banaji, 2007)	Internal consistency .55 to .94 (Sriram & Greenwald, 2009)	Internal consistency .69 (Gawronski et al. 2011)

(continued)

Table 2. (continued)

	Association-based Measures		
Criteria	Implicit Association Test (IAT)	Brief IAT	Single Target IAT
Predictive validity	Validated by several research teams and shown to predict outcomes including customer satisfaction, task performance, and organizational citizenship behavior (Greenwald, Poehlman, Uhlmann, & Banaji, 2009)	Validated by one research team and shown to predict outcomes including voting behavior (Greenwald, Smith, Sriram, Bar-Anan, & Nosek, 2009)	Validated by one research team and shown to predict outcomes including consumer choices (Karpinski & Steinman, 2006)
Correlations with explicit measures	Varies from low to high by domain (Hofmann, Gawronski, Gschwender, Le, & Schmitt, 2005; Nosek, 2005)	Vary by domain (Sriram & Greenwald, 2009)	Vary by domain (Karpinski & Steinman, 2006)
Vulnerability to faking and response distortion	Low (Asendorpf, Banse, & Mücke, 2002; Fiedler & Bluemke, 2005; Steffens, 2004)	No data available	Low (Karpinski & Steinman, 2006)
Flexibility	High, but "control" category choice must be made carefully	High, but "control" category choice must be made carefully	High, may be preferred to the IAT if attitudes toward a single target are of interest
Adaptability across languages	Moderate, but picture stimuli can easily be used	Moderate, but picture stimuli can easily be used	Moderate, but picture stimuli can easily be used
Standardized administration and scoring	Yes	Yes	Yes
Use of complex stimuli	Limited to simple, prototypical exemplars	Limited to simple, prototypical exemplars	Limited to simple, prototypical exemplars
Content domain	Personality, attitudes, beliefs (for a review of prior uses, see Greenwald, Poehlman, et al., 2009)	Personality, attitudes, beliefs	Personality, attitudes, beliefs
Mode of administration	Requires computer, but paper-and-pencil and PDA versions now available	Requires computer	Requires computer
Cost	$450 software + computer/PDA; cost of paper copies	$450 software + computer	$450 software + computer

(continued)

Table 2. (continued)

	Association-based Measures		
Criteria	Implicit Association Test (IAT)	Brief IAT	Single Target IAT
Resources	Lane, Banaji, Nosek, and Greenwald (2007); http://www.projectimplicit.net/; http://www.millisecond.com/download/samples/v3/IAT/default.aspx	http://www.projectimplicit.net/; http://www.millisecond.com/download/samples/v3/IAT/BriefIAT/default.aspx	http://www.projectimplicit.net/; http://www.millisecond.com/download/samples/v3/IAT/ST_IAT/default.aspx
Criteria	Sorting Paired Features Task	"Shooter" Task	Priming Measure
Reference	Bar-Anan, Nosek, and Vianello (2009)	Correll, Park, Judd, and Wittenbrink (2002)	Fazio, Jackson, Dunton, and Williams (1995); Fazio, Sanbonmatsu, Powell, and Kardes (1986)
Description	Similar to the IAT, but all four pairings of categories and attributes are presented simultaneously. This allows for disentangling strength of subassociations.	Participants view White/Black individuals holding either weapons or nonthreatening objects. Participants press a "shoot" key if they perceive a threat and a "no shoot" key if they do not. The task relies on signal-detection theory for scoring.	Prime stimuli are flashed on a computer screen. Immediately afterwards, target words appear on the screen and participants must categorize them as positive or negative. If exposure to a prime is more likely to speed up the categorization of positive words than negative words, positive implicit attitudes toward the primed category are inferred.
Theoretical mechanism	Social cognition; associative networks	Social cognition; cognitive schemas	Social cognition; associative networks
Reliability	Internal consistency .71; test-retest reliability .42 (Vianello, Bar-Anan, & Nosek, 2007)	No data available	Internal consistency <.30 across studies (Uhlmann, Pizarro, & Bloom, 2008)
Predictive validity	No data available	This task is used only as an outcome measure	Validated by several research teams and shown to predict outcomes including nonverbal behavior and race-based discrimination (Fazio & Olson, 2003)
Correlations with explicit measures	Low (Bar-Anan et al., 2009)	Low (Correll et al., 2002)	Low (Fazio & Olson, 2003)
Vulnerability to faking and response distortion	No data available	No data available	Low (Fazio et al., 1995)

(continued)

Table 2. (continued)

	Association-based Measures		
Criteria	Sorting Paired Features Task	"Shooter" Task	Priming Measure
Flexibility	High; may be preferred to the IAT if specific subassociations are of interest	Low	High
Adaptability across languages	Moderate, but picture stimuli can easily be used	High, because exclusively picture-based	Moderate, but picture stimuli can easily be used
Standardized administration and scoring	Yes	Yes	Yes
Use of complex stimuli	Limited to simple, prototypical exemplars	Yes	Limited to simple, prototypical exemplars
Content domain	Personality, attitudes, beliefs	Stereotypes	Personality, attitudes, beliefs (for a review of prior uses, see Fazio & Olson, 2003)
Mode of administration	Requires computer	Requires computer	Requires computer
Cost	$450 software + computer	PsyScope software (free) + computer	$450 software + computer
Resources	http://projectimplicit.net/nosek/spf/; http://www.millisecond.com/download/samples/v3/SortingPairedFeatures/default.aspx	http://backhand.uchicago.edu/Center/ShooterEffect/ (note: this is a link to a demonstration page, not resources for using the measure in research); PsyScope software http://psy.cns.sissa.it/	Software packages (e.g., e-Prime, Inquisit) can be used to program this task. http://www.millisecond.com
Criteria	Implicit Self-Evaluation Survey (ISES)	Affect Misattribution Procedure (AMP)	Extrinsic Affective Simon Task (EAST)
Reference	Hetts, Sakuma, and Pelham (1999)	Payne, Cheng, Govorun, and Stewart (2005)	De Houwer (2003)
Description	Participants' attention is focused on the self. Then they complete word stems assessing the accessibility of positive versus negative words.	Prime stimuli related to a target category are presented and participants are asked to then rate the aesthetic (un)pleasantness of a subsequent Chinese character. AMP may not be an entirely implicit measure: 45% of naïve participants can tell the task is measuring their attitudes and report intentionally evaluating the primes (Bar-Anan & Nosek, 2011).	Participants sort stimuli based on valence of words or subtle word color (blue vs. green). Performance on color sorting is superior when the color response is shared with the response expected for valence of the target (e.g., if the word *insect* is blue, and both blue and unpleasant share a common key response).
Theoretical mechanism	Social cognition; associative networks	Social cognition; associative networks	Social cognition; associative networks
Reliability	Internal consistency .53 to .59; test-retest .38 (Bosson, Swann, & Pennebaker, 2000)	Internal consistency .70 to .90 (Payne et al., 2005)	Internal consistency <.30 (De Houwer & De Bruycker, 2007; Teige, Schnabel, Banse, & Aspendorf, 2004)

(continued)

Table 2. (continued)

	Association-based Measures		
Criteria	Implicit Self-Evaluation Survey (ISES)	Affect Misattribution Procedure (AMP)	Extrinsic Affective Simon Task (EAST)
Predictive validity	Mixed results (Bosson et al., 2000; Zeigler-Hill, 2006)	Validated by several research teams and shown to predict outcomes including voting and candy consumption (Hofmann, Friese, & Roefs, 2009; Payne et al., 2005)	Mixed results (De Jong, Wiers, Van de Braak, & Huijding, 2007)
Correlations with explicit measures	Low (Hetts et al., 1999)	Moderate (Payne et al., 2005)	Low (De Houwer & De Bruycker, 2007)
Vulnerability to faking and response distortion	No data available	Low (Payne et al., 2005)	No data available
Flexibility	Low; only useful for assessing self-esteem	Moderate; limited to measuring attitudes	Moderate; limited to measuring attitudes
Adaptability across languages	Low	High; mostly picture based	Low
Standardized administration and scoring	Yes	Yes	Yes
Use of complex stimuli	Limited to thoughts about the self	Limited to simple, prototypical exemplars	Limited to simple, prototypical exemplars
Content domain	Self-esteem	Attitudes	Attitudes
Mode of administration	Paper-pencil	Requires computer	Requires computer
Cost	Cost of paper copies	$450 software + computer	$450 software + computer
Resources	Partial description of materials in Hetts et al. (1999)	http://www.millisecond.com/download/samples/v3/AMP/; http://www.unc.edu/~bkpayne	http://users.ugent.be/~jdhouwer/; http://www.millisecond.com/download/samples/v3/StandardEast/default.aspx
Criteria	Go/No-Go Association Task (GNAT)	Name-Letter Self Esteem Measure	Approach-Avoidance Simulation
Reference	Nosek and Banaji (2001)	Nuttin (1985)	Fila-Jankowska and Jankowski (2008)
Description	Similar to the IAT, but uses a respond/not respond approach to capitalize on signal detection measures. It can be used for one or more categories.	Participants identify the most attractive letter within a letter string. Custom letter strings include one letter from participants' first name or family name. Preference for letters in one's name reflects positive associations with the self.	Participants see a symbol of themselves in the middle of a computer screen. Their task is to move this symbol as quickly as possible toward or away from objects appearing at the bottom of the screen. Approach movements signal a positive attitude toward the object, and avoidance movements signal a negative attitude toward the object.

(continued)

Table 2. (continued)

Criteria	Association-based Measures		
	Go/No-Go Association Task (GNAT)	Name-Letter Self Esteem Measure	Approach-Avoidance Simulation
Theoretical mechanism	Social cognition; associative networks	Social cognition; associative networks	Social cognition; associative networks
Reliability	Internal consistency .20 (Nosek & Banaji, 2001)	Internal consistency .35 to .57 (Bosson et al., 2000; LeBel & Gawronski, 2009); test-retest .63 (Bosson et al., 2000)	Internal consistency .86; test-retest reliability .70 (A. Fila-Jankowska, personal communication, December 12, 2011)
Predictive validity	No data available	Validated by several research teams and shown to predict outcomes including preference for positive feedback and positive interpretations of ambiguity (Buhrmester, Blanton, & Swann, 2011)	Validated by one research team and shown to predict outcomes including supervisor-rated employee success and success selling products (Fila-Jankowska & Jankowski, 2008)
Correlations with explicit measures	Low (Nosek & Banaji, 2001)	Low (Bosson et al. 2000)	Moderate (A. Fila-Jankowska, personal communication, December 12, 2011)
Vulnerability to faking and response distortion	No data available	No data available	No data available
Flexibility	High; may be preferred to the IAT if attitudes toward a single target are of interest	Low flexibility; only useful for assessing self-esteem	High
Adaptability across languages	Moderate, but picture stimuli can easily be used	Moderate; has been used in English and non-English speaking countries	High; relies on pictures. Polish, English, and Arabic versions are available.
Standardized administration and scoring	Yes, can produce signal detection or response latency measures	Yes	Yes
Use of complex stimuli	Limited to simple, prototypical exemplars	Limited to simple stimuli	Yes
Content domain	Personality, attitudes, beliefs	Self-esteem	Attitudes
Mode of administration	Requires computer	Paper-pencil or computer	Requires computer
Cost	$450 software + computer	Cost of paper copies	Free software + computer
Resources	http://www.projectimplicit.net/nosek/gnat/; http://www.millisecond.com/download/samples/v3/GNAT/	Very simple implementation, described in Nuttin (1985)	Measure and support available from authors
	Interpretation-based Measures		
Criteria	Rorschach Inkblot Test	Thematic Apperception Test (TAT)	Miner Sentence Completion Scale
Reference	Rorschach (1927); see also Lilienfeld, Wood, & Garb, 2000)	Proshansky (1943); see also McClelland, Koestner, and Weinberger (1989)	Miner (1965); Stahl, Grigsby, and Gulati (1985)

(continued)

Table 2. (continued)

	Interpretation-based Measures		
Criteria	Rorschach Inkblot Test	Thematic Apperception Test (TAT)	Miner Sentence Completion Scale
Description	Participants view 10 ambiguous "ink blots" and say whatever comes to mind (free association phase). Participants then explain their responses to each card (inquiry phase), and both their interpretations and behavior in explaining them are subjectively coded.	Participants generate narrative stories for 31 ambiguous pictures. Motives for achievement, power, and affiliation/ intimacy are subjectively coded.	Participants are given the first words of 40 sentences and asked to complete these sentences. Responses are coded for managerial motivations. A more recent version uses a multiple choice format (Stahl et al., 1985)
Theoretical mechanism	Psychodynamic theory; defense mechanisms	Psychodynamic theory; defense mechanisms	Defense mechanisms
Reliability	Test-retest reliability .30 to .90 (Lilienfeld et al., 2000)	Test-retest reliability .30 (Lilienfeld et al., 2000)	Original version has a test-retest reliability .66 to .91 (Miner, 1997); multiple choice version has an internal consistency of .21 and test-retest reliability .61 (Stahl et al., 1985).
Predictive validity	Mixed results (Lilienfeld et al., 2000)	Validated by several research teams and shown to predict outcomes including task performance, task continuation, and managerial advancement (Spangler, 1992)	Validated by several research teams and shown to predict outcomes including entrepreneurial employment and career success (Gantz, Erickson, & Stephenson, 1972; Miner, 1965)
Correlations with explicit measures	Low (Lilienfeld et al., 2000)	Low (Spangler, 1992)	Low (Miner, 1978)
Vulnerability to faking and response distortion	Moderate (Perry & Kinder, 1990; Schretlen, 1997)	Moderate (Holmes, 1974)	No data available
Flexibility	Low; limited range of motives can be assessed	Low; limited range of motives can be assessed	Low; limited range of motives can be assessed
Adaptability across languages	Not valid cross-culturally (Lilienfeld et al., 2000)	Potentially high because exclusively picture-based	Moderate
Standardized administration and scoring	No; relies on subjective coding of independent rater	No; relies on subjective coding of independent rater	Original version relies on subjective coding of independent rater. Multiple choice version features objective scoring.

(continued)

Table 2. (continued)

	Interpretation-based Measures		
Criteria	Rorschach Inkblot Test	Thematic Apperception Test (TAT)	Miner Sentence Completion Scale
Use of complex stimuli	Moderate	Yes	Moderate
Content domain	Personality and motivations (for a review of prior uses, see Lilienfeld et al., 2000)	Personality and motivations (for a review of prior uses, see Lilienfeld et al., 2000)	Managerial motivations
Mode of administration	Interview; requires highly trained subjective raters	Interview; requires highly trained subjective raters	Paper-pencil
Cost	$183.30 for Rorschach plates and scoring guide	$88.25 for cards and scoring guide	$125 for scoring manual (Miner, 1964, 1986) and cost of paper copies
Resources	http://psychcorp.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8689-097&Mode=summary	http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-4019-046&Mode=summary	See Miner (1964, 1986) for scoring guide.

Criteria	Conditional Reasoning Task (CRT)	Partially Structured Self-Concept Measure	Implicit Positive and Negative Affect Test (IPANAT)
Reference	James (1998), James and LeBreton (2011)	Vargas, Von Hippel, and Petty (2004)	Quirin, Kazén, and Kuhl (2009)
Description	Participants are presented with an apparently intellective task. They have to pick from four response options, with two logically correct answers for each item, one of which appears reasonable only to individuals high on a specific motivational trait (i.e., aggression, achievement).	Participants read about the behavior of an ambiguous target (e.g., individual who attends church twice a year). Target is rated as contrasting with individuals' own self-concept (e.g., target perceived as highly religious by nonreligious individuals, but as not at all religious by very devout individuals).	Participants read words ostensibly from a foreign language and interpret their emotional meaning.
Theoretical mechanism	Justification mechanisms; self-concept maintenance	Social cognition; cognitive schemas	Social cognition; cognitive schemas

(continued)

Table 2. (continued)

	Interpretation-based Measures		
Criteria	Conditional Reasoning Task (CRT)	Partially Structured Self-Concept Measure	Implicit Positive and Negative Affect Test (IPANAT)
Reliability	Internal consistency, test-retest, and factorial reliabilities vary from .74 to .87 (James & LeBreton, 2011; James & McIntyre, 2000)	Internal consistency .54 to .90 (Vargas et al., 2004)	Internal consistency .81; test-retest reliability .72 to .76 (Quirin, Kazén, & Kuhl, 2009)
Predictive validity	Validated by several research teams and shown to predict outcomes including workplace deviance, organizational citizenship, job performance, and voluntary turnover (James & LeBreton, 2011)	Validated by one research team and shown to predict outcomes including cheating behavior and religious behaviors (Vargas et al., 2004)	Validated by one research team and shown to predict outcomes including physiological reactions (Quirin, Kazén, & Kuhl, 2009; Quirin, Kazén, Rohrmann, & Kuhl, 2009)
Correlations with explicit measures	Low (James & McIntyre, 2000)	Low (Vargas et al., 2004)	Modest (Quirin, Kazén, & Kuhl, 2009; Quirin, Kazén, Rohrmann, et al., 2009)
Vulnerability to faking and response distortion	Low (LeBreton, Barksdale, Robin, & James, 2007)	No data available	No data available
Flexibility	Low; lengthy development process for new versions	High	Low; can only be used to measure affect
Adaptability across languages	Moderate	Moderate	High
Standardized administration and scoring	Yes	Yes	Yes
Use of complex stimuli	Yes	Yes	Yes
Content domain	Personality and motives (achievement motivation, aggression, aberrant self-promotion, addiction proneness, adaptability, team orientation, power)	Self-concept, attitudes	Affect
Mode of administration	Paper-pencil	Paper-pencil	Paper-pencil

(continued)

Table 2. (continued)

	Interpretation-based Measures		
Criteria	Conditional Reasoning Task (CRT)	Partially Structured Self-Concept Measure	Implicit Positive and Negative Affect Test (IPANAT)
Cost	Free for academic research use, but must contact the James Lab for distribution (iap@psych.gatech.edu) Commercially available through PsychCorp	Cost of paper copies	Cost of paper copies
Resources	http://www.psychology.gatech.edu/personality/tests.htm; http://www.pearsonpsychcorp.com.au/productdetails/309	Full measure available in Vargas et al. (2004)	Full measure available in Quirin , Kazén, & Kuhl (2009)
Criteria	Stereotypic Explanatory Bias (SEB)	Linguistic Intergroup Bias (LIB)	
Reference	Sekaquaptewa, Espinoza, Thompson, Vargas, and Von Hippel (2003)	Maass, Ceccarelli, and Rudin (1996)	
Description	Participants presented with incomplete sentence strings that describe stereotype consistent or inconsistent behavior; participants with implicit racial bias more likely to write explanations (vs. continuing the sentence without explanation) for stereotype inconsistent behavior.	Participants describe stereotype-consistent and stereotype-inconsistent act in either concrete or abstract terms.	
Theoretical mechanism	Social cognition; cognitive schemas	Social cognition; cognitive schemas	
Reliability	No data available	No data available	
Predictive validity	Validated by one research team and shown to predict outcomes including unfriendly behavior toward a Black interaction partner (Sekaquaptewa et al., 2003)	Validated by one research team and shown to predict outcomes including impressions of persons (Von Hippel, Sekaquaptewa, & Vargas, 1997)	
Correlations with explicit measures	Low (Sekaquaptewa et al., 2003)	Low (Von Hippel et al., 1997)	

(continued)

Table 2. (continued)

	Interpretation-based Measures	
Criteria	Conditional Reasoning Task (CRT)	Partially Structured Self-Concept Measure
Vulnerability to faking and response distortion	No data available	No data available
Flexibility	Low; can only be used to measure stereotypes	Low; can only be used to measure stereotypes
Adaptability across languages	Moderate	Low, but versions available in Italian and English
Standardized administration and scoring	No; requires subjective coding and calculated agreement	Yes
Use of complex stimuli	Yes	Yes
Content domain	Stereotypes	Stereotypes
Mode of administration	Paper-pencil	Paper-pencil
Cost	Cost of paper copies	Cost of paper copies
Resources	A practical guide is provided in Sekaquaptewa, Vargas, and Von Hippel (2010)	A practical guide is provided in Sekaquaptewa et al. (2010)

explicit measures, use of complex stimuli, and fakeability), and practical concerns (estimated costs, mode of administration, adaptability across languages, flexibility for measuring new constructs, and links/available resources). Although organized broadly around our typology, Table 2 draws in part on the criteria outlined by James and LeBreton (2011) and Bing, LeBreton, et al. (2007) for the assessment of implicit measures. In the following, we first describe the types of measures and then discuss the evaluative criteria.

Admittedly, there are alternative ways to categorize implicit measures besides the typology we propose (i.e., accessibility-, association-, and interpretation-based). For example, one can distinguish implicit measures based on the format in which they are administered (e.g., computer-based reaction time measures vs. responses to paper-pencil questionnaires). These methodological distinctions are important and complementary but different from the broader conceptual distinction we propose. Our categorizations have less to do with obvious properties (e.g., the means of delivery) than with the underlying assumptions of what is being tapped. Our typology has the advantage of identifying substantive similarities between measures that are superficially quite different in their administration. For example, word stem completions rely on paper-pencil responses, and lexical decision tasks rely on reaction time, but both are accessibility-based measures of the automatic activation of concepts (and could likely serve as substitutes for one another). In support of this idea, Johnson and Lord (2010) observed significant agreement between accessibility-based scores from word stem and reaction time measures. Conversely, although the IAT (an association-based measure) and lexical decision task (an accessibility-based measure) both rely on response-time data collected during a computer-based sorting task, they assess different types of information at implicit levels and would be appropriate for very different areas of inquiry.

Accessibility-Based Implicit Measures

Accessibility-based implicit measures assess whether a *single* target concept or category is currently activated and accessible in a person's mind. The target concept may be incidentally activated (e.g., the concept of ''submission'' is readily accessible while an employee is interacting with his or her supervisor but is less accessible when the same employee is interacting with peers) or chronically accessible across contexts (e.g., an individual high in trait positive affectivity will have heightened accessibility of the concept ''pleasant'' across situations; see Johnson et al., 2010, for an accessibility-based implicit measure of affectivity). Regardless of whether the nature of activation is state- or trait-based, concepts that are highly accessible at implicit levels influence how people perceive and respond to their environment (Strack & Deutsch, 2004).

The critical assumption of accessibility-based implicit measures is that when a target concept is accessible, respondents should more readily recognize and identify stimuli (e.g., words) belonging to the concept-set. For example, Leroy (2009) found that when participants completing a timed intellective task were interrupted, words associated with the unmet goals of the task (e.g., *complete*, *finish*) retained heightened accessibility several minutes later. In the following, we describe three examples of accessibility-based implicit measures: lexical decision tasks (Kunda et al., 2002; Meyer & Schvaneveldt, 1971), word fragment completion tasks (Gilbert & Hixon, 1991; Johnson et al., 2010), and Stroop tasks (Mathews & MacLeod, 1985; Stroop, 1935).

In a lexical decision task (Meyer & Schvaneveldt, 1971), participants are instructed to use a computer keyboard to quickly decide whether a string of letters represents a real English word (e.g., *weak*, *tree*) or nonsensical non-word (e.g., *wiah*, *tii*). Of the real words, half are related to a target category (e.g., *strong* and *dominance* are both indicative of the concept of power), and half are category-neutral words matched to the individual target words based on commonality in the English language and number of letters (e.g., *coffee* and *silliness* might serve as neutral counterparts to *strong* and *dominance*). References like the English Lexicon Project (Balota et al., 2007), the

Frequency Dictionary of Contemporary American English (Davies & Gardner, 2010), and the University of South Florida Free Association, Rhyme, and Word Fragment Norms (Nelson, McEvoy, & Schreiber, 2004) indicate how common words are in their everyday use. The average, within-person response time for correctly identifying category-relevant words represents the automatic accessibility of the target concept, where faster times signify greater accessibility. For example, employees with a strong sense of equity sensitivity (Huseman, Hatfield, & Miles, 1987) would respond faster to words like *fair* and *justice* compared to those with weak equity sensitivity (Kay & Jost, 2003). We would expect, then, that employees' average response time to equity-related words on a lexical decision task is inversely related to the magnitude of their emotional reactions to justice-related events at work. Software commonly used to run these and other reaction time measures is downloadable for $450 (per computer), and free 30-day trials are offered (http://www.millisecond.com/). Licenses for web delivery are also available for an increased cost. Software and adaptable scripts for creating and administering lexical decision tasks specifically are available at http://www.millisecond.com/download/samples/v3/LexicalDecisionTask/.

In a word fragment completion task, participants are presented with a series of word fragments that can be completed to form multiple words. Importantly, the word fragments (e.g., "_OY") are created in such a way that they can form target words ("JOY") associated with the focal construct (positive affectivity) or neutral, non-target words (e.g., "BOY" or "SOY"). As another example, the fragment "_EAR" can form a word that reflects negative affectivity ("FEAR") or various non-target words (e.g., "PEAR" and "NEAR"). The proportion of target words that respondents generate is used to infer the automatic activation of the focal construct (Gilbert & Hixon, 1991; Johnson & Saboe, 2011). Thus, for someone with strong negative affectivity, words like *fear*, *anxious*, and *worry* enjoy heightened accessibility in memory and are therefore more likely to be generated when completing the word fragments. The total proportion of target words to non-target words can then be used to predict criteria (Johnson et al., 2010). For information on how to develop and validate word fragment completion tasks, see Tiggemanna, Hargreavesa, Polivyb, and McFarlane (2004) and Koopman et al. (in press).

A final example of an accessibility-based implicit measure is the Stroop task (Stroop, 1935), where participants are tasked with naming the color of letters that form words (e.g., the word *company* in green font). Although the original task involves assessing the extent of interference when color words are incongruent with the color font (e.g., the word *blue* in red font), the Stroop task has since been modified to assess interference owing to the meaning of non-color words (MacLeod, 1991; Williams, Mathews, & MacLeod, 1996). Specifically, participants experience greater difficulty identifying font color when words reflect concepts that are highly accessible at implicit levels. The average, within-person response time for naming font color represents the automatic accessibility of the target concept. Unlike lexical decision tasks, though, slower response times signify greater accessibility because words that reflect salient concepts create more interference when naming font color. For example, Mathews and MacLeod (1985) found that people in highly anxious states are slower to name font color for threat-related words (e.g., *hazard* and *injury*). A modified Stroop task like the one developed by Mathews and MacLeod could be used to measure, for example, employees' implicit anxiety during times of organizational change. A study by Ritter, Fischbein, and Lord (2006) provides an example of a modified Stroop task used for organizational research. Software and adaptable scripts for Stroop tasks are available online (e.g., http://www.millisecond.com/download/samples/v3/Stroop/).

Association-Based Implicit Measures

Association-based implicit measures assess the automatic links between *multiple* target concepts in memory (e.g., the strength of the association between the concept of female and the concept of weak

would capture an implicit stereotype about women). These measures are designed to tap into the attributes respondents—at some level—believe are associated with a given category. The underlying assumption of association-based implicit measures is that activation of a single category triggers spreading activation to nearby categories and attributes within an underlying set of social knowledge structures (Greenwald et al., 2002). Association-based implicit measures typically rely on reaction times when categorizing rapidly presented stimuli to determine the extent to which multiple target concepts are automatically associated with one another. The category of association-based implicit measures includes priming tasks (Fazio et al., 1986; Fazio, Jackson, Dunton, & Williams, 1995) and the IAT (Greenwald et al., 1998), among others.

In a priming measure of stereotypical associations, words representing male and female stereotypes (e.g., *strong* and *weak*) are flashed on a computer screen (e.g., Blair & Banaji, 1996). Immediately afterwards, male and female names appear on the screen and participants must categorize them as male or female. If exposure to the word *weak* is more likely to speed up the categorization of female names than exposure to *strong*, it suggests an implicit stereotype of women as weak.

Similarly, in an organizational-attitude IAT, company logos or other organization-specific words/images appear on the screen and participants categorize them according to categories of ''Organization X'' or ''Organization Y'' (where Organization X is their employing organization). Simultaneously, participants must categorize words as representative of the categories pleasant and unpleasant. In one segment of the test, items related to Organization X and unpleasant share one response key and Organization Y items and pleasant share another. In another segment, the pairings are reversed. If participants respond faster when Organization X items and unpleasant are paired than when Organization Y items and unpleasant are paired, evidence for a negative attitude (i.e., implicit dissatisfaction) toward one's organization are obtained (Leavitt, Fong, et al., 2011).

Most association-based implicit measures similarly take the form of computerized category sorting tasks that capture such a ''task-switching'' penalty, wherein the respondent presumably must ''shift tasks'' when sorting incompatible categories (e.g., insects and pleasant) with a common response. This task-switching penalty is reflected in standardized within-person differences in response latencies. These tasks differ on their use of response-latency measures versus signal detection statistics (e.g., the Go/No-Go Task, or GNAT; Nosek & Banaji, 2001), the ability to separate out strength of individual associations within the task (Sorting Paired Features Task, or SPF; Bar-Anan, Nosek, & Vianello, 2009), and the total number of trials required (Sriram & Greenwald, 2009).

Instructions on how to implement both the IAT and priming measures are readily available (e.g., Lane, Banaji, Nosek, & Greenwald, 2007; Rudman, 2011). Adaptable scripts for both computerized and paper-pencil IATs are likewise downloadable (http://www.millisecond.com/download/samples/v3/IAT/), as well as the Go/No-Go Task (http://www.millisecond.com/download/samples/v3/GNAT/default.aspx) and Sorting Paired Features Task (http://www.millisecond.com/download/samples/v3/SortingPairedFeatures/default.aspx).

Interpretation-Based Implicit Measures

Interpretation-based implicit measures provide participants with ambiguous stimuli or alternatively plausible item responses and capture systematic response tendencies (including information processing biases and justifications for one's actions) that are indicative of certain beliefs or a latent personality motive (LeBreton et al., 2007; Von Hippel et al., 1997). For example, if an individual has a strong power motive, they are likely to believe that it is both justifiable and reasonable for a strong leader to exert control and influence over a group (James et al., 2012). Thus, the underlying assumption of interpretation-based measures is that a person's chronically accessible motive or worldview will differentially inform his or her explanations for his or her own behaviors and the attributions he or she makes about others, with the goal of maintaining a positive self-concept by justifying his or

her own actions. A number of interpretation-based implicit measures are likely to prove useful in organizational research.

As discussed earlier, interpretation-based measures have a long history within social, organizational, and clinical psychology in the form of projective measures. In theory, responses on such tasks reflect the operation of psychological defense mechanisms (Cramer, 2000, 2006). Deep psychological needs and motivations are "projected" onto ambiguous images, influencing how participants interpret them. The reader is likely familiar with the Rorschach inkblot test (Rorschach, 1927), in which participants are, over the course of 45 minutes, presented with a series of 10 bilaterally symmetrical images and asked to freely associate about each. Participants' free associations in response to each inkblot are then scored by one or more raters for themes such as implicit dependency needs (Bornstein, 1998a, 1998b), a process that takes up to 2 hours (Exner, 1986; Lilienfeld et al., 2000; Masling, 2002). Rorschach inkblot tests have exhibited the ability to distinguish individuals who have been diagnosed with personality disorders from normal controls (e.g., Bornstein, 1998a), as well as some discriminant validity (Bornstein, 2002), but their reliability and validity remain controversial (Lilienfeld et al., 2000).

More common in organizational research is the Thematic Apperception Test (Morgan & Murray, 1935), which similarly relies on a picture interpretation technique for assessing individual motives. Participants are presented with 30 cards depicting ambiguous situations and asked to tell a story about what is happening in the picture. These stories are then coded for themes that reflect the need for achievement, aggression, and power. Coding and interpretation of responses to the TAT pictures takes approximately 1 to 2 hours per participant (Lilienfeld et al., 2000). TAT measures of fundamental social motives have been shown to predict behavior in a number of domains (Brunstein & Maier, 2005; McClelland & Boyatzis, 1982). For example, leaders' motives patterns were shown to predict managerial success years later (McClelland & Boyatzis, 1982). Spangler's (1992) meta-analysis found that while questionnaire measures of need for achievement better predicted relevant behaviors when extrinsic incentives were present, TAT measures of achievement motives were stronger predictors in the presence of intrinsic incentives. At the same time, significant concerns have been raised about the reliability and validity of the TAT (Lilienfeld et al., 2000).

The primary practical issue regarding both Rorschach inkblot tests and the TAT is that they are extremely time-consuming to administer and score and, furthermore, require extensive training to engage in the highly subjective interpretation of participants' responses. These measures may also lack face validity, leading to disengaged or defensive responding by employees. These barriers make them difficult for most organizational scholars to adopt. We believe it is important to highlight that the more recent interpretation-based measures offer clear psychometric and practical advantages over projective measures, including standardized scoring and more consistent evidence for their reliability.

The Conditional Reasoning Test (CRT; James, 1998) has been developed to capture justification mechanisms an individual might employ to support and justify their underlying motives (including power, achievement, and aggression). The CRT is ostensibly presented as a measure of cognitive ability, and items contain a brief situation from which the respondent is asked to derive a logical inference. For each item, there are two logically/semantically "correct" response options (out of four total), with one of the "correct" alternatives designed to appear plausible only to those with the specified latent motive. Work on validation of the CRT has demonstrated that it is robust to attempts at faking, as long as the precise purpose of the measure is not disclosed (LeBreton et al., 2007). A major strength of the CRT is that unlike projective measures such as the TAT, its items are scored quantitatively and objectively. Thus, as long as the CRT is used to measure its intended construct, it can be administered and scored "out of the box." Furthermore, well-validated CRTs are now available for several personality characteristics (e.g., aggression and achievement motivation) with others in development, making it increasingly attractive for organizational scholars.

Another interpretive implicit measurement approach that features quantitative scoring is the linguistic intergroup bias (LIB). Similarly to the CRT, LIB measures work on the assumption that individuals will project their worldview by making judgments that confirm and support it (Maass, Ceccarelli, & Rudin, 1996; Maass, Salvi, Arcuri, & Semin, 1989; Von Hippel et al., 1997). As such, ambiguous behavior that is stereotype defying will be described specifically, but ambiguous behavior that is stereotype confirming will be described quite generally. For example, if the individual holds a highly stereotyped view of a minority group, describing a target's specific behaviors in abstract or general terms (e.g., the action "Jamal yelled" is recalled as "Jamal is an aggressive person") helps justify the rater's worldview (Von Hippel et al., 1997).

Finally, partially structured self-concept measures (Vargas et al., 2004) require participants to make judgments about a target's ambiguous behavior, finding that individuals tend to contrast the behavior of others away from their own attitudes. For example, if an item describes an individual who attends religious services once or twice a year and prays once or twice a month, an individual who is not religious would rate the target as highly religious; by contrast, a deeply devout individual would describe this person as not especially religious. These attitudinal responses predict behavior consistent with the inferred attitude (Vargas et al., 2004). Like the CRT and LIB, partially structured self-concept measures have the advantage of quantitative scoring.

Appropriate Choice of Implicit Measures

The next challenge for organizational scholars is how to choose the most appropriate implicit measure among the ever-growing list of available ones. Researchers must ask themselves whether they need an implicit measure to assess the construct of interest, and if so whether an accessibility-based, association-based, or interpretation-based measure is most appropriate. Listed in Table 2 are available implicit measures and their theoretical underpinnings. The measures are categorized based on our typology, and each measure is evaluated along a range of central criteria. These criteria build and expand on those proposed by Bing, LeBreton, et al. (2007) and James and LeBreton (2011) for the assessment of implicit measures. They include the measure's internal consistency and test-retest reliability, predictive validity, correlations with explicit measures, vulnerability to faking and response distortion, flexibility (i.e., how easy or difficult it is to adapt the measure to assess a new construct), adaptability across languages, whether the measure is amenable to standardized administration and scoring, ability to assess reactions to complex stimuli, applicability for assessing personality/motives and attitudes/beliefs, use of paper-pencil versus computerized format, and estimated financial costs. We further provide key references to relevant publications and indicate available resources to help organizational researchers get started using implicit measures (e.g., websites with ready-to-use scripts and programs and seminal publications on best practices). Some of our assessments (e.g., the extent to which the measure can be flexibly adapted to assess new constructs) are inherently subjective, and we encourage researchers to consult the original articles and resources listed and draw their own conclusions about the utility of each measure. Due to space limitations and large number of criteria (11) and measures (23) involved, many of the criteria and measures are addressed exclusively in the table. In the following, we elaborate at greater length on particularly critical issues related to choosing an implicit measure.

Do I Need to Use an Implicit Measure?

As discussed earlier, there are a number of conditions in which use of an implicit measure is advantageous, such as when the construct of interest potentially lies outside of conscious awareness, evaluation apprehension and/or social desirability pressures are high, predicting incremental variance is critical because of the importance of the outcome, or the researcher is concerned about disengaged

participants. Satisfying one or more of these conditions suggests that the use of an implicit measure will likely add value. However, the primary criterion is that the construct of interest lies at least in part outside of conscious awareness or control; the other criteria represent added benefits associated with using implicit measures.

Which Category of Implicit Measure Should I Use?

Accessibility-based implicit measures are particularly well suited for assessing what comes to mind spontaneously within a given context, as well as how people react to real individuals and naturalistic organizational settings. These dynamic shifts in accessibility measured in situ allow for findings that would otherwise be overlooked when alternate methodologies are used. For example, using a lexical decision task, Kunda et al. (2002) found that words representative of stereotypes of African Americans (e.g., *crime* and *athletic*) are automatically accessible 15 seconds into an interaction with a Black confederate but not after 12 minutes. However, when participants received negative feedback from the Black confederate, negative stereotypes were swiftly reactivated. By contrast, association-based implicit measures like the IAT, which employ simplified stimuli to assess whether the target group as a whole is associated with stereotypical traits, cannot speak to whether (and when) stereotypes are actively on people's minds when they interact with actual minority coworkers. Furthermore, accessibility-based implicit measures can capture how people respond in complex situations. For example, Johnson et al. (2010) developed a word fragment completion measure of the accessibility of positive and negative emotion words and used it to measure affectivity at work. Their implicit measure of construct accessibility explained more variability in task performance and organizational citizenship behavior than self-reported emotions. Association-based implicit measures like the IAT can assess the extent to which employees generally associate their organizations with positive or negative feelings (Leavitt, Fong, et al., 2011) but cannot effectively determine what emotions people actually feel while performing their jobs.

However, because they assess the association between multiple target concepts (e.g., female and weak), association-based implicit measures are well suited to capture individual differences in implicit attitudes and beliefs about classes of tasks, people, or organizations in general. These differences in turn predict judgments and behaviors. Priming and IAT measures exhibit robust predictive validity across a wide range of studies (Fazio & Olson, 2003; Greenwald, Poehlman, et al., 2009; Nosek, Greenwald, & Banaji, 2007). In contrast to association-based measures, accessibility-based measures are not well suited for assessing evaluative or any other characteristics associated with a general social category because they measure the level of activation of a single target concept in a distinct situation.

Association-based measures also have some shortcomings that warrant mention. In order to assess the characteristics associated with a target category, priming tasks and the IAT average reaction times to a series of stimuli representing the category (e.g., a series of minority faces in a measure of racial stereotypes). As a result, the stimuli are necessarily simplified (e.g., the expressionless faces of unknown minority targets) and devoid of individuating details and the situational context. Thus, association-based measures lack the capacity to assess reactions to stimuli presented for more than a fraction of a second and that require more complex processing (e.g., a 12-minute workplace interaction; Kunda et al., 2002). It follows, then, that because of the rapid nature of the task, these types of measures are not very effective at capturing attitudes about highly nuanced targets. For example, while the IAT works well for capturing attitudes related to ''European American'' versus ''African American,'' it is questionable that it would work for discerning attitudes toward 20th-century African American poets from Chicago versus those from Harlem.

Another major shortcoming of some of the most widely used association-based implicit measures, among them the IAT, is that they rely on relative comparisons between two target categories

(e.g., liking Company A more than Company B) rather than assessing associations with a single category (e.g., liking Company A; Blanton, Jaccard, Christie, & Gonzales, 2007; Blanton, Jaccard, Gonzales, & Christie, 2006). Researchers primarily interested in attitudes toward a single category should rely on alternative association-based implicit measures such as the single category IAT (Karpinski & Steinman, 2006), GNAT (Nosek & Banaji, 2001), and Sorting Paired Features Task (Bar-Anan et al., 2009), which were designed expressly for this purpose.

Another controversy related to association-based implicit measures is whether they tap personal attitudes or cultural knowledge (Arkes & Tetlock, 2004; Banaji, Nosek, & Greenwald, 2004; Karpinski & Hilton, 2001; Mitchell & Tetlock, 2006; Olson & Fazio, 2004a; Uhlmann, Poehlman, & Nosek, 2012). Critics have argued such associations reflect knowledge of broader cultural attitudes (e.g., widespread prejudice against Black Americans) rather than the person's own attitudes. That automatic associations predict relevant judgments and behaviors (Greenwald, Poehlman, et al., 2009), correlate significantly with explicit measures (Nosek, 2005), interact in meaningful ways with explicit attitudes and motives (Dasgupta & Rivera, 2006; Olson & Fazio, 2004b; Towles-Schwen & Fazio, 2003), and are affected by manipulations designed to influence personal attitudes (e.g., manipulations of personal goals; Ferguson & Bargh, 2004; Seibt, Häfner, & Deutsch, 2007; Sherman, Rose, Koch, Presson, & Chassin, 2003) all suggest they reflect personal attitudes to a substantial degree (for a review, see Uhlmann et al., 2012).

Moreover, knowledge of cultural attitudes does not necessarily represent a confound for the predictive validity of association-based implicit measures given that perceived cultural norms frequently guide behavior (Armitage & Conner, 2001; Fishbein & Ajzen, 1975; Yoshida, Peach, Zanna, & Spencer, 2012). Consider, for example, that automatic associations with members of minority groups predict consumers' ratings of store cleanliness in the presence of a Black versus White salesperson (Hekman et al., 2010). Whether the predictive power of these associations reflects a basis in personal or cultural attitudes (or some combination) is of theoretical interest, but less practically relevant so long as the implicit measure predicts the outcome in question. Furthermore, it is important to emphasize that the cultural knowledge critique is directed principally at implicit measures of prejudice and stereotyping. Knowledge of broader cultural attitudes is much less likely to represent a confounding influence on measures of most variables of interest to organizational scholars, such as organizational identification, job satisfaction, or attitudes toward one's coworkers.

Finally, interpretation-based implicit measures are most effective at assessing complex social beliefs and fundamental social motives. The partially structured measure of self-concept developed by Vargas et al. (2004) can be employed to capture values and behavioral tendencies too complex for measures of simple mental associations. As described earlier, the Vargas et al. measure captures people's subjective referents for a particular issue. Partially structured self-concept measures could be useful for predicting who is likely to engage in high levels of organizational citizenship or volunteering (i.e., an employee who stays late once a month is viewed as prosocial vs. withdrawn) or for discerning an individual's standards for ethical behavior or corporate social responsibility (i.e., a manager who recalls a known hazardous product is rated as virtuous vs. reactive, an executive who uses his or her expense account liberally is viewed as spending a great deal of money or relatively little).

Additionally, interpretation-based implicit measures may be useful for capturing complex motives and worldviews (James, 1998; James & LeBreton, 2011). For example, the CRT was designed with such social motives in mind. Target items for the CRT are designed to appear rational only to individuals who rely heavily on justification mechanisms to validate their needs and behaviors (e.g., their deep-seated need for power; James & LeBreton, 2011). Thus, we recommend that research questions involving motivational constructs should consider interpretation-based measures like the CRT first.

Is the Implicit Measure Reliable?

In addition to theoretical issues such as whether construct accessibility, evaluative associations, or motivations are of greatest interest, practical concerns such as reliability and predictive validity are extremely important when choosing between implicit measures. For most paper-pencil implicit measures with quantitative scoring, the procedure for calculating internal consistencies and test-retest reliabilities is essentially the same as for explicit self-report questionnaires. However, assessing the psychometric properties of implicit measures based on reaction time and the coding of free responses by independent raters is less straightforward.

Determining the internal consistency of reaction time measures involves separating the trials and/or experimental blocks completed by each participant and calculating the extent to which they correspond with one another. Internal consistency for IAT measures can easily be established using Nosek's (2005) split-thirds method (i.e., a Cronbach's alpha is computed by scoring three subsets of the total 128 IAT trials and treating them as scale items). For more on how to calculate the reliability of both reaction time– and signal detection–based implicit measures, see Greenwald et al. (1998), Nosek and Banaji (2001), and Correll, Park, Judd, and Wittenbrink (2002).

As seen in Table 2, implicit measures are generally less reliable than their explicit counterparts and in a few cases exhibit reliabilities below commonly accepted standards for individual difference measures. This may be due in part to factors that artificially inflate the reliability of explicit measures, such as a conscious effort to respond consistently across items and measurement occasions. Proponents of the Thematic Apperception Test have argued that participants feel pressured to tell different stories about the pictures when they take the test a second time, producing spuriously low test-retest reliabilities (Winter & Stewart, 1977). Low test-retest reliabilities can also be theoretically meaningful, reflecting the tendency for implicit measures to tap into implicit cognitive or affective states rather than stable traits to a certain extent (Blair, 2002). Many implicit measures have respectable test-retest reliabilities, suggesting a sizeable stable component. However, whether a given implicit measure taps states or traits is best treated as an empirical question that must be evaluated on a measure-by-measure basis.

Regardless of these ambiguities, we encourage researchers to choose those measures from each category (accessibility-based, association-based, and interpretation-based) that exhibit the strongest or most well-understood psychometric properties, unless there is a strong overriding reason not to do so. For example, researchers who wish to employ an association-based implicit measure should prefer the IAT, Brief IAT (Sriram & Greenwald, 2009), Single Category IAT (Karpinski & Steinman, 2006), or Sorting Paired Features Tasks (Bar-Anan et al., 2009) rather than the Extrinsic Affective Simon Task (EAST; De Houwer, 2003) and priming tasks (Fazio et al., 1986; Fazio et al., 1995) based on the measures' respective internal consistencies and test-retest reliabilities. For the same reason, researchers who wish to use an interpretation-based implicit measure to assess power motives should prefer the CRT (James & LeBreton, 2011) rather than the less reliable Rorschach inkblot test (Rorschach, 1927) or Thematic Apperception Test (Lilienfeld et al., 2000).

Does the Implicit Measure Predict Judgments and Behaviors?

The most extensively examined implicit measures in terms of predictive validity are the Rorschach inkblot test, TAT, IAT, priming measures, and the CRT (Fazio & Olson, 2003; Greenwald, Poehlman, et al., 2009; James & LeBreton, 2010, 2011; Lilienfeld et al., 2000). Table 2 summarizes whether the predictive validity of an implicit measure has been confirmed by multiple teams of investigators, validated by one team of investigators, not validated at all, or whether evidence of its predictive validity is mixed (we avoid presenting specific effect size estimates, as meta-analytic

values are available only for a few measures, and predictive validity is likely to depend as much on the construct measured as on the tool itself). Following Lilienfeld et al. (2000), we treat replication by independent groups of investigators as an important indicator of a measure's predictive validity. Evidence is characterized as mixed when independent labs have failed to confirm the implicit measure's predictive validity.

Accessibility-based implicit measures are more commonly used as dependent measures than as predictors of behavior (Kunda & Spencer, 2003; Leroy, 2009). For example, Kunda et al. (2002) examined the accessibility of gender stereotypes after brief interactions with members of minority groups. However, lexical decision tasks and modified Stroop tasks have been used in clinical research to predict self-injurious behavior and other psychopathology (Williams et al., 1996), and organizational researchers are beginning to use word stem completions to explain behaviors with managerial implications (Johnson et al., 2010; Johnson & Lord, 2010; Johnson & Saboe, 2011). For example, Johnson et al. (2010) found that the proportion of negative affectivity words that employees generated was related to counterproductive work behavior. We regard the predictive validity of accessibility-based implicit measures as promising but not established to the same degree as for some association-based and interpretation-based measures.

The predictive validity of the most commonly used association-based implicit measures, the IAT and priming tasks, has been confirmed across scores of laboratories (for reviews, see Fazio & Olson, 2003; Greenwald, Poehlman, et al., 2009; Nosek et al., 2007; for criticisms of two specific studies and replies by the authors, see Blanton et al., 2009; McConnell & Leibold, 2009; Ziegert & Hanges, 2009). Although most of these studies were published in social psychology journals, many have relevance to organizational settings. For instance, IAT measures have predicted stereotypical impressions of female job applicants (Gawronski, Ehrenberg, Banse, Zukova, & Klauer, 2003; Rudman & Glick, 2001), women's career aspirations (Rudman & Heppen, 2003), ratings of the quality of customer service interactions and perceived cleanliness of the retail environment (Hekman et al., 2010), unethical/illegal behavior in business tasks (Reynolds et al., 2010), job performance and organizational citizenship (Leavitt, Fong, et al., 2011), and drug rehabilitation nurses' motivation to change jobs to avoid stigmatized patients (Von Hippel, Brener, & Von Hippel, 2008). In an especially compelling real-world study, Rooth (2010) mailed fake job applications to several thousand businesses varying only whether the name of the applicant was Swedish or Arab. The implicit racial stereotypes of the job recruiters were further assessed using the IAT. Greater levels of implicit stereotyping were associated with a reduced likelihood of inviting Arab candidates to interview for the position; by contrast, explicit endorsement of racial stereotypes exhibited no significant predictive validity.

The oldest projective measure, the Rorschach inkblot test, is also that for which the empirical evidence is most mixed. Although some meta-analyses suggest some validity for the Rorschach with regard to distinguishing individuals with psychopathology from normal controls, others do not (Lilienfeld et al., 2000). Numerous questions have been raised about the Rorschach's effectiveness for use with both clinical and nonclinical populations (Lilienfeld et al., 2000; although see Bornstein, 1998a, 1998b, 2002, for evidence and arguments that some more recent versions of the Rorschach are valid). In contrast, meta-analysis confirms a significant relationship between TAT measures and behavioral outcomes (Spangler, 1992). The predictive validity of the TAT is strongest for behaviors that are intrinsically rather than extrinsically motivated (Spangler, 1992). Of the contemporary interpretation-based measures that feature quantitative scoring, the CRT is by far the most extensively validated (Bing, LeBreton, et al., 2007; James, 1998; James et al., 2004; James & LeBreton, 2011). For example, CRT measures of aggressive tendencies consistently predict counterproductive work behaviors and job performance (James & LeBreton, 2010).

Use of Arbitrary Metrics

It should be noted that even when they correlate with behavior, implicit measures typically rely on arbitrary metrics inappropriate for individual diagnostic assessment (Blanton & Jaccard, 2006). For instance, that a person scores a +.5 on a race IAT (a score indicating a stronger pattern of association between White and good and Black and bad) is not independently informative about the individual. Rather, this value is only meaningful in the context of a greater data set, and only for prediction. Conversely, conditional reasoning tests are designed to produce less arbitrary metrics and would be more appropriate and defensible for clinical assessment or individual human resource decisions (James & LeBreton, 2011). Thus, researchers should be careful in the conclusions they draw and recommendations they make from the use of these measures. Future research using implicit measures should aim to develop norms and cut-off scores, the usual way of creating nonarbitrary metrics in psychological and managerial research.

Can the Implicit Measure Be Flexibly Adapted to Assess New Constructs?

The implicit measures currently available vary greatly in their flexibility versus established psychometric properties. For mature areas of inquiry, researchers can rightfully expect that new measures will be met with heightened scrutiny, and choosing a measure with established psychometric properties is thus a wise choice. On the other hand, the ability to measure implicit processes opens up many new areas of inquiry, and flexible measures allow for greater ability to capture new constructs.

Accessibility-based implicit measures (i.e., lexical decision tasks and word completion tasks) appear to offer considerable flexibility for developing new measures (an example of the process can be found in Johnson & Saboe, 2011). It should be noted, however, that this procedure (involving finding alternative word fragment solutions with comparable lexical properties) can be a relatively time-consuming task, and great care should be exercised to choose words that closely relate to the category of interest (see previous section describing available lexical databases).

Associative measures appear to offer a reasonable tradeoff between established psychometric properties and relative flexibility. The IAT has been well validated through extensive data collection efforts (Nosek et al., 2007). It has been demonstrated to resist attempts at faking (Asendorpf et al., 2002; Steffens, 2004) and predicts behavioral outcomes across multiple domains of social behavior (Greenwald, Poehlman, et al., 2009). Readily adaptable scripts exist for both image- and word-based versions of the IAT, and idiographic versions integrating user-generated items have also been developed (for an example, see Leavitt, Fong, et al., 2011). However, new applications of the IAT and other associative measures should still be validated independently, and scholars must still be heedful in developing new versions. Those constructing new IAT measures should also be aware of potential attribute confounds when choosing their items. For example, if a researcher were trying to create an IAT to capture associations between self and leader versus follower, they might inadvertently be measuring implicit self-esteem if participants can sort the leader words from the follower words based on their valence (Greenwald & Farnham, 2000). With these concerns in mind (and the availability of easily adaptable scripts), developing a new IAT is a relatively straightforward process.

In contrast, most interpretation-based implicit measures rely on complex and laboriously created stimuli, which are difficult to simply "swap" in order to measure a different construct. As summarized in Table 2, all but one interpretation-based implicit measure (the partially structured self-concept measure; Vargas et al., 2004) are relatively low in flexibility. Conditional reasoning tests exist to assess achievement motivation, aggression, aberrant self-promotion, addiction proneness, adaptability, team orientation, and power motives (James & LeBreton, 2011), but developing new scenarios and interpretation responses that address a novel construct is a labor-intensive process that can take years. Several other interpretation-based measures were expressly developed to assess only

a single construct, such as mood in the case of the Implicit Positive and Negative Affect Test (Quirin, Kazén, & Kuhl, 2009) and stereotyping in the case of the Stereotypic Explanatory Bias (Sekaquaptewa, Espinoza, Thompson, Vargas, & Von Hippel, 2003). Thus, interpretation-based implicit measures tend to trade reduced flexibility in measuring new constructs for greater consistency of stimuli and psychometric characteristics across measurement occasions.

In cases in which the researcher would ideally prefer an interpretation-based implicit measure in order to measure complex beliefs (e.g., the CRT) but one is not available, we recommend adapting the partially structured self-concept measure (Vargas et al., 2004), by far the most flexible interpretation-based implicit measure. As described earlier, in this measure participants simply read a vignette about a target's ambiguous behavior (e.g., attending church twice a year) and then rate the behavior on the dimension of interest (e.g., religiosity). Developing and pretesting a new vignette describing ambiguous behaviors relevant to a new construct of interest is a relatively straightforward process (Sekaquaptewa, Vargas, & Von Hippel, 2010). Another option may be to use one of the more flexible accessibility- or association-based measures. The IAT in particular can be easily modified to assess a wide variety of attitudes, beliefs, social stereotypes, and aspects of the self-concept (Greenwald, Poehlman, et al., 2009). We believe that given the wide array of implicit measures and potential target constructs summarized in Table 2, most researchers most of the time should be able to find or adapt a measure that works for them. Of course, however, there will inevitably be some disappointing cases in which no extant implicit measure is suitable for the researcher's purposes.

Is the Implicit Measure Adaptable Across Cultures?

As multicultural and international research continues to gain interest in the organizational sciences, issues of interpretation and language have created the need for translation/back-translation methods and culturally situated measures for capturing our constructs. For detailed discussions of the back-translation process, see Brislin (1970) and van de Vijver and Leung (2000). Note, however, that adapting implicit measures into other languages presents unique challenges that vary based on the measure involved. For example, the process for constructing most accessibility-based measures requires that target words share similar lexical frequency and length with their corresponding neutral words (this is true for both word-completion measures and the lexical decision task; Balota et al., 2007; Johnson & Saboe, 2011; Koopman et al., in press; Nelson et al., 2004; Tiggemanna et al., 2004). As such, creating "equivalent" versions of these measures in multiple languages is an iterative process involving both back-translation (Brislin, 1970) and careful word selection in each language (Koopman et al., in press). At the same time, adapting interpretation-based measures (e.g., the conditional reasoning task) into other languages is more time-consuming and challenging than for standard explicit measures given that one must ensure that the subtle meaning of the scenarios and interpretation options remains consistent across cultures. Although the aggression version of the CRT is currently being validated in multiple languages/cultures and a video-based version is available that should prove useful for cross-cultural work, adapting an existing CRT into another language and validating it represents a time-consuming challenge.

By contrast, many of the associative measures described in Table 2 can be used with picture stimuli instead of words, such that the researcher need only translate minimal instructions necessary for the study. Associative measures have now been developed for use with toddlers (the Preschool Implicit Association Test; Cvencek, Greenwald, & Meltzoff, 2011) and nonhuman primates (the Looking Time Implicit Association Test; Mahajan et al., 2011), further suggesting that associative measures are robust to language or literacy issues.

What Resources Are Available for the Study and Within the Research Context?

Many implicit measures require access to computers and the use of relatively expensive software. If the data collection will occur in an organizational setting where multiple computer terminals are not available (e.g., a military basic training environment or a manufacturing plant with blue-collar workers), most reaction-time based measures (e.g., lexical decision task, computerized IAT) are not a feasible choice (although the advent of small and inexpensive "netbooks" may allow researchers to create mobile research labs, or they may administer the IAT on a PDA; Dabbs, Bassett, & Dyomina, 2003). If the investigator wishes to use an accessibility-based implicit measure and is limited to a paper-pencil format, word stem completions are ideal (Koopman et al., in press). For researchers intending to employ an association-based measure but for whom reaction time is not an option, reliable paper-pencil versions of the IAT are now available (Lemm, Lane, Sattler, Khan, & Nosek, 2008).

Of the association-based measures, paper-pencil versions of the IAT are the least expensive option. Most interpretation-based implicit measures, including the CRT, LIB, and partially structured self-concept measure, already employ a paper-pencil format and should therefore be very appealing to researchers faced with limited resources and/or a challenging research setting. Nevertheless, given the unique assumptions and root constructs of accessibility-based, association-based, and interpretation-based measures, we recommend that scholars consider the theoretical appropriateness of each (and not simply resource constraints) in making their decision.

Avenues for Impactful Organizational Research Using Implicit Measures

In this final section, we focus on the general structure of research questions likely to be fruitful when applying implicit measures to organizational research. We begin by describing what we label *first-generation* implicit research questions, which involve investigating whether implicit variables have additive effects vis-à-vis their explicit analogs. We then summarize *second-generation* implicit research questions, which capture the dynamic interplay between implicit and explicit cognition.

First-generation implicit research. The way that information is encoded, stored, and processed at implicit and explicit levels differs in meaningful ways. It is not surprising, then, that the affective, cognitive, and behavioral products of implicit and explicit processing are not mere facsimiles of one another. Although there tends to be a modest correlation between scores on implicit and explicit measures (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Nosek, 2005), they often predict unique variance in their criteria of interest (Greenwald, Poehlman, et al., 2009; Johnson et al., 2010). Thus, much initial research was aimed at establishing whether implicit scores predict incremental variance beyond explicit scores and the size of their unique contribution. For example, Johnson et al. (2010) observed that implicit affectivity (measured via a word fragment completion task) predicted supervisor-rated task performance and citizenship behavior above and beyond explicit affectivity (measured via Watson, Clark, & Tellegen's [1988] Positive and Negative Affect Scale [PANAS]). In fact, the implicit measure appeared to be the superior predictor of supervisor-rated performance: The average ΔR^2 for implicit scores was .24 and the average contribution to the model R^2 for implicit scores was 82%. In contrast, the average ΔR^2 for explicit scores when entered in a second step following the implicit scores was .08 and their average contribution to the model R^2 was 18%. Paralleling these findings, it has been found that implicit measures of attitudes, beliefs, and self-concept predict variability in relevant outcomes above and beyond their explicit counterparts (Johnson & Saboe, 2011; Leavitt, Fong, et al., 2011; for a meta-analysis, see Greenwald, Poehlman, et al., 2009). Findings such as these suggest that effect sizes may be underestimated when constructs that operate at implicit levels are inappropriately measured using explicit techniques. Given that improvements in prediction have practical significance in many cases (e.g., improved worker health

in the case of safety performance), there is value in estimating the incremental and relative importance of implicit scores. Nevertheless, we believe that ''second-generation'' implicit research, which examines the unique interplay of implicit and explicit cognition in the workplace, will provide great insight into organizational behavior.

Second-generation implicit research. Of further interest are the ways in which implicit and explicit processes interface, converge and diverge, and change over time. Importantly, although nascent work has been conducted with regard to some of these issues, many of these second-generation questions have yet to be addressed in organizational literature. In the following, we present a nonexhaustive list of more complex potential relationships between implicit cognitions, explicit cognitions, and behaviors. This list builds on and greatly expands on the implicit-explicit interactions cataloged by Bing, LeBreton, et al. (2007) and is broken down into moderator effects, meditational relationships, and iterative processes that play out over time.

Moderator Effects

Detecting interactions involving implicit and explicit processes can be of great value to the organization sciences. Several interaction patterns are theoretically meaningful. First, explicit traits can facilitate or ''channel'' the expression of implicit tendencies. Second, individuals can attempt to compensate for implicit cognitions they explicitly reject. Third, discrepant implicit and explicit evaluations of the same attitude object can lead to feelings of ambivalence and diminished attitude-behavior correspondence. Finally, factors that moderate whether implicit and explicit cognitions correspond with one another can be fruitfully examined.

Channeling. The ''channeling hypothesis'' stipulates that implicit motives primarily influence behavior when explicit personality traits that facilitate their expression are present (McClelland, Koestner, & Weinberger, 1989). Such interactive effects have been observed using TAT and CRT measures of power and affiliation motives, as well as aggressive cognitions (Bing, Stewart, et al., 2007; Frost, Ko, & James, 2007; Winter, John, Stewart, Klohnen, & Duncan, 1998). For example, TAT measures of the implicit need for affiliation and power predicted future behaviors more effectively for extroverted than introverted participants (Winter et al., 1998). This is consistent with the idea that because the life interests of extroverted individuals are directed outward, their implicit motives are more readily channeled into their social behaviors. In organizational contexts, the expression of implicit tendencies may similarly be channeled by higher-level processes. Thus, in addition to explicit personality traits, prevailing organizational norms might influence the extent to which an employee's implicit tendencies are expressed and, in turn, influence actual behavior. For example, Reynolds and colleagues (2010) found that an implicit association between business and ethical led to unethical behavior, but only in a more prototypical (competitive) business context.

Explicit compensation. Explicit compensation effects occur when an individual attempts to consciously override or suppress his or her implicit cognitions. For example, people with high explicit self-esteem and low implicit self-esteem tend to be narcissistic and defensive—a pattern theoretically underpinned by models of threatened egotism, which suggest that such individuals become defensive in their attempts to compensate for low implicit self-regard (Jordan, Spencer, & Zanna, 2005; Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; Zeigler-Hill, 2006). Therefore, measuring both implicit and explicit self-esteem simultaneously might provide a potentially powerful way of assessing organizational leaders' narcissism and predicting irresponsible executive decision making (Chatterjee & Hambrick, 2007). A related but distinct form of explicit compensation occurs in the case of discrepancies between implicit motives (as assessed by the CRT) and explicit

personality measures. For example, individuals who are high in implicit achievement motivation but consciously disavow any such motive tend to manifest their achievement motivation only in indirect and subtle ways (Bing, LeBreton, et al., 2007).

Thus, explicit corrective processes are more likely to be successful for outcomes over which the individual can effectively exert conscious control (e.g., hiring decisions, as opposed to nonverbal behaviors; Wilson, Lindsey, & Schooler, 2000). In some cases, the person can even overcompensate for his or her self-perceived automatic biases (Olson & Fazio, 2004b; Towles-Schwen & Fazio, 2003). For instance, Olson and Fazio (2004b) found that participants who harbored negative associations with members of minority groups, but also scored high on explicit motivation to control prejudice, provided overly favorable trait ratings to Black targets.

Implicit-explicit ambivalence. Sometimes implicit processes do not concord with explicit processes. Such dissociations create a dilemma because implicit and explicit processing lead to opposing predictions. Take, for example, an employee with high explicit positive affectivity but low implicit positive affectivity: What are the chances of this employee showing organizational citizenship behaviors, given that high explicit positive affectivity fosters citizenship behavior but low implicit positive affectivity inhibits it? One potential consequence of discrepancies between implicit and explicit cognitions is diminished behavioral effects of both. Consistent with this idea, Greenwald, Poehlman, et al.'s (2009) meta-analysis found that across scores of investigations and topics, when IAT and self-report measures were weakly correlated, both were less effective predictors of behavior. More recently, Leavitt, Fong, et al. (2011) observed that employees were less likely to be identified with their organization when discrepancies between implicit and explicit job attitudes were high. When explicit and implicit processes diverge, they can pull the person in opposite directions, such that neither drives behavior.

Resolving the dilemma of implicit-explicit ambivalence requires an understanding of when implicit processing has greater influence on behavior vis-à-vis explicit processing, which depends on both situation- and person-based factors. With respect to the former, implicit processing is likely to dominate when situations are characterized by, for example, high cognitive load or high task routinization (e.g., Aarts & Dijksterhuis, 2000; Devine, 1989). With respect to the latter, implicit attitudes are more likely to predict behavior when people have, for example, high expertise or low task motivation (e.g., Chaiken, 1987; Ericsson, Krampe, & Tesch-Römer, 1993). One individual difference variable that has direct implications for the tug of war between implicit and explicit processing is need for cognition, which refers to the extent that people enjoy and engage in effortful thinking (Cacioppo & Petty, 1982). People with high need for cognition engage in more systematic and deliberative processing and thus should engage in greater explicit processing and place greater weight on such processing. Consistent with this view, Johnson and Steinman (2009) observed that unfairness had a stronger effect on explicit motivation when need for cognition was high, whereas its effect on implicit motivation was stronger when need for cognition was low. In addition, automatic associations are more likely to predict the behaviors of individuals who are low in need for cognition (Florack, Scarabis, & Bless, 2001) or are psychologically exhausted (Hofmann et al., 2007). A direction for future research is to identify additional person- and organization-based factors that moderate the relative influence of dissociated implicit and explicit processes in work settings.

Dissociations as the dependent variable. Finally, dissociations between implicit and explicit measures can themselves be treated as a theoretically meaningful outcome. Nosek (2005) examined moderators of the correlations between IAT and self-report measures across 57 attitude objects and found that implicit-explicit correlations were significantly lower in domains likely to elicit social desirability concerns (e.g., gender stereotyping, as opposed to consumer preferences). Conditions in which employees are likely to self-censure or self-deceive in explicit responses (e.g., employees

are highly embedded, layoffs are likely, or normative commitment is high) are likely to produce low convergence in implicit/explicit processes. Furthermore, the degree of correspondence between scores on implicit and explicit measures is affected by state variables. For example, people's self-reported attitudes become more consistent with their automatic associations when they focus on their emotions rather than on their cognitions (Smith & Nosek, 2011) and provide their reports under conditions of high, rather than low, cognitive load (Quirin, Kazén, & Kuhl, 2009; Ratliff, Smith, & Nosek, 2008). Thus, to the extent that workplace conditions elicit emotional responses and are cognitively taxing, we expect discrepancies between implicit and explicit processes to decline.

Mediation Effects

Less commonly examined than moderation effects are mediation effects (MacKinnon, 2008; Preacher & Hayes, 2008) involving implicit processes. Implicit cognitions can exert indirect effects on behavior that are mediated by their constraining influence on explicit cognitions. In addition, changes in explicit attitudes can be mediated by preceding changes in implicit attitudes and vice versa. Finally, the impact of situational factors on behavior can be mediated by implicit cognitions.

Constraint effects. Dual process models posit that implicit and explicit processing occur simultaneously and can spill over to influence one another (Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004). Given that implicit processing operates on faster time cycles and often outside of attention and motivation, it is typical for implicit processing to constrain what unfolds at explicit levels (Lord & Harvey, 2002). Models that incorporate implicit and explicit processing might therefore adopt a mediation framework wherein implicit processes have direct effects on behavior as well as indirect effects via explicit processing (Bing, LeBreton, et al., 2007). In other words, implicit cognitions may sometimes bias explicit cognitions and in doing so indirectly shape relevant judgments and behaviors. This hypothesis is consistent with many contemporary theories in the organizational sciences. For example, Weiss and Cropanzano's (1996) affective events theory proposes that discrete work events may elicit automatic affect-driven behavior through an implicit route or more calculated behavior through an explicit route that is shaped by implicit processes.

Implicit mediation of explicit attitude change. Context has been shown to be extremely important in the expression of implicit associations (Blair, 2002). For example, exposure to positive counterexamples (e.g., images of high-achieving African Americans such as Oprah Winfrey) reduces implicit racial bias for at least 24 hours (Dasgupta & Greenwald, 2001; Lowery, Hardin, & Sinclair, 2001). Peters and Gawronski (2011) contend that the working self-concept is populated by associations that are momentarily activated (rather than stable), such that "the implicit self-concept provides an on-line, context-sensitive source of activated information that substantiates, and potentially informs the revision of, this network of self-beliefs" (p. 436). By making a particular trait (introversion/extroversion) present within the working self through a focused-recall exercise (i.e., remembering times where participants were particularly introverted or extroverted), they were able to find significant corresponding movement in an Implicit Association Test designed to capture introversion/extroversion associated with the self. This dynamic shifting of implicit associations has been theorized to be most likely for polyvalent, multifaceted constructs (Gregg, Seibt, & Banaji, 2006), where sets of subassociations can be activated. Many organizational phenomena of interest are both multifaceted and polyvalent (e.g., "my organization" can include the physical environment, coworkers, supervisor, my job, or my industry, and I may feel differently about each), suggesting that dynamic shifts in implicit associations should be of interest to organizational scholars.

Of particular interest, implicit cognitions can mediate the effects of experimental manipulations on explicit attitudes. Gawronski and Bodenhausen (2006) review evidence that automatic

associations mediate the effect of affective and experiential manipulations on explicit attitudes; conversely, explicit attitudes mediate the effects of logical arguments on automatic associations. Examining the specific mediating role of explicit and implicit cognitions for attitude change is important for many areas in organization science. Research on corporate reputation, for example, might benefit from a better understanding of how people's explicit attitudes toward a company change through preceding shifts in implicit cognitions.

Implicit mediation of behavior. Implicit cognitions can also mediate the effects of situational variables on relevant outcomes. For example, DeSteno, Valdesolo, and Bartlett (2006) found that having a work collaboration disrupted by a third party elicited feelings of jealousy and that this effect was mediated by changes in implicit self-esteem scores, as assessed by the IAT. Similarly, Leavitt, Zhu, and Aquino (2011) found that the effects of situationally activated moral identity on concern for stakeholders were mediated by shifts in the extent to which participants automatically associated business with ethics. These initial investigations go beyond correlational studies (Greenwald, Poehlman, et al., 2009) in demonstrating that implicit attitudes can actually mediate external influences on behavior.

Iterative Effects

Causal relationships between implicit cognitions, explicit cognitions, and behaviors are most likely multidirectional and play out over time in an iterative manner. Implicit cognitions may in some cases determine future behaviors but in others simply reflect past acts the person has already carried out. Of particular theoretical interest is the possibility that explicit attitudes often constitute post hoc justifications for behaviors driven by implicit cognitions.

Do implicit attitudes direct or reflect behavior?. Existing work establishes a correlational relationship between scores on implicit measures and relevant outcomes. However, correlations between implicit measures and behavioral outcomes could result from past actions shaping implicit cognitions rather than implicit cognitions guiding future behaviors. For example, frequently carried out behaviors may condition new automatic associations. One means of examining this possibility is the use of longitudinal designs in which attitudinal variables and behaviors are assessed at multiple points in time. Such a design allows the researcher to begin to answer the question "Do implicit attitudes direct or reflect behavior?" Of particular interest, the researcher can examine whether implicit attitudes at Time 1 predict behavior at Time 2 more effectively than behavior at Time 1 predicts implicit attitudes at Time 2, pointing to a potential causal contribution of implicit attitudes. Such processes may prove especially generative for better understanding the potentially reciprocal role of workplace attitudes on organizational citizenship or counterproductive work behaviors.

Explicit attitudes as post hoc constructions. In some cases, implicit cognitions drive behaviors, which are in turn rationalized and justified in the form of explicit attitudes (for experimental evidence of such a process, see Uhlmann, Pizarro, Tannenbaum, & Ditto, 2009). Explicit attitudes have been shown to reflect past behavior based on two primary mechanisms: self-perception and cognitive dissonance. Self-perception effects occur when a person infers his or her attitudes by consciously observing or recalling his or her past behaviors (Bem, 1972). Cognitive dissonance, in contrast, is a more "hot" process in which the person explicitly rationalizes his or her past behavior through a process of motivated reasoning (Festinger, 1957).

We speculate that the "hot" motives tapped by interpretation-based implicit measures such as the CRT underlie the behaviors implicated in cognitive dissonance effects, whereas the cognitive processes tapped by accessibility-based and association-based implicit measures drive the behaviors

that are the subject of self-perception effects. A CRT measure of aggressive motives may predict future antisocial workplace behaviors, which are then rationalized via explicit endorsement of such behaviors as morally acceptable. Conversely, the automatic associations tapped by IAT measures may drive consumer choices, and consumers then infer their explicit preferences by observing their own past behaviors. Empirical evidence of such effects would not necessarily suggest that explicit cognitions are epiphenomenal. Once a person has explicitly rationalized deviant workplace behaviors driven by implicit social motives, his or her newly formed explicit attitudes may ''take on a life of their own'' and genuinely guide future acts (and potentially shape implicit cognitions through the multifold processes outlined previously). Distinctions in such processes may prove useful in furthering our understanding of domains such as moral disengagement (Bandura, 1999), wherein individuals excuse themselves from their own moral standards after committing ethical transgressions.

In addition to examining the extent to which implicit and explicit measures predict unique variance in organizational behaviors, future research in organizations should seek to account for the potentially dynamic interplay between implicit and explicit cognitions. This includes a consideration of potential moderator effects, meditator effects, and iterative processes that play out over time.

Conclusion

Researchers have long focused on the explicit aspects of organizational life that are readily reportable in interviews and surveys. However, due to multitasking, high cognitive load, routinization, and other characteristics of modern work life, a large proportion of daily processing occurs outside employees' awareness and control. By failing to account for implicit influences, existing theories in the organizational sciences may be incomplete and at times incorrect. This has led to calls by researchers to pay greater attention to implicit processing within organizations (e.g., Barsade et al., 2009; Bing, LeBreton, et al., 2007; Haines & Sumner, 2006). The inclusion of implicit processes and implicit measures should open new areas of inquiry, resolve inconsistencies between theory and findings, and help add methodological completeness to our work. This article offers a critical and comprehensive ''toolkit'' to get organizational researchers started in that pursuit.

Effectively adapting implicit measures for use in organizational settings requires that researchers have knowledge of when they are needed, their limitations, and the appropriateness of their use. To address these issues, we identified conditions in which implicit measures will be especially valuable to organizational scholars, which range from theoretical specifications (e.g., when focal phenomenon exists outside awareness) to methodological issues (e.g., when response distortion is likely). Knowing when to use implicit measures is, however, only half the battle because multiple alternatives exist, each with its own underlying assumptions, strengths, and limitations. We developed the first functional taxonomy of available implicit measures based on their critical assumptions and the implicit processes that they capture (i.e., accessibility, associations, or interpretations; see Table 2). The present review and its associated tables serve as a ''clearinghouse'' for available resources and key citations related to individual measures. At the same time we present theoretical and practical criteria for choosing the most appropriate measure for a given research question, based on the goals and resources of the researchers. With these new tools in hand, organizational researchers can set out to explore how implicit processes operate in organizational contexts, influencing how employees think, feel, and behave at work.

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Notes

1. Although the terms *implicit* and *explicit* refer to psychological processes, we use the term *implicit measures* as a rubric to describe indirect measures specifically designed to capture *implicit processes*. All *implicit measures* are necessarily indirect, but not all indirect measures are implicit. For example, measuring the wear on floor tiles in a museum is an indirect measure of the popularity of an exhibit, but museum patrons may well be consciously aware of their attitudes toward the exhibit. Thus, the term *implicit measures* describes both measurement type (indirect) and the target of measurement (implicit processes). We use the term *explicit measures* to describe tools specifically designed to capture explicit cognition (usually self-report questionnaires).
2. Biological measures such as cortisol levels, skin conductance, and functional magnetic resonance imaging (fMRI) represent a separate class of indirect measures. Although these measures might also be promising for organizational research, they are too distal from the psychological measures we focus on in this article to be included in our taxonomy.

References

Aarts, H., & Dijksterhuis, A. (2000). Habits as knowledge structures: Automaticity in goal-directed behaviour. *Journal of Personality and Social Psychology*, *78*, 53-63.

Anastasi, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). New York, NY: Prentice-Hall.

Arkes, H. R., & Tetlock, P. E. (2004). Attributions of implicit prejudice, or "Would Jesse Jackson 'fail' the Implicit Association Test?" *Psychological Inquiry*, *15*, 257-278.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta analytic review. *British Journal of Social Psychology*, *40*, 471-499.

Asendorpf, J. B., Banse, R., & Mücke, D. (2002). Double dissociation between implicit and explicit personality self-concept: The case of shy behavior. *Journal of Personality and Social Psychology*, *83*, 380-393.

Balota, D. A., Yap, M. J., Cortese, M. J., Hutchison, K. A., Kessler, B., Loftis, B., . . . Treiman, R. (2007). The English lexicon project. *Behavior Research Methods*, *39*, 445-459.

Banaji, M. R., Nosek, B. A., & Greenwald, A. G. (2004). No place for nostalgia in science: A response to Arkes & Tetlock. *Psychological Inquiry*, *15*, 279-289.

Bandura, A. (1999). Moral disengagement in the perpetration of inhumanities. *Personality and Social Psychology Review*, *3*, 193-203.

Bar-Anan, Y., & Nosek, B. A. (2011). *Perceptions of intentionally causing unintentional attitude effects: The case of the affective misattribution procedure*. Unpublished manuscript.

Bar-Anan, Y., Nosek, B. A., & Vianello, M. (2009). The sorting paired features task: A measure of association strengths. *Experimental Psychology*, *56*, 329-343.

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, efficiency, intention, and control in social cognition. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 1-40). Hillsdale, NJ: Erlbaum.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, *54*, 462-479.

Barsade, S. G., Ramarajan, L., & Westen, D. (2009). Implicit affect in organizations. *Research in Organizational Behavior*, *29*, 135-162.

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 6, pp. 1-62). New York, NY: Academic Press.

Bing, M. N., LeBreton, J. M., Davison, H. K., Migetz, D. Z., & James, L. R. (2007). Integrating implicit and explicit social cognitions for enhanced personality assessment: A general framework for choosing measurement and statistical methods. *Organizational Research Methods*, *10*, 346-389.

Bing, M. N., Stewart, S. M., Davison, H. K., Green, P. D., McIntyre, M. D., & James, L. R. (2007). An integrative typology of personality assessment for aggression: Implications for predicting counterproductive workplace behavior. *Journal of Applied Psychology*, *92*, 722-744.

Blair, I. V. (2002). The malleability of automatic stereotypes and prejudice. *Personality and Social Psychology Review*, *6*, 242-261.

Blair, I. V., & Banaji, M. R. (1996). Automatic and controlled processes in stereotype priming. *Journal of Personality and Social Psychology*, *70*, 1142-1163.

Blanton, H., & Jaccard, J. (2006). Arbitrary metrics in psychology. *American Psychologist*, *61*, 27-41.

Blanton, H., Jaccard, J., Christie, C., & Gonzales, P. M. (2007). Plausible assumptions, questionable assumptions and post hoc rationalizations: Will the real IAT, please stand up? *Journal of Experimental Social Psychology*, *43*, 399-409.

Blanton, H., Jaccard, J., Gonzales, P., & Christie, C. (2006). Decoding the Implicit Association Test: Implications for criterion prediction. *Journal of Experimental Social Psychology*, *42*, 192-212.

Blanton, H., Jaccard, J., Klick, J., Mellers, B., Mitchell, G., & Tetlock, P. E. (2009). Strong claims and weak evidence: Reassessing the predictive validity of the IAT. *Journal of Applied Psychology*, *94*, 567-582.

Borkenau, P., Paelecke, M., & Yu, R. (2009). Personality and lexical decision times for evaluative words. *European Journal of Personality*, *24*, 123-136.

Bornstein, R. F. (1998a). Implicit and self-attributed dependency needs in dependent and histrionic personality disorders. *Journal of Personality Assessment*, *71*, 1-14.

Bornstein, R. F. (1998b). Implicit and self-attributed dependency strivings: Differential relationships to laboratory and field measures of help seeking. *Journal of Personality and Social Psychology*, *75*, 778-787.

Bornstein, R. F. (2002). A process dissociation approach to objective-projective test score interrelationships. *Journal of Personality Assessment*, *78*, 47-68.

Bosson, J. K., Swann, W. B., Jr., & Pennebaker, J.W. (2000). Stalking the perfect measure of implicit self esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology*, *79*, 631-649.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, *1*, 185-216.

Brunstein, J. C., & Maier, G. W. (2005). Implicit and self-attributed motives to achieve: Two separate but interacting needs. *Journal of Personality and Social Psychology*, *89*, 205-222.

Buhrmester, M. D., Blanton, H., & Swann, W. B., Jr. (2011). Implicit self-esteem: Nature, measurement, and a new way forward. *Journal of Personality and Social Psychology*, *100*, 365-385.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, *42*, 116-131.

Chaiken, S. (1987). The heuristic model of persuasion. In M. Zanna, J. Olson, & C. Herman (Eds.), *Social influence: The Ontario symposium* (*Vol. 5*, pp. 3-39). Hillsdale, NJ: Erlbaum.

Chatterjee, A., & Hambrick, D. C. (2007). It's all about me: Narcissistic CEOs and their effects on company strategy and performance. *Administrative Science Quarterly*, *52*, 351-386.

Conrey, F. R., Sherman, J. W., Gawronski, B., Hugenberg, K., & Groom, C. (2005). Separating multiple processes in implicit social cognition: The Quad-Model of implicit task performance. *Journal of Personality and Social Psychology*, *89*, 469-487.

Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology*, *83*, 1314-1329.

Cramer, P. (2000). Defense mechanisms in psychology today: Further processes for adaptation. *American Psychologist*, *55*, 637-646.

Cramer, P. (2006). *Protecting the self: Defense mechanisms in action*. New York, NY: Guilford Press.

Cvencek, D., Greenwald, A. G., & Meltzoff, A. N. (2011). Measuring implicit attitudes of 4-year-olds: The Preschool Implicit Association Test. *Journal of Experimental Child Psychology*, *109*, 187-200.

Dabbs, J. M., Bassett, J. F., & Dyomina, N. V. (2003). The PALM IAT: A portable version of the implicit association task. *Behavior Research Methods*, *35*, 90-95.

Dasgupta, N., & Greenwald, A. G. (2001). On the malleability of automatic attitudes: Combating automatic prejudice with images of admired and disliked individuals. *Journal of Personality and Social Psychology*, *81*, 800-814.

Dasgupta, N. M., & Rivera, L. M. (2006). From automatic anti-gay prejudice to behavior: The moderating role of conscious beliefs about gender and behavioral control. *Journal of Personality and Social Psychology*, *91*, 268-280.

Davies, M., & Gardner, D. (2010). *A frequency dictionary of contemporary American English: Word sketches, collocates and thematic lists*. London: Routledge.

De Houwer, J. (2003). The extrinsic affective Simon task. *Experimental Psychology*, *50*, 77-85.

De Houwer, J., & De Bruycker, W. (2007). The implicit association test outperforms the extrinsic affective Simon task as an implicit measure of inter-individual differences in attitudes. *British Journal of Social Psychology*, *46*, 401-421.

De Jong, P. J., Wiers, R. W., Van de Braak, M., & Huijding, J. (2007). Using the extrinsic affective Simon test as a measure of implicit attitudes towards alcohol: Relationship with drinking behavior and alcohol problems. *Addictive Behaviors*, *32*, 881-887.

Derous, E., Nguyen, H.-H., & Ryan, A. M. (2009). Hiring discrimination against Arab minorities: Interactions between prejudice and job characteristics. *Human Performance*, *22*, 297-320.

DeSteno, D., Valdesolo, P., & Bartlett, M. Y. (2006). Jealousy and the threatened self: Getting to the heart of the green-eyed monster. *Journal of Personality and Social Psychology*, *91*, 626-641.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, *56*, 5-18.

Dijksterhuis, A., & Bargh, J. A. (2001). The perception-behavior expressway: Automatic effects of social perception on social behavior. *Advances in Experimental Social Psychology*, *33*, 1-40.

Duchek, J. M., & Neely, J. H. (1989). A dissociative word-frequency X levels-of-processing interaction in episodic recognition and lexical decision tasks. *Memory and Cognition*, *17*, 148-162.

Egloff, B., & Schmukle, S. C. (2004). Gender differences in implicit and explicit anxiety measures. *Personality and Individual Differences*, *36*, 1807-1815.

Eide, P., Kemp, A., Silberstein, R. B., Nathan, P. J., & Stough, C. (2002). Test-retest reliability of the emotional Stroop task: Examining the paradox of measurement change. *The Journal of Psychology*, *136*, 514-520.

Epstein, S., & Pacini, R. (1999). Some basic issues regarding dual-process theories from the perspective of cognitive-experiential self-theory. In S. Chaiken & Y. Trope (Eds.), *Dual process theories in social psychology* (pp. 462-482). New York, NY: Guilford Publishers.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, *100*, 363-406.

Exner, J. E., Jr. (1986). *The Rorschach: A comprehensive system. Vol. I: Basic foundations* (2nd ed.). New York, NY: Wiley.

Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology*, *69*, 1013-1027.

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition: Their meaning and use. *Annual Review of Psychology*, *54*, 297-327.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, *50*, 229-238.

Ferguson, M. J., & Bargh, J. A. (2004). Liking is for doing: The effects of goal pursuit on automatic evaluation. *Journal of Personality and Social Psychology*, *87*, 557-572.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

Fiedler, K., & Bluemke, M. (2005). Faking the IAT: Aided and unaided response control on the implicit association tests. *Basic and Applied Social Psychology*, *27*, 307-316.

Fila-Jankowska, A., & Jankowski, K. (2008). Parametry psychometryczne metody symulowanego dążenia-unikania (SDU) [Psychometric parameters of the Approach-Avoidance Simulation (AAS) method]. *Psychologia Społeczna*, *3*, 109-123.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition* (2nd ed.). New York, NY: McGraw-Hill.

Florack, A., Scarabis, M., & Bless, H. (2001). When do associations matter?: The use of implicit associations towards ethnic groups in person judgments. *Journal of Experimental Social Psychology*, *37*, 518-524.

Frost, B. C., Ko, C. E., & James, L. R. (2007). Implicit and explicit personality: A test of a channeling hypothesis for aggressive behavior. *Journal of Applied Psychology*, *92*, 1299-1319.

Gantz, B. S., Erickson, C. O., & Stephenson, R. W. (1972). Some determinants of promotion in a research and development population. *Proceedings of the 80th Annual Convention of the American Psychological Association*, *7*, 451-452.

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, *132*, 692-731.

Gawronski, B., Deutsch, R., & Banse, R. (2011). Response interference tasks as indirect measures of automatic associations. In K. C. Klauer, A. Voss, & C. Stahl (Eds.), *Cognitive methods in social psychology* (pp. 78-123). New York, NY: Guilford Press.

Gawronski, B., Ehrenberg, K., Banse, R., Zukova, J., & Klauer, K. C. (2003). It's in the mind of the beholder: The impact of stereotypic associations on category-based and individuating impression formation. *Journal of Experimental Social Psychology*, *39*, 16-30.

Gawronski, B., & Strack, F. (2004). On the propositional nature of cognitive consistency: Dissonance changes explicit, but not implicit attitudes. *Journal of Experimental Social Psychology*, *40*, 535-542.

George, J. M. (2009). The illusion of will in organizational behavior research: Nonconscious processes and job design. *Journal of Management*, *35*, 1318-1339.

Gilbert, D. T., & Hixon, J. G. (1991). The trouble of thinking: Activation and application of stereotypic beliefs. *Journal of Personality and Social Psychology*, *60*, 509-517.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, *102*, 4-27.

Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellott, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review*, *109*, 3-25.

Greenwald, A. G., & Farnham, S. D. (2000). Using the implicit association test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, *79*, 1022-1038.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464-1480.

Greenwald, A. G., & Nosek, B. A. (2008). Attitudinal dissociation: What does it mean? In R. Petty, R. Fazio, & P. Briñol (Eds.), *Attitudes: Insights from the new implicit measures* (pp. 65-82). Hillsdale, NJ: Lawrence Erlbaum Associates.

Greenwald, A. G., Poehlman, T. A., Uhlmann, E., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, *97*, 17-41.

Greenwald, A. G., Smith, C. T., Sriram, N., Bar-Anan, Y., & Nosek, B. A. (2009). Race attitude measures predicted vote in the 2008 U.S. presidential election. *Analyses of Social Issues and Public Policy*, *9*, 241-253.

Gregg, A. P., Seibt, B., & Banaji, M. R. (2006). Easier done than undone: Asymmetry in the malleability of implicit preferences. *Journal of Personality and Social Psychology*, *90*, 1-20.

Haines, E. L., & Sumner, K. (2006). Implicit measurement of attitudes, stereotypes, and self-concepts in organizations: Teaching old dogmas new tricks. *Organizational Research Methods*, *9*, 536-553.

Hekman, D., Aquino, K., Owens, B., Mitchell, T., Schilpzand, P., & Leavitt, K. (2010). An examination of whether and how racial and gender biases influence customer satisfaction ratings. *Academy of Management Journal*, *53*, 238-264.

Hetts, J. J., Sakuma, M., & Pelham, B. W. (1999). Two roads to positive regard: Implicit and explicit self-evaluation and culture. *Journal of Experimental Social Psychology*, *35*, 512-559.

Hofmann, W., Friese, M., & Roefs, A. (2009). Three ways to resist temptation: The independent contributions of executive attention, inhibitory control, and affect regulation to the impulse control of eating behavior. *Journal of Experimental Social Psychology*, *45*, 431-435.

Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the implicit association test and explicit self-report measures. *Personality and Social Psychology Bulletin*, *31*, 1369-1385.

Hofmann, W., Rauch, W., & Gawronski, B. (2007). And deplete us not into temptation: Automatic attitudes, dietary restraint, and self-regulatory resources as determinants of eating behavior. *Journal of Experimental Social Psychology*, *43*, 497-504.

Holmes, D. S. (1974). The conscious control of thematic projection. *Journal of Consulting and Clinical Psychology*, *42*, 323-329.

Huseman, R., Hatfield, J., & Miles, E. (1987). A new perspective on equity theory: The equity sensitivity construct. *Academy of Management Review*, *12*, 222-234.

James, L. R. (1998). Measurement of personality via conditional reasoning. *Organizational Research Methods*, *1*, 131-163.

James, L. R., & LeBreton, J. M. (2010). Assessing aggression using conditional reasoning. *Current Directions in Psychological Science*, *19*, 30-35.

James, L. R., & LeBreton, J. M. (2011). *Assessing the implicit personality through conditional reasoning*. Washington, DC: American Psychological Association.

James, L. R., LeBreton, J. M., Mitchell, T. R., Smith, D. R., DeSimone, J. A., Cookson, R., & Lee, H. J. (2012). Use of conditional reasoning to measure the power motive. In R. S. Landis & J. M. Cortina (Eds.), *Frontiers of Methodology in Organizational Research*. London: Routledge.

James, L. R., & McIntyre, M. D. (2000). *Conditional reasoning test of aggression manual*. Knoxville, TN: Innovative Assessment Technology.

James, L. R., McIntyre, M. D., Glisson, C. A., Bowler, J., & Mitchell, T. R. (2004). The conditional reasoning measurement system for aggression: An overview. *Human Performance*, *17*, 271-295.

James, L. R., McIntyre, M. D., Glisson, C. A., Green, P. D., Patton, T. W., LeBreton, J. M., . . . Williams, L. J. (2005). A conditional reasoning measure for aggression. *Organizational Research Methods*, *8*, 69-99.

Johnson, R. E., & Lord, R. G. (2010). Implicit effects of justice on self-identity. *Journal of Applied Psychology*, *95*, 681-695.

Johnson, R. E., & Saboe, K. (2011). Measuring implicit traits in organizational research: Development of an indirect measure of employee implicit self-concept. *Organizational Research Methods*, *14*, 530-547.

Johnson, R. E., & Steinman, L. (2009). The use of implicit measures for organizational research: An empirical example. *Canadian Journal of Behavioural Science*, *41*, 202-212.

Johnson, R. E., & Tan, J. A. (2009). Explicit reasons for examining the implicit motive system. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *2*, 103-105.

Johnson, R. E., Tolentino, A. L., Rodopman, O. B., & Cho, E. (2010). We (sometimes) know not how we feel: Predicting work behaviors with an implicit measure of trait affectivity. *Personnel Psychology*, *63*, 197-219.

Jordan, C. H., Spencer, S. J., & Zanna, M. P. (2005). Types of high self-esteem and prejudice: How implicit self-esteem relates to ethnic discrimination among high explicit self-esteem individuals. *Personality and Social Psychology Bulletin*, *31*, 693-702.

Jordan, C. H., Spencer, S. J., Zanna, M. P., Hoshino-Browne, E., & Correll, J. (2003). Secure and defensive high self-esteem. *Journal of Personality and Social Psychology*, *85*, 969-978.

Karpinski, A., & Hilton, J. L. (2001). Attitudes and the Implicit Association Test. *Journal of Personality and Social Psychology*, *81*, 774-788.

Karpinski, A., & Steinman, R. B. (2006). The single category Implicit Association Test as a measure of implicit social cognition. *Journal of Personality and Social Psychology*, *91*, 16-32.

Kay, A. C., & Jost, J. T. (2003). Complementary justice: Effects of "poor but happy" and "poor but honest" stereotype exemplars on system justification and implicit activation of the justice motive. *Journal of Personality and Social Psychology*, *85*, 823-837.

Kay, A. C., Wheeler, S. C., Bargh, J. A., & Ross, L. (2004). Material priming: The influence of mundane physical objects on situational construal and competitive behavioral choice. *Organizational Behavior and Human Decision Processes*, *95*, 83-96.

Kindt, M., Bierman, D., & Brosschot, J. F. (1996). Stroop versus Stroop: Comparison of a card format and a single-trial format of the standard color-word Stroop task and the emotional Stroop task. *Personality and Individual Differences*, *21*, 653-661.

Koopman, J., Howe, M., Johnson, R. E., Tan, J. A., & Chang, C.-H. (in press). A framework for developing word fragment completion tasks. *Human Resource Management Review*.

Kunda, Z., Davies, P. G., Adams, B. D., & Spencer, S. J. (2002). The dynamic time course of stereotype activation: Activation, dissipation, and resurrection. *Journal of Personality and Social Psychology*, *82*, 283-299.

Kunda, Z., & Spencer, S. J. (2003). When do stereotypes come to mind and when do they color judgment? A goal-based theory of stereotype activation and application. *Psychological Bulletin*, *129*, 522-544.

Lane, K. A., Banaji, M. R., Nosek, B. A., & Greenwald, A. G. (2007). Understanding and using the Implicit Association Test: IV: What we know (so far) about the method. In B. Wittenbrink & N. Schwarz (Eds.), *Implicit measures of attitudes* (pp. 59-102). New York, NY: Guilford.

Latham, G. P., Stajkovic, A. D., & Locke, E. A. (2010). The relevance and viability of subconscious goals in the workplace. *Journal of Management*, *36*, 234-255.

Leavitt, K., Fong, C. T., & Greenwald, A. G. (2011). Asking about well-being gets you half an answer: Intra-individual processes of implicit and explicit job attitudes. *Journal of Organizational Behavior*, *32*, 672-687.

Leavitt, K., Zhu, L., & Aquino, K. (2011, August). *Priming moral identity attenuates implicit beliefs about business*. Presented at the Academy of Management annual meeting, San Antonio, TX.

LeBel, E. P., & Gawronski, B. (2009). How to find what's in a name: Scrutinizing the optimality of five scoring algorithms for the name-letter task. *European Journal of Personality*, *23*, 85-106.

LeBreton, J. M., Barksdale, C. D., Robin, J., & James, L. R. (2007). Measurement issues associated with conditional reasoning tests: Indirect measurement and test faking. *Journal of Applied Psychology*, *92*, 1-16.

Lemm, K. M., Lane, K. A., Sattler, D. N., Khan, S. R., & Nosek, B. A. (2008). Assessing implicit cognitions with a paper-format implicit association test. In T. Morrison & M. Morrison (Eds.), *The psychology of modern prejudice* (pp. 123-146). Hauppauge, NY: Nova Science Publishers.

Leroy, S. (2009).Why is it so hard to do my work? The challenge of attention residue when switching between work tasks. *Organizational Behavior and Human Decision Processes*, *109*, 168-181.

Lieberman, M. D. (2007). Attention, control and automaticity: Social cognitive neuroscience. *Annual Review of Psychology*, *58*, 259-289.

Lieberman, M. D., Gaunt, R., Gilbert, D. T., & Trope, Y. (2002). Reflection and reflexion: A social cognitive neuroscience approach to attributional inference. *Advances in Experimental Social Psychology*, *34*, 199-249.

Lilienfeld, S. O., Wood, J. M., & Garb, H. N. (2000). The scientific status of projective techniques. *Psychological Science in the Public Interest*, *1*, 27-66.

Lord, R. G., Diefendorff, J. M., Schmidt, A. M., & Hall, R. J. (2010). Self-regulation at work. *Annual Review of Psychology*, *61*, 548-568.

Lord, R. G., & Harvey, J. L. (2002). An information processing framework for emotional regulation. In R. Lord, R. Klimoski, & R. Kanfer (Eds.), *Emotions in the workplace: Understanding the structure and role of emotions in organizational behavior* (pp. 115-146). San Francisco, CA: Jossey-Bass.

Lowery, B. S., Hardin, C. D., & Sinclair, S. (2001). Social influence effects on automatic racial prejudice. *Journal of Personality and Social Psychology*, *81*, 842-855.

Maass, A., Ceccarelli, R., & Rudin, S. (1996). Linguistic intergroup bias: Evidence for in-group protective motivation. *Journal of Personality and Social Psychology*, *71*, 512-526.

Maass, A., Salvi, D., Arcuri, L., & Semin, G. R. (1989). Language use in intergroup contexts. *Journal of Personality and Social Psychology*, *57*, 981-993.

MacKinnon, S.P. (2008). *Introduction to statistical mediation analysis*. New York, NY: Erlbaum.

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin*, *109*, 163-203.

Mahajan, N., Martinez, M. A., Gutierrez, N. L., Diesendruck, G., Banaji, M. R., & Santos, L. R. (2011). The evolution of intergroup bias: Perceptions and attitudes in rhesus macaques. *Journal of Personality and Social Psychology*, *100*, 387-405.

Manschreck, T. C., Maher, B. A., Milavetz, J. J., Ames, D., Weisstein, C. C., & Schneyer, M. L. (1988). Semantic priming in thought disordered schizophrenic patients. *Schizophrenia Research*, *1*, 61-66.

Martin, L. L., & Tesser, A. (1996). Some ruminative thoughts. In R. Wyer (Ed.), *Advances in social cognition* (Vol. 9, pp. 1-47). Hillsdale, NJ: Erlbaum.

Masling, J. (2002). How do I score thee? Let me count the ways or some different methods of categorizing Rorschach responses. *Journal of Personality Assessment*, *79*, 399-421.

Mathews, A. M., & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy*, *23*, 563-569.

McClelland, D. C., & Boyatzis, R. E. (1982). The leadership motive pattern and long term success in management. *Journal of Applied Psychology*, *67*, 737-743.

McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? *Psychological Review*, *96*, 690-702.

McClelland, J. L., McNaughton, B. L., & O'Reilly, R. C. (1995). Why there are complementary learning systems in the hippocampus and neocortex: Insights from the successes and failures of connectionist models of learning and memory. *Psychological Review*, *102*, 419-457.

McConnell, A. R., & Leibold, J. M. (2009). Weak criticisms and selective evidence: Reply to Blanton et al. (2009). *Journal of Applied Psychology*, *94*, 583-589.

Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology*, *90*, 227-234.

Miner, J. B. (1964). *Scoring guide for the Miner Sentence Completion Scale*. New York, NY: Springer.

Miner, J. B. (1965). *Studies in management education*. New York, NY: Springer.

Miner, J. B. (1978). The Miner Sentence Completion Scale: A reappraisal. *Academy of Management Journal*, *21*, 283-294.

Miner, J. B. (1986). *Scoring guide for the Miner Sentence Completion Scale-Form T*. Buffalo, NY: Organizational Measurement Systems Press.

Miner, J. B. (1997). A psychological typology and its relationship to entrepreneurial success. *Entrepreneurship and Regional Development*, *9*, 319-334.

Miner, J. B., Chen, C. C., & Yu, K. C. (1991). Theory testing under adverse conditions: Motivation to manage in the People's Republic of China. *Journal of Applied Psychology*, *76*, 343-349.

Miner, J. B., & Raju, N. S. (2004). Risk propensity differences between managers and entrepreneurs and between low- and high-growth entrepreneurs: A reply in a more conservative vein. *Journal of Applied Psychology*, *89*, 3-13.

Miner, J. B., Smith, N. R., & Bracker, J. S. (1989). Role of entrepreneurial task motivation in the growth of technological innovative firms. *Journal of Applied Psychology*, *74*, 554-560.

Miner, J. B., Smith, N. R., & Bracker, J. S. (1994). Role of entrepreneurial task motivation in the growth of technologically innovative firms: Interpretations from follow-up data. *Journal of Applied Psychology*, *79*, 627-630.

Mitchell, G., & Tetlock, P. (2006). Antidiscrimination law and the perils of mindreading. *Ohio State Law Journal*, *67*, 1023-1121.

Morgan, C. D., & Murray, H. A. (1935). A method of investigating fantasies: The Thematic Apperception Test. *Archives of Neurology and Psychiatry*, *34*, 289-306.

Nelson, D. L., McEvoy, C. L., & Schreiber, T. A. (2004). The University of South Florida free association, rhyme, and word fragment norms. *Behavior Research Methods, Instruments, & Computers*, *36*, 402-407.

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, *84*, 231-259.

Nosek, B. A. (2005). Moderators of the relationship between implicit and explicit evaluation. *Journal of Experimental Psychology: General*, *134*, 565-584.

Nosek, B. A., & Banaji, M. R. (2001). The go/no-go association task. *Social Cognition*, *19*, 161-176.

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2007). The Implicit Association Test at age 7: A methodological and conceptual review. In J. Bargh (Ed.), *Social psychology and the unconscious: The automaticity of higher mental processes* (pp. 265-292). New York, NY: Psychology Press.

Nuttin, J. M., Jr. (1985). Narcissism beyond Gestalt and awareness: The name letter effect. *European Journal of Social Psychology*, *15*, 353-361.

Olson, M. A., & Fazio, R. H. (2004a). Reducing the influence of extra-personal associations on the Implicit Association Test. *Journal of Personality and Social Psychology*, *86*, 653-667.

Olson, M. A., & Fazio, R. H. (2004b). Trait inferences as a function of automatically-activated racial attitudes and motivation to control prejudiced reactions. *Basic and Applied Social Psychology*, *26*, 1-11.

Payne, B. K., Cheng, C. M., Govorun, O., & Stewart, B. (2005). An inkblot for attitudes: Affect misattribution as implicit measurement. *Journal of Personality and Social Psychology*, *89*, 277-293.

Payne, K. A., Binik, Y. M., Amsel, R., & Khalife, S. (2004). When sex hurts, anxiety and fear orient attention towards pain. *European Journal of Pain*, *9*, 427-436.

Perry, G. G., & Kinder, B. N. (1990). The susceptibility of the Rorschach to malingering: A schizophrenia analogue. In C. Spielberger & J. Butcher (Eds.), *Advances in personality assessment* (Vol. 9, pp. 127-140). Hillsdale, NJ: Lawrence Erlbaum.

Peters, K. R., & Gawronski, B. (2011). Mutual influences between the implicit and explicit self-concepts: The role of memory activation and motivated reasoning. *Journal of Experimental Social Psychology*, *47*, 436-442.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879-891.

Proshansky, H. M. (1943). A projective method for the study of attitudes. *The Journal of Abnormal and Social Psychology*, *38*, 393-395.

Quirin, M., Kazén, M., & Kuhl, J. (2009). When nonsense sounds happy or helpless: The Implicit Positive and Negative Affect Test (IPANAT). *Journal of Personality and Social Psychology*, *97*, 500-516.

Quirin, M., Kazén, M., Rohrmann, S., & Kuhl, J. (2009). Implicit but not explicit affectivity predicts circadian and reactive cortisol: Using the Implicit Positive and Negative Affect Test. *Journal of Personality*, *77*, 401-425.

Ratliff, K. A., Smith, C. T., & Nosek, B. A. (2008). Distinguishing automatic and controlled components of attitudes from direct and indirect measurement methods. *Journal of Experimental Social Psychology*, *44*, 386-396.

Reynolds, S., Leavitt, K., & Decelles, K. (2010). Automatic ethics: The effects of implicit assumptions and contextual cues on moral behavior. *Journal of Applied Psychology*, *95*, 752-760.

Rikers, R. M. J. P., Loyens, S., te Winkel, W., Schmidt, H. G., & Sins, P. H. M. (2005). The role of biomedical knowledge in clinical reasoning: A lexical decision study. *Academic Medicine*, *80*, 945-949.

Ritter, B. A., Fischbein, R. L., & Lord, R. G. (2006). Implicit and explicit expectations of justice as a function of manager and subordinate race. *Human Relations*, *58*, 1-21.

Rooth, D. (2010). Automatic associations and discrimination in hiring: Real world evidence. *Labour Economics*, *17*, 523-534.

Rorschach, H. (1927). *Rorschach Test—Psychodiagnostic plates*. Cambridge, MA: Hogrefe Publishing Corp.

Rudman, L. A. (2011). *Implicit measures for social and personality psychology*. Thousand Oaks, CA: Sage.

Rudman, L. A., & Borgida, E. (1995). The afterglow of construct accessibility: The behavioral consequences of priming men to view women as sexual objects. *Journal of Experimental Social Psychology*, *31*, 493-517.

Rudman, L. A., & Glick, P. (2001). Prescriptive gender stereotypes and backlash toward agentic women. *Journal of Social Issues*, *57*, 743-762.

Rudman, L. A., Greenwald, A. G., & McGhee, D. E. (2001). Implicit self-concept and evaluative implicit gender stereotypes: Self and ingroup share desirable traits. *Personality and Social Psychology Bulletin*, *27*, 1164-1178.

Rudman, L. A., & Heppen, J. B. (2003). Implicit romantic fantasies and women's interest in personal power: A glass slipper effect? *Personality and Social Psychology Bulletin*, *29*, 1357-1370.

Schretlen, D. J. (1997). Dissimulation on the Rorschach and other projective measures. In R. Rogers (Ed.), *Clinical assessment of malingering and deception* (2nd ed., pp. 208-222). New York, NY: Guilford.

Scott, K. A., & Brown, D. J. (2006). Female first, leader second? Gender bias in the encoding of leadership behavior. *Organizational Behavior and Human Decision Processes*, *101*, 230-242.

Seibt, B., Häfner, M., & Deutsch, R. (2007). Prepared to eat: How immediate affective and motivational responses to food cues are influenced by food deprivation. *European Journal of Social Psychology*, *37*, 359-379.

Sekaquaptewa, D., Espinoza, P., Thompson, M., Vargas, P., & Von Hippel, W. (2003). Stereotypic explanatory bias: Implicit stereotyping as a predictor of discrimination. *Journal of Experimental Social Psychology*, *39*, 75-82.

Sekaquaptewa, D., Vargas, P., & Von Hippel, W. (2010). A practical guide to paper-and-pencil implicit measures of attitudes. In B. Gawronski & B. Payne (Eds.), *Handbook of implicit social cognition: Measurement, theory, and applications* (pp. 140-155). New York, NY: Guilford Press.

Shantz, A., & Latham, G. P. (2009). An exploratory field experiment on the effect of subconscious and conscious goals on employee performance. *Organizational Behavior and Human Decision Processes*, *109*, 9-17.

Sherman, S. J., Rose, J. S., Koch, K., Presson, C. C., & Chassin, L. (2003). Implicit and explicit attitudes toward cigarette smoking: The effects of context and motivation. *Journal of Social and Clinical Psychology*, *22*, 13-39.

Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending, and a general theory. *Psychological Review*, *84*, 127-190.

Siegrist, M. (1997). Test-retest reliability of different versions of the Stroop test. *The Journal of Psychology*, *131*, 299-306.

Smith, C. T., & Nosek, B. A. (2011). Affective focus increases the concordance between implicit and explicit attitudes. *Social Psychology*, *42*, 300-313.

Spangler, W. D. (1992). Validity of questionnaire and TAT measures of need for achievement: Two meta-analyses. *Psychological Bulletin*, *112*, 140-154.

Sriram, N., & Greenwald, A. G. (2009). The Brief Implicit Association Test. *Experimental Psychology*, *56*, 283-294.

Stahl, M. J., Grigsby, D. W., & Gulati, A. (1985). Comparing the job choice exercise and the multiple choice version of the Miner Sentence Completion Scale. *Journal of Applied Psychology*, *70*, 228-232.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, *69*, 797-811.

Steffens, M. C. (2004). Is the Implicit Association Test immune to faking? *Experimental Psychology*, *51*, 165-179.

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behaviour. *Personality and Social Psychology Review*, *8*, 220-247.

Strauss, G. P., Allen, D. N., Jorgensen, M. L., & Cramer, S. L. (2005). Test-retest reliability of standard and emotional Stroop tasks: An investigation of color-word and picture-word versions. *Assessment*, *12*, 330-337.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, *18*, 643-662.

Teige, S., Schnabel, K., Banse, R., & Asendorpf, J. B. (2004). Assessment of multiple implicit self-concept dimensions using the extrinsic affective Simon task (EAST). *European Journal of Personality*, *18*, 495-520.

Tiggemanna, M., Hargreavesa, D., Polivyb, J., & McFarlane, T. (2004). A word-stem completion task to assess implicit processing of appearance-related information. *Journal of Psychosomatic Research*, *57*, 73-78.

Towles-Schwen, T., & Fazio, R. H. (2003). Choosing social situations: The relation between automatically-activated racial attitudes and anticipated comfort interacting with African Americans. *Personality and Social Psychology Bulletin*, *29*, 170-182.

Uhlmann, E. L., Pizarro, D. A., & Bloom, P. (2008). Varieties of social cognition. *Journal for the Theory of Social Behaviour*, *38*, 293-322.

Uhlmann, E. L., Pizarro, D. A., Tannenbaum, D., & Ditto, P. H. (2009). The motivated use of moral principles. *Judgment and Decision Making*, *4*, 476-491.

Uhlmann, E. L., Poehlman, T. A., & Nosek, B. (2012). Automatic associations: Personal attitudes or cultural knowledge? In J. Hanson (Ed.), *Ideology, Psychology, and Law* (pp. 228-260). New York, NY: Oxford University Press.

Van de Vijver, F., & Leung, K. (2000). Methodological issues in psychological research on culture. *Journal of Cross-Cultural Psychology*, *31*, 33-51.

Vargas, P. T., Von Hippel, W., & Petty, R. E. (2004). Using partially structured attitude measures to enhance the attitude-behavior relationship. *Personality and Social Psychology Bulletin*, *30*, 197-211.

Vianello, M., Bar-Anan, Y., & Nosek, B. A. (2007). *Reliability of the SPF: Test-retest and internal consistency* (Project Implicit Technical Report No. 2007-01). Retrieved from http://projectimplicit.net/nosek/spf/

Von Hippel, W., Brener, L., & Von Hippel, C. (2008). Implicit prejudice toward injecting drug users predicts intentions to change jobs among drug and alcohol nurses. *Psychological Science*, *19*, 7-11.

Von Hippel, W., Sekaquaptewa, D., & Vargas, P. (1997). The Linguistic Intergroup Bias as an implicit indicator of prejudice. *Journal of Experimental Social Psychology*, *33*, 490-509.

Warrington, E. K., & Weiskrantz, L. (1970). Amnesic syndrome: Consolidation or retrieval? *Nature*, *228*, 629-630.

Warrington, E. K., & Weiskrantz, L. (1974). The effect of prior learning on subsequent retention in amnesic patients. *Neuropsychologia*, *12*, 419-428.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063-1070.

Wegner, D. M., & Bargh, J. A. (1998). Control and automaticity in social life. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., Vol. 1, pp. 446-496). New York, NY: McGraw-Hill.

Weiss, H. M., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the structure, causes, and consequences of affective experiences at work. *Research in Organizational Behavior*, *18*, 1-74.

Williams, J. M. G., Mathews, A., & MacLeod, C. (1996). The emotional Stroop task and psychopathology. *Psychological Bulletin*, *120*, 3-24.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Belknap Press/Harvard University Press.

Wilson, T. D., & Brekke, N. (1994). Mental contamination and mental correction: Unwanted influences on judgments and evaluations. *Psychological Bulletin*, *116*, 117-142.

Wilson, T. D., Dunn, D. S., Kraft, D., & Lisle, D. J. (1989). Introspection, attitude change, and attitude-behavior consistency: The disruptive effects of explaining why we feel the way we do. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 22, pp. 287-343). Orlando, FL: Academic Press.

Wilson, T. D., Lindsey, S., & Schooler, T. Y. (2000). A model of dual attitudes. *Psychological Review*, *107*, 101-126.

Winter, D. G., John, O. P., Stewart, A. J., Klohnen, E. C., & Duncan, L. E. (1998). Traits and motives: Toward an integration of two traditions in personality research. *Psychological Review*, *105*, 230-250.

Winter, D. G., & Stewart, A. J. (1977). Power motivation as a function of retest instructions. *Journal of Consulting and Clinical Psychology*, *45*, 436-440.

Yogeeswaran, K., & Dasgupta, N. (2010). Will the "real" American please stand up? The effect of implicit national prototypes on discriminatory behavior and judgments. *Personality and Social Psychology Bulletin*, *36*, 1332-1345.

Yoshida, E., Peach, J. M., Zanna, M. P., & Spencer, S. J. (2012). Not all automatic associations are created equal: How implicit normative evaluations are distinct from implicit attitudes and uniquely predict meaningful behaviour. *Journal of Experimental Social Psychology*, *48*, 694-706.

Zeigler-Hill, V. (2006). Discrepancies between implicit and explicit self-esteem: Implications for narcissism and self-esteem instability. *Journal of Personality*, *74*, 119-143.

Ziegert, J. C., & Hanges, P. J. (2005). Employment discrimination: The role of implicit attitudes, motivation, and a climate for racial bias. *Journal of Applied Psychology*, *90*, 553-562.

Ziegert, J. C., & Hanges, P. J. (2009). Strong rebuttal for weak criticisms. *Journal of Applied Psychology*, *94*, 590-597.

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