Chapter 12

Conceptualizing and measuring the implicit personality: The state of the science

Amanda N. Moeller, Benjamin N. Johnson, Kenneth N. Levy, and James M. LeBreton
The Pennsylvania State University, University Park, PA, United States

Research on implicit processes and constructs originated with the idea that people lack introspective awareness of what motivates their behavior (McClelland, Atkinson, Clark, & Lowell, 1953). For nearly a century, researchers have been interested in distinguishing between conscious and unconscious processes and understanding the unique influence that the unconscious, or *implicit*, personality has on behavior. McClelland, Koestner, and Weinberger's (1989) dual-motive theory put forth the idea that self-attributed needs, interests, desires are inherently different than those that are reported through imaginative thought. For example, explicit motives represent the deliberate representations of a person's desires, whereas implicit motives represent a person's unconscious desires that serve to orient, select, and energize behavior (McClelland, 1987; McClelland et al., 1989).

The implicit personality has proven difficult to measure and quantify, but a variety of methods and techniques exist that make possible the measurement of this illusive construct. Measures of implicit motives are referred to as *indirect measures*. Indirect measures are those that (a) the respondent is unaware of the true purpose of the measure and (b) do not require the respondent to self-report on the construct of interest (Greenwald & Banaji, 1995). Rather, they bypass direct self-assessments and indirectly tap into mental processes.

Indirect measurement systems stem from different schools of thought about how implicit motives are expressed and the means by which they are able to be captured and quantified. In the early part of the 21st century several important reviews were published that reviewed standards for evaluating the quality of indirect measures (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009; James & LeBreton, 2012; Lilienfeld, Wood, & Garb, 2000; Ozer, 1999). These reviews are important milestones in the trajectory of implicit personality

research, both marking the state of the field and providing specific recommendations for improving measurement. Across these reviews, three key themes emerge: (1) the importance of theory, (2) the need for adequate psychometric and other measurement properties, and (3) the ability to draw valid inferences from scores on the measures. While these criteria are characteristic of all sound measures, there are key criteria related to theory, measurement, and inference that set indirect measures apart from direct measures.

First, with regard to theory, indirect measures are most suitable to measure traits or motives that are theorized to operate at an unconscious level (Uhlmann et al., 2012). Indirect measures are also useful when the construct of interest is likely to be affected by social desirability concerns. For these reasons, indirect measures cannot rely on face validity in their construction or use, and instead often rely more heavily than direct measures on an underlying theoretical rationale. Some have suggested the importance of experimental validation research to test whether the scores derived from these assessments do in fact correspond with the manipulated implicit personality construct of interest (De Houwer et al., 2009). For example, exposing respondents to media containing negative depictions of violence produces at least momentary differences in individuals' implicit attitudes toward aggression as measured indirectly via a response latency test (Zlatevska & Spence, 2012).

Because the implicit personality is not always accessible via conscious introspection, it cannot be easily measured using assessments that require respondents to introspect and report on their own traits, motives, or attitudes. Instead, the implicit personality must be measured through indirect means. This often requires ambiguous stimuli and test items, deception, or the omission of information about the true purpose of an assessment. However, simply not providing a respondent with the goals of an assessment does not make a measure indirect; instead, indirect measurement must bypass conscious or introspective processing in relation to the construct at hand, such as through a speeded response format or requiring an open-ended, unconstrained narrative response to ambiguous cues. In part for these reasons, developing satisfactory measures of the implicit personality has been a challenging—and sometimes controversial—endeavor.

Second, with respect to measurement, one central requirement and advantage of indirect measurement is the presumption that such measurement should be resistant to intentionally faked or manipulated responding (Gawronski, 2009). For example, respondents may be unlikely to consciously divulge socially unacceptable attitudes or behaviors like aggression or racial prejudices. This immunity to conscious faking is a consequence (or evidence) of the indirectness with which implicit personality constructs are measured. The fundamental idea behind this is that respondents may be more likely to manipulate or fake their answers if they are aware of the true purpose of the assessment. To satisfy this indirectness-of-measurement criterion, indirect measures should

not inform respondents about the construct being assessed nor should they require respondents to generate descriptions of themselves or their standing on the construct of interest (Greenwald & Banaji, 1995; James & LeBreton, 2012). It is important to note that indirect measures are not resistant to faking if the purpose of the assessment is revealed to respondents. Even "good" indirect measures are susceptible to faking if other safeguards are not put in place.

Like all good measures of personality, indirect measures should be standardized in their administration, scoring, and interpretation (James & LeBreton, 2012; Lilienfeld et al., 2000; Uhlmann et al., 2012). Standardization is particularly important for rater-scored indirect measures to prevent contamination by the intentions, motives, or subjective perceptions of the rater. The coding process of these indirect measures is often time-consuming and effortful, but the information gained from them can be quite rich, as one response can be coded using a number of scoring manuals for different constructs of interest. Standardized coding schemes, guidelines, and examples of prior codes preserve the ability of measure results to provide an unadulterated representation of the examinee's personality. To deter coders from projecting their own interpretations into any gaps in respondents' stories or inferring meaning from ambiguous descriptions contained in the responses they are assessing, researchers may also promote the adage "When in doubt, leave it out," meaning that coders should err on the side of caution and avoid making coding decisions from inference (Pang, 2010). The expectation that coders achieve sufficient inter-rater reliability also limits coder-specific error.

Third, with respect to inference, research indicates that the implicit and explicit personality operate relatively independently of each other (Bornstein, 1999; Bosson, Swann, & Pennebaker, 2000; James & LeBreton, 2012; McClelland et al., 1989; Winter, 1998). Implicit personality measures may either predict different aspects of outcome domains than explicit measures (e.g., aggressive behavior vs hostile attitudes; De Houwer et al., 2009; James & LeBreton, 2012) or may show incremental validity over explicit measures by explaining additional variance in the same outcomes (Bing, LeBreton, Davison, Migetz, & James, 2007; Kurdi et al., 2019; Lilienfeld et al., 2000). For instance, Frost, Ko, and James (2007) reported that in a sample of nearly 200 young adults, the implicit motive to aggress (measured using an implicit conditional reasoning task) predicted covert aggression in the form of passive attempts at obstructing others from achieving their immediate goals ($r = 0.61$), while the explicit motive to aggress (measured directly using the NEO Angry Hostility self-report scale) predicted overt expressions of hostility ($r = 0.38$). Furthermore, even though there was a nonsignificant correlation between the measures of implicit and explicit aggression ($r = 0.06$), both measures predicted overt, premeditated displays of hostility. In general, measures of implicit and explicit constructs are usually not highly correlated (Bosson et al., 2000; Greenwald & Banaji, 1995; McClelland et al., 1989; Shaver, Belsky, & Brennan, 2000). Thus, by combining

indirect measures of implicit personality with direct measures of explicit personality, researchers have been able to obtain a richer understanding of the dispositional bases of human behavior.

Interestingly, evidence also suggests that correlations between indirect measures of the same construct may vary, depending on the construct being assessed, and at times may also be nonsignificant. For instance, a comparison of seven indirect measures found high inter-test correlations for political attitudes but low inter-test correlations for self-esteem (Bar-Anan & Nosek, 2012). Some have suggested that lack of convergence between measures of implicit constructs may be due to poor psychometric properties of indirect measures, such as low reliability (e.g., LeBel & Paunonen, 2011; though see also De Schryver, Hughes, Rosseel, & De Houwer, 2016) or moderate temporal stability (e.g., Gawronski, Morrison, Phills, & Galdi, 2017). For instance, the different convergence correlations described above from Bar-Anan and Nosek (2012) appeared positively related to both the measures' internal consistency and test–retest reliability and Cunningham, Preacher, and Banaji (2001) found that correcting for limited internal consistency uncovered high convergence between indirect measures of race attitudes. However, others have argued and found evidence not that poor psychometric properties contribute to low correlations between indirect measures, but rather that each may be tapping into different aspects of a complex and multifaceted domain. For instance, Olson and Fazio (2003) found evidence suggesting that assessing attitudes toward *categories* (e.g., White/Black) vs *members of categories* (e.g., faces of White/Black individuals) may produce non-convergent effects. Regardless, given much that is still unknown regarding why indirect measures of the same construct may sometimes not correlate with each other, strong theoretical rationales, careful selection of measurement tools, and thoughtful interpretation of findings in the context of the task at hand are warranted.

In summary, good measurement of the implicit personality generally involves strong underlying theory, indirect measurement that is resilient to dishonest responding and social pressures, solid psychometric properties including reliability of coders of narrative response data, and independent and/or incremental predictions of outcomes over and above direct measures of the same construct. With these qualities in mind, we will review a number of different forms of indirect measurement that lend themselves to assessing aspects of implicit personality. These measurement systems are grouped into three classes: projective measures, response latency measures, and conditional reasoning measures. We discuss the history and development of each of these classes of measurement systems as well as their theoretical underpinnings. We also introduce exemplar cases of each class, and we explore how these measures have been applied across different areas of psychology and psychometric research. We draw special attention to areas of ongoing development and highlight limitations to each class of indirect measure as well as to the field of implicit personality measurement as a whole. We conclude by

summarizing the needs of future research and advances in the indirect measurement of implicit motives.

Projective measures

As a class of indirect measures of the implicit personality, projective measures represent some of the most widely used tools and assessments for indirectly measuring implicit motives (Pang, 2010; Schultheiss & Schultheiss, 2014). They aim to capture implicit motives via the unique ways in which people provide structure and meaning to ambiguous stimuli. Patterns and themes unique to the imaginative content a person produces are theorized to serve as a window into a person's inner motives and desires (McClelland, Atkinson, Clark, & Lowell, 1976). Projective measures may require respondents to view images of people or abstract inkblots and produce a story that describes the content, to generate their own content by drawing an image, or to complete sentence stems with their own words. Implicit motives are thought to be projected into the content a person creates from which they can then be measured. Different content-coding methods can be used to identify motive-relevant themes in the content that respondents produce. Projective measures are typically used in clinical settings and, to a lesser extent, in academic research and forensic settings. Though some consider the use of projective measures to be controversial because of issues related to reliability and validity, proponents of projective measures point to the fact that the generation of such imaginative content does not require respondents to consciously reflect on those motives and desires, thus rendering them useful for the indirect assessment of implicit motives.

Exemplary projective measures: Thematic apperception test and picture story exercise

One well-known projective measure is the Thematic Apperception Test (TAT; Murray, 1943), which made popular the use of image cues in the measurement of implicit motives. Administration protocol for the TAT involves showing respondents images of people involved in ambiguous social situations and asking them to create an imaginative story about the pictures that describes what is happening in each of the images. The original version of this measure was developed by Murray after a student of his pondered whether pictures could evoke useful content in a clinical setting (Douglas, 1993; Murray, 1951). The images used in the TAT originated from magazines, and they included pictures like two men engaging in an animated conversation, a young couple standing together arm in arm, and a figure of a man clinging to a rope in the act of either climbing up or down (C.D. Morgan & Murray, 1935, 1938; W.G. Morgan, 1995). Stemming from the initial development of the TAT, other projective techniques followed suit in utilizing picture cues as a method for capturing implicit motives.

The Picture Story Exercise (PSE; McClelland et al., 1989) is a projective test descendent of Morgan and Murray's (1935) TAT, and it serves as the most widely utilized projective measure outside of clinical settings and within academic research batteries (Pang, 2010). The PSE contains an updated set of images that are thought to arouse motive-specific content as well as a standardized scoring protocol (McClelland, 1987). Picture story cues differ in their strength, ambiguity, universality, relevance, and extensity (Pang, 2010). Cue strength refers to the amount of imagery for a particular motive that is elicited by the image. For example, one image cue depicts a ship captain, which is thought to have a "high pull" for the power motive, while another image cue depicts a scene of a night club, which is thought to have a "high pull" for both the power motive and the affiliation motive. Relatedly, cue ambiguity refers to the ability of an image cue to evoke more than one motive. Cue ambiguity promotes variance in scores because if images are overwhelmingly detailed and specific, respondents are more likely to converge in their interpretations of the image (Pang, 2010). Cue universality refers to the aim of PSE image cues to evoke motivational themes across members of a population. The relevance of image cues describes the images' ability to reflect relevant concerns, perspectives, and experiences. Pang (2010) recommends that image cues should be updated when they become culturally irrelevant in terms of clothes, hair styles, and other characteristics depicted in the cues. Finally, the extensity of image cues refers to the need for images to be representative of relevant situations in which motives are aroused. For example, to arouse the affiliation motive, a researcher may include image cues that depict people in groups or characters talking to each other.

State of the field of projective measures

Some of the more recent research examining implicit processes using projective measures like the TAT and PSE examined physiological and biological outcomes. For example, implicit power motive scores derived from picture story exercise content coding protocols have been linked to elevated levels of salivary testosterone (Schultheiss, Campbell, & McClelland, 1999), cortisol (Wirth, Welsh, & Schultheiss, 2006), and estradiol in women (Stanton & Edelstein, 2009). Schultheiss, Wirth, and Stanton (2004) found that women who were taking oral contraceptives, which typically contain progesterone, had higher scores on the PSE for the implicit motive for affiliation. Stanton and Schultheiss (2009) proposed a hormonal model of the implicit motive for power that sought to describe how testosterone levels change as a function of this motive and situations related to social dominance.

One promising new addition to the class of projective measures is a new set of "hybrid" projective techniques (also referred to as *semiprojective measures*), which borrow the ambiguous image cue component from indirect assessment protocols and self-report statements that are characteristic of direct measures.

For example, the Multi-Motive Grid (MMG; Sokolowski, Schmalt, Langens, & Puca, 2000) is a hybrid projective technique for measuring the "big three" implicit motives (affiliation, achievement, and power). Respondents are asked to view ambiguous picture cues and rate how well 14 motive-related statements apply to each image. Although scoring systems for hybrid projective techniques are more standardized since respondents respond to a common set of statements that can be objectively quantified and scored, evidence suggests that the addition of self-report response options may impair the validity of such techniques for measuring implicit motives (Schüler, Brandstätter, Wegner, & Baumann, 2015; Ziegler, Schmidt-Atzert, Buhner, & Krumm, 2007). The range of possible responses is clearly narrower when the free association component of the indirect technique is eliminated, but, moreover, responding to direct motive-related statements may change the type of cognitive processing a person experiences when viewing an image cue (Krumm, Schäpers, & Göbel, 2016; Meyer, 1997). In sum, the addition of self-report declarative statements to a projective technique might fundamentally alter the way implicit motives are expressed and enhance self-monitoring response tendencies.

Major advantages of projective measures

The coding process of projective measures is often time consuming and laborious, but the information thought to be gained from projective measures is quite rich. A single response to an image cue may be coded using a number of scoring manuals for different motives and constructs of interest. Standardized coding schemes, guidelines, and examples of prior codes preserve the ability of measure results to provide an unadulterated representation of the examinee's personality (Veroff, 1992).

Critiques of projective measures

The use of projective measures in research, clinical settings, and forensic settings has historically been controversial (Hunsley & Bailey, 1999; Lilienfeld et al., 2000; Piotrowski, 2015). Criticisms include their ostensible susceptibility to faking and situational influences and weak test–retest reliability. Motives are thought to be relatively stable over time, like other facets of personality. Thus, scores on projective measures should be relatively stable over time as well. However, although some studies suggest that the reliability coefficients are similar to that of many self-report measures (Hiller, Rosenthal, Bornstein, Berry, & Brunell-Neuleib, 1999; Meyer, 2004; Parker, Hanson, & Hunsley, 1992), the test–retest reliability of scores of several projective measures tend to be low (Lundy, 1985; Schultheiss & Pang, 2007). Research shows that respondents may feel compelled to change their stories when responding to picture cues a second time, which diminishes test–retest reliability (Schultheiss & Pang, 2007). Another study found that test–retest reliability on the PSE was relatively

low when respondents complete the assessment twice in the same testing session, even when they were informed that telling similar stories is acceptable, but that test–retest reliability was relatively high when respondents completed the PSE with a time lag of 2 weeks between sessions (Schultheiss, Liening, & Schad, 2008). Busch and Hofer (2012), in their test of the PSE in German and Cameroonian samples, found that test–retest reliability was sufficiently high (0.25 in the German sample and 0.19 in the Cameroonian sample) when respondents were tested with a time lag of 18 months between sessions. Still, it is worth noting that these test–retest reliability values are lower than what is typically deemed sufficient for self-report measures.

More recently, researchers have uncovered additional boundaries that limit test–retest reliability on projective measures. Ramsay and Pang (2013) found that scores derived from an ambiguous PSE picture set generated greater test–retest reliability (as well as greater convergent and predictive validity) than scores derived from an unambiguous PSE picture set. These findings were replicated by Ramsay (2014), who found that motive scores for the need for achievement derived from an ambiguous image cue set were more predictive of achievement-related performance on two theoretically relevant tasks than motive scores derived from an unambiguous picture set. They recommended that researchers consider choosing a set of ambiguous picture cues when using the PSE in their research.

Overall, evidence suggests that researchers can mitigate bias in data collection by increasing the time lag between repeated administrations of projective measures, considering the theoretically optimal level of cue ambiguity for the research question being studied, and limiting information provided to respondents about the true purpose of the measure in order to uphold its status as an indirect measure.

Predictive validity of projective measures

McClelland et al. (1989) predicted that scores on indirect measures of motives should best predict spontaneous (respondent) behavioral trends present in a variety of settings, and scores on measures of self-attributed motives should best predict deliberate, goal-directed (operant) behavior. Indeed, they found that TAT scores of the implicit motive for achievement served as a better predictor of respondent achievement-related behavior than self-attributed achievement motivation, and self-attributed achievement motive scores served as a better predictor of operant achievement-related behavior. This dual-motive framework was extended to the domains of the implicit motives for intimacy and power, which produced similar patterns of results (Craig, Koestner, & Zuroff, 1994; Koestner, Weinberger, & McClelland, 1991).

Spangler's (1992) meta-analyses examined the validity of the TAT and self-report surveys in measuring the need for achievement. Consistent with previous findings, correlations between TAT scores and career success in the presence of

intrinsic achievement incentives were particularly large, as were correlations between questionnaire scores and success in the presence of extrinsic or social achievement incentives. Still, others point to the fact that these correlations ranged from approximately 0.13 to 0.22, indicating that the variance in achievement-related behavior that both TAT scores and questionnaire scores could account for is relatively low (Bornstein, 2002). This highlights the need for researchers to take into account the effect sizes of outcomes when drawing conclusions from the use of indirect measures of implicit motives.

Indirect assessment via projective measures is fragile and may be easily disrupted by information provided intentionally or inadvertently to respondents (Lilienfeld et al., 2000). Previous research found that when researchers informed respondents of the true purpose of the assessment to measure motives, the indirect nature of the projective measure was compromised and validity of the motive scores was low (Lundy, 1988). Others find that both "faking good" (i.e., presenting oneself in a favorable light) and "faking bad" (referred to as *malingering* in clinical contexts) is possible on a number of different projective measures (Holmes, 1974; Sewell & Rogers, 2008; Ziegler et al., 2007).

Pang (2010) posited that for projective measures that utilize image cues, the less ambiguous a picture cue is, the more likely it is to arouse suspicion about the purpose of the test. However, little has been done to empirically examine how cue ambiguity affects the indirect nature of projective measures. We encourage researchers to examine the degree to which respondents are aware of the purpose of the projective measures they are administered and to study the contexts under which the principle of indirectness may be violated.

Response latency measures

A second quite popular category of indirect measures are response latency tests. Response latency tests ask respondents to view and react to stimuli while their response or reaction time is measured. How quickly respondents are able to react or make decisions about the stimuli is thought to lend insight into latent perceptions, feelings, and motives. Response latency measures are assumed to tap into associations in the mind between various words or concepts, with more closely related concepts requiring less time to connect than more distally related concepts (Greenwald et al., 2002; Uhlmann et al., 2012). Assessment of reaction time is assumed to provide an avenue into implicit aspects of personality that may modulate responses to a test indirectly and without necessitating conscious reflection. One primary advantage touted by proponents of these tests is that requiring swift responses to stimuli *prevents* conscious interference with more automatic internal processes that may drive important real-world behaviors. These types of measures are typically used to measure implicit attitudes and beliefs, especially around stereotypes, biases, and prejudices, given the hypothesis that they are resistant to social desirability influences. Though implicit attitudes and beliefs are conceptually distinct from implicit personality, the focus

of response latency tests on relatively stable and enduring traits that may drive real-world behavior make them a useful lens into important facets of the implicit personality.

As a response to the overwhelming reliance on direct, often self-reported, measurement of both self-focused and social attitudes, Greenwald and Banaji (1995) highlighted the importance of assessing implicit components of social cognition as an antidote to biased reporting caused by social desirability and lack of insight. They developed and tested the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), which relied on quick responses to bypass conscious, deliberate responding and tap into individuals' implicit views of themselves and others. The IAT was not the first response latency measure of implicit constructs. For instance, the classic Stroop task was modified in 1985 to assess implicit threat processing among anxious adults by comparing reaction times for identifying the color of threat-relevant vs non-threat-relevant words (Mathews & MacLeod, 1985). Similarly, various priming procedures had been suggested as response-latency-based indirect measures (e.g., Fazio, Jackson, Dunton, & Williams, 1995). However, the IAT quickly became one of the most popular tests to assess a range of constructs (e.g., stereotypes) having to do with race, gender, etc., and has been extended to various implicit personality characteristics such as achievement motivation and extraversion/introversion (see Uhlmann et al., 2012, for a review). The IAT has also seen a series of revisions and adaptations, such as the Go/No-Go Task (Nosek & Banaji, 2001). Given its prevalence and flexibility, we focus on the IAT as a useful example of response latency measures of the implicit personality.

Exemplary response latency measure: The implicit association test

Though the IAT originated as a measure of attitudes toward different racial and ethnic groups (Greenwald et al., 1998), its methodology has been used in countless iterations, assessing a range of personality, social cognitive, and other constructs. The IAT generally requires that respondents sort words associated with four concepts in order to measure the relative strength of associations (operationalized via reaction time) between pairs of concepts. The rationale behind the IAT is that the time it takes respondents to identify or respond to stimuli in various pairings is indicative of stronger (for quicker response times) or weaker (for slower response times) associations between these target concepts. For instance, race bias can be assessed based on the degree to which stereotypic (compatible) word pairs (e.g., "White/good" and "Black/bad") produce faster response times (the "IAT effect") than counterstereotypic (incompatible) word pairs (e.g., "White/bad" and "Black/good"). The purported mechanism underlying the IAT and other response latency measures is consistent with neural network theories of learning and associations of words and concepts in the brain

(i.e., more densely or closely associated concepts should be easier and faster for a person to connect than concepts that are loosely connected).

State of the field of response latency measures

The majority of evidence suggests that response latency tests use an indirect means of assessment, a central tenet of good implicit personality measurement. Despite evidence, as mentioned above, that "conscious propositional knowledge" (De Houwer, 2006) may influence IAT results (e.g., exposing participants to certain word-pairs prior to completing the IAT; Karpinski & Hilton, 2001), in contrast to direct measures of the same constructs, respondents are generally unable to influence their results on response latency tests like the IAT and priming tasks when told to intentionally fake a specific pattern of responses (e.g., to appear more conscientious) (Banse, Seise, & Zerbes, 2001; Fiedler & Bluemke, 2005; Kim, 2003; see Uhlmann et al., 2012, for a review). On the IAT, for example, only in the case being instructed to slow down responding on compatible trials in particular can participants produce faked responses that vary significantly from those without such instruction (Fiedler & Bluemke, 2005; Verschuere, Prati, & De Houwer, 2009). Given this, statistical approaches to identifying (and correcting for) manipulated responses have successfully been developed. Specifically, an algorithm that evaluates task slowing on compatible trials may be able to detect up to 75% of faked cases and correcting for an index of faking likelihood increased correlations between faked and non-faked IATs from 0.11 to 0.34 (Cvencek, Greenwald, Brown, Gray, & Snowden, 2010). Clearly this level of consistency between faked and non-faked IATs remains low, but correction for intentional faking may still be worthwhile.

Nevertheless, participants apparently do not independently discover the need to inhibit responding in order to fake results without instruction to do so, even if they have a general understanding of how the IAT works (Kim & Greenwald, 1998), nor are they able to predict their results on the IAT, even given familiarity with the task (Nosek, Greenwald, & Banaji, 2007). Certain adaptations of the IAT, however, may be more susceptible to faking without instruction (e.g., the autobiographical IAT; Verschuere et al., 2009), especially in the context of past experience with the test. One particular concern that may merit more research regards the effect the increasing popularity and ubiquity of the IAT may have on participants' ability to fake responses. As reviews such as the present one become more available, research participants may become more educated as to ways to fake IAT results, and researchers may need to continue to develop countermeasures for this potential issue, especially if they wish to use the IAT and other response latency measures for purposes in which intentional faking may benefit the respondent.

Further supporting the utility of the IAT are the relatively robust psychometric properties found across iterations of the task. Test–retest reliability estimates of the IAT fall around 0.50 to 0.60 for short time frames, such as a few weeks

(Lane, Banaji, Nosek, & Greenwald, 2007; Mierke & Klauer, 2003), and IAT scores may correlate up to 0.50 with scores up to a year later (Egloff, Schwerdtfeger, & Schmukle, 2005; Rae & Olson, 2018), suggesting some degree of stability in the constructs being measured. However, some research has found manipulations (e.g., priming of specific famous Black or White individuals prior to a racial attitude IAT) have the ability to perturb (at least in the short-term) responses on the IAT (e.g., De Houwer, 2002), complicating the picture of stability. Mierke and Klauer (2003) also point out that method-specific variance (specifically individual differences in the ability to shift between different sets, regardless of content) conflates internal consistency and test–retest reliability metrics, also making it difficult to fully disentangle these psychometric properties.

In terms of internal consistency, estimates are around 0.80 across a range of scoring algorithms for the IAT (Greenwald, Nosek, & Banaji, 2003; Mierke & Klauer, 2003). Stuttgen, Vosgerau, Messner, and Boatwright (2011) noted that IAT reliability depends on the constructs being measured and the context of test administration, emphasizing the importance of testing the psychometric properties of new IATs, rather than assuming new tests will show reliability consistent with prior tests (see below). Furthermore, improvements continue to be made to the reliability of IATs through modifications to scoring algorithms, using computationally rich adaptations that better model outlier reaction times and treat errors. However, consensus has yet to be reached regarding the optimal scoring algorithm for the IAT (Blanton, Jaccard, & Burrows, 2015; Richetin, Costantini, Perugini, & Schönbrodt, 2015). Finally, evidence suggests that the IAT appears to function similarly across administrative contexts (e.g., online vs in the laboratory; Lane et al., 2007; Kurdi et al., 2019).

Aggregating across many trials appears necessary for the psychometric quality of the IAT. Longer IATs (e.g., 7 blocks of 20–40 trials each) generate more reliable and valid scores (Gregg & Klymowsky, 2013; Steffens, 2004), improving internal consistency by about 0.15 and test–retest reliability by about 0.25 (Sriram & Greenwald, 2009), although some researchers have indicated acceptable psychometric properties of shorter and more circumscribed versions of the IAT (Nosek, Greenwald, & Banaji, 2005; Sriram & Greenwald, 2009). These findings come with caveats, as the Brief IAT, for instance, appears better suited to positive-valence and self-oriented categories than others (Sriram & Greenwald, 2009). Furthermore, researchers have found that scores produced by the Brief IAT may be more susceptible to extraneous factors and processes (e.g., the increased latency produced by set shifting effects between trials; Rothermund & Wentura, 2010). Although adaptations such as the Brief IAT may be useful in research contexts with time constraints, the lengthier paradigm is generally recommended.

Surprisingly, we were unable to find any research exploring measurement invariance of the IAT across various demographic groups. Although not a test of the influence of *respondent* characteristics on IAT effects, one recent

meta-analysis did explore heterogeneity in the correlation between IAT scores and relevant outcomes depending on the *target group* of interest (e.g., sexual minorities, psychiatric populations), finding little fluctuation across these foci. Measurement invariance of response latency tests is an important avenue for future research given that the majority of IAT research explores attitudes regarding major demographic or social groups (e.g., political parties), and the potential for confounding between measurement non-invariance and true implicit personality differences seems high. In order to make firm claims of group-level differences in attitudes, beliefs, or implicit personality as assessed by these tests, one must rule out the possibility that these tests measure the constructs of interest differently across these groups. On the other hand, a wealth of research has confirmed the ability of the IAT to accurately detect theoretically consistent group differences (e.g., vegetarians vs nonvegetarians in attitudes toward meat/nonmeat; straight vs gay individuals attitudes toward heterosexuality/homosexuality) via mean-level differences in IAT scores, though some research has failed to find hypothesized group differences (e.g., attitude toward spiders among spider phobics vs nonphobics) (De Houwer, 2002; Lane et al., 2007).

Major advantages of response latency measures

A major strength of the IAT is its flexibility, in that exemplars reflecting any target concepts can be easily utilized in the task. Adaptations have even been developed that evaluate attitudes toward more than two concepts simultaneously (Karpinski & Steinman, 2006; Klymowsky & Gregg, 2012). Efforts to validate variants of the IAT have found that as few as two items (i.e., the target category labels themselves, rather than exemplars of these categories) may be able to produce valid results (Nosek et al., 2005). However, this flexibility may also require thoughtful consideration of which stimuli are selected and used in order to best assess implicit constructs. Generally speaking, researchers developing specific IAT tasks have selected face valid exemplars to represent concepts of interest. Early work using the IAT confirmed the hypothesis that respondents do respond to similarities and differences in valence of the underlying target concepts reflected by exemplars, rather than to specific irrelevant features of the unique words used in the task, providing support for the use of the IAT as a measure of the relative strength of associations among latent constructs (De Houwer, 2001; Olson & Fazio, 2003). This finding stood in contrast to some other indirect measures at the time (e.g., the bona fide pipeline) that assesses evaluations of exemplars, rather than the categories underlying them (Olson & Fazio, 2003). However, further research noted that the amount to which specific exemplar words reflect target categories may influence results in the IAT (De Houwer, 2002; Nosek et al., 2005), with one study using multiple IAT category sets (e.g., implicit self-esteem) finding attenuated effects in IATs that used category stimuli with more fuzzy distinctions in their valence (e.g., self

vs other) compared to those with less ambiguous distinctions between categories (e.g., flowers vs insects) (Yu, Wang, Wang, & Bastin, 2012). Together, research over the past two decades has suggested that IAT item selection should be a thoughtful and empirical process, in which items that best reflect the concepts of interest, and concepts that can be more clearly demarcated based on the attributes of interest, will perform best to capture implicit attitudes.

Critiques of response latency measures

Part of the need for careful selection of items in response latency measures relate to the critiques of the paradigm's theoretical underpinnings. Many writers have pointed out that, despite the purported mechanisms, what engenders differences in response times is likely caused by multiple factors. As admitted by Greenwald and colleagues in their original paper (Greenwald et al., 1998), and echoed by later scholars (e.g., De Houwer, 2002; McConnell & Rydell, 2019), the IAT does not directly measure beliefs or attitudes but can only measure *associations*, which are hypothesized to be manifestations of these underlying beliefs. This not only limits the range of beliefs that can be tapped through reaction times (e.g., complex, conditional beliefs cannot easily be assessed by the IAT; De Houwer, 2002), but leaves the IAT vulnerable to a range of other causes for differences in response times among pairs of words.

De Houwer (2002), among others, has also reiterated the point that the IAT is only able to measure *relative* strength of associations between concept pairs. For instance, IAT results may be identical when: (1) the implicit pairing between "White" and "good" is strong but there is no difference between "Black" and "good" and "Black" and "bad"; and when (2) the implicit pairing between "Black" and "bad" is strong but there is no difference between "White" and "good" and "White" and "bad." Given this, IAT-based claims regarding one's biases against specific groups are ill advised, and only claims regarding the *relative* associations of different groups to positive or negative characteristics can be made. This early-recognized limitation of the IAT led to the later development of the single category IATs (Bluemke & Friese, 2008; Karpinski & Steinman, 2006; Wigboldus, Holland, & van Knippenberg, 2005), which present only one target concept in conjunction with two attitude words (e.g., "good," "bad") to distinguish the specific strengths of these associations independent of a second target concept. However, single category IATs have shown reduced psychometric properties compared to the original two-category IAT, emphasizing the trade-offs that may be necessary when using such a tool (Stieger, Göritz, Hergovich, & Voracek, 2011). Similarly, the Go/No-Go task, a related measure that requires only a single response (or non-response) at a time to a series of construct-relevant cues, likewise shows limited internal consistency (i.e., 0.20; Nosek & Banaji, 2001).

Alternative explanations of what gives rise to different reaction times on measures like the IAT (besides the true strength of implicit associations among

concepts) have included mere exposure to target concepts in the participant's environment (Arkes & Tetlock, 2004; De Houwer, 2006; Karpinski & Hilton, 2001; Olson & Fazio, 2003, 2004) and the salience of target concepts (De Houwer, Geldof, & De Bruycker, 2005; Rothermund & Wentura, 2004). First, experimental manipulations have found evidence for an effect on the IAT (but not self-report measures) of exposure to certain word pairs (e.g., "young" and "good," "old" and "bad"; Karpinski & Hilton, 2001). To reduce the risk of exposure effects, Olson and Fazio (2004) suggested using "personalized" IATs, using words that are not socially construed with a specific valence (e.g., "I like/I don't like" rather than "pleasant/unpleasant"). They found reduced IAT effects (e.g., less race bias among White participants) using this modified IAT, potentially indicative of reduced exposure effects, though the cause of this change is speculative and high correlations between this personalized IAT and direct (i.e., self-report) measures of the same attitudes call into question whether such an IAT still assesses implicit attitudes.

Second, though some research has found evidence for modified IAT effects by experimentally manipulating the salience of certain target categories (De Houwer et al., 2005). Gregg and Lepore (2012) successfully disambiguated salience effects from true effects by comparing four IATs reflecting different combinations of salience and meaningful associations, suggesting that salience was not sufficient to explain IAT effects. Furthermore, Chang and Mitchell (2011) developed a "split IAT" that introduced a third neutral category, allowing disambiguation of the salience of target concepts from implicit attitude driven associations, potentially reducing the confounding effect of salience. Thus, two alternative explanations for response latency effects appear to contribute to some of the variation in response times but cannot fully explain the results of measures like the IAT, providing evidence for the ability of these measures to truly detect implicit attitudes, biases, and personality.

Predictive validity of response latency measures

A substantial body of research has found that scores on the IAT are moderately correlated with relevant behavioral outcomes, such as hiring decisions, voting patterns, consumer preferences, substance use, suicide attempts (r's range from roughly 0.20 to 0.40; Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Lane et al., 2007; Nosek, Hawkins, & Frazier, 2011; Rudman, 2008). However, another meta-analysis, across a wide range of indicators of racial discrimination, called into question claims regarding the predictive validity of racial stereotypes in particular, with Oswald, Mitchell, Blanton, Jaccard, and Tetlock (2013) finding only an $r = 0.15$ association between IAT scores and outcomes, and a non-significant effect in the majority of domains explored. This study further showed that explicit attitude measures were better predictors of these outcomes than the IAT. Yet, others questioned the aspects of the conceptual and methodological approach of this study, suggesting that: (1) validity measures

of discrimination generally did not adequately reflect the real-world manifestation of discrimination; and (2) discrimination measures did not produce sufficient variance to be well-predicted by IAT scores (Carlsson & Agerström, 2016; Greenwald, Banaji, & Nosek, 2015).

In an attempt to resolve this ongoing debate and to provide a more comprehensive look at intergroup relations and discrimination, Kurdi et al. (2019) recently conducted a meta-analysis of over 200 reports and more than 36,000 participants who completed a range of standard and modified IATs across various aspects of intergroup relations (e.g., attitudes toward political parties, attitudes toward heterosexuality/homosexuality). Their results also suggested, at best, small correlations between IAT scores and relevant domains (none greater than $r = 0.16$). These correlations were relatively homogeneous across study setting, target concept, controllability of outcome, etc. However, when restricting their analysis only to studies using the full IAT (rather than an adaptation), with study questions focused on IAT-relevant-outcome relationships, that used directly opposite attributes as IAT stimuli, and that maintained high conceptual overlap between the IAT items and the outcome measures, this effect was moderate ($k = 13$; $r = 0.37$). These findings suggest that part of what might give rise to mixed findings regarding the predictive validity of the IAT may the use of different adaptations of the measure, though the consistency across settings and other moderating factors is notable.

Experimental research has become increasingly utilized to show how real-world stimuli and experiences may modify participants' implicit biases, attitudes, and preferences, as detected by response latency tests (De Houwer, 2002). For instance, Zlatevska and Spence (2012) provide an illuminating examination of the effect of violent media and advertisements on implicit attitudes toward violence, finding individual differences in changing IAT scores after TV programming that were theoretically consistent with participants self-reported aggressiveness. Such research highlights both the utility of the IAT to detect changes in implicit attitudes after theoretically relevant life events and experiences, as well as its sensitivity to individual differences in explicit attitudes. However, further exploration of the stability, durability, and longevity of such manipulations is needed (De Houwer, 2002). Furthermore, more work is needed to expand the relatively simple associations that are usually explored via response latency measures (e.g., basic concept-valence associations) through more complex designs, such as capturing conditional beliefs (e.g., "If I fail this test, I am no good") by assessing shifts in IAT results on a self-esteem IAT before and after a perceived failure (De Houwer, 2002).

Several reviews have found the average correlation between the IAT and direct measures of the same construct to be around 0.24–0.30 (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Lane et al., 2007), though this association may vary (e.g., election attitudes ≈0.70; age bias ≈0.13; Nosek, 2007; Lane et al., 2007), with up to 50% of heterogeneity in this association due to potential moderators (Hofmann et al., 2005). This association

may be similar to the correlation between IAT and other response latency measures of the same construct (e.g., $r = 0.2$–0.3 between the IAT and Go/No-Go Task in assessing drinking attitudes; Ingram, 2014), though data on associations between types of response latency measures are limited. Specifically, the association appeared stronger when: (1) affective self-reports were used, (2) self-reports asked for "spontaneous" responses (e.g., spontaneous adjective descriptions), and (3) the conceptual overlap between the IAT and direct measure was high.

A series of studies has found support for the incremental validity beyond direct measures provided by the IAT in predicting outcomes, averaging around 0.20 (Greenwald et al., 2009; Kurdi et al., 2019; Maison, Greenwald, & Bruin, 2004; Nosek & Smyth, 2007; Teige-Mocigemba, Klauer, & Sherman, 2016). Furthermore, Kurdi et al.'s meta-analysis found incremental validity for direct measures over and above the IAT as well, consistent with the "related but distinct" conceptualization of these two types of measures posited by several researchers (Greenwald & Nosek, 2001; Nosek & Smyth, 2007). Interestingly, the strength of the association between the IAT and criteria became stronger as the association between the IAT and direct measures of the same construct became stronger. This calls into question traditional dual-process models positing purely distinct and additive implicit and explicit processes and is instead consistent with more recent hypotheses that implicit processes may influence explicit processes, which consequently effect behavior (Greenwald & Banaji, 2017; Kurdi et al., 2019). Each of these findings support the idea of the IAT as an indirect measure of implicit processes, meaningfully independent from direct measures of the explicit counterparts, consistent with criteria for good measurement of the implicit personality (James & LeBreton, 2012).

Despite associations between IAT scores and relevant outcomes, it is worth noting that there is little evidence for the utility of interpreting *specific* scores or levels of IAT effects (Blanton & Jaccard, 2006). Although evidence exists suggesting that a zero-score on an IAT (i.e., no difference in association strength by target category) does in fact reflect the absence of bias, as individuals with this score also reliably show an absence of bias on direct measures (Greenwald, Nosek, & Sriram, 2006), and though increasing IAT effects are associated with increasing preferences for one group over another (Greenwald et al., 2006), non-zero scores still tend to lack a clear correspondence to *levels* of an attribute in the real-world. For instance, some have found participants who have no behavioral manifestations of prejudice may still may show inflated IAT scores indicative of bias, advising caution when interpreting indirect measures like the IAT as necessarily reflecting actualized biases (Arkes & Tetlock, 2004; Blanton, Jaccard, Strauts, Mitchell, & Tetlock, 2015). Gregg and Klymowsky (2013) also make several conceptually driven recommendations building off of the observations of Greenwald et al. (2006) to reduce the arbitrary nature of an individual's scores generated by the IAT. For example, they recommend comparing scores to average response times as a reflection of typical levels of an attitude and suggest

scaling individuals' scores against the typical range and percentiles of other respondents, in order to produce at least a rough correspondence with real-world individual differences. However, clearly more work needs to be done with regard to standardization and norming of IAT results (Blanton, Jaccard, & Burrows, 2015). Developing normative standards for test results would allow specific percentile or cutoff scores to be used for selection or intervention purposes (e.g., individuals scoring at the Xth percentile on a measure of implicit aggression should not be hired).

Conditional reasoning measures

One of the most novel methods for the indirect assessment of implicit motives is the conditional reasoning measurement system (CR; James, 1998). Of the three indirect measurement systems discussed in the present chapter (projective, response latency, and conditional reasoning), conditional reasoning represents the youngest in the field. The aim of its development was to try and address some of the limitations associated with projective and response latency measures while maintaining the unique strengths of these other measurement systems (e.g., indirect nature of assessment, the use of evocative stimuli to arouse implicit motives, the maintenance of independence from direct measures of motives; James & LeBreton, 2012). Conditional reasoning measures tap into the implicit personality by assessing the reasoning processes used to enhance the rational appeal of pursing behaviors that satisfy the underlying motive. Specifically, these reasoning processes take the form of implicit cognitive biases (e.g., hostile attribution bias). James (1998) referred to these implicit biases as *justification mechanisms* (*JMs*) to emphasize the critical role that they play in rationalizing the pursuit of behaviors designed to satisfy a latent need or motive (e.g., need for aggression).

The conditional reasoning measurement system was originally developed for measuring *relative motive strength*, which contrasts the strength of the motive to achieve against the strength of the motive to avoid failure (Atkinson, 1958a, 1958b; McClelland, 1985). Relative motive strength has been shown to predict whether a person approaches or avoids challenging tasks (Atkinson, 1978; James & Mazerolle, 2002). It was argued that it is possible to indirectly measure a person's relative motive strength by assessing the way they reason about their preferences toward approaching or avoiding difficult tasks (James, 1998).

Conditional reasoning measure items are structured as inductive reasoning problems where respondents are presented with (a) an item stem containing a set of premises, (b) an inference task requiring the respondents to find the appropriate solution, and (c) a set of solutions to the inference task. Each item is framed as an inductive reasoning problem with four potential solutions, and respondents are instructed to select the most reasonable solution to each problem. For each problem, two of the four potential solutions are considered logical

and inductively plausible solutions. However, one of these two solutions is based on reasoning associated with JMs derived from the focal construct of interest, whereas the second plausible solution is based on antithetical reasoning.

The two remaining responses are both written to be clearly inductively implausible. These illogical responses are included as part of CR items to enhance the face validity of these items as reasoning problems containing correct and incorrect answers. In accordance with recommended testing protocols (James & LeBreton, 2012; LeBreton, Grimaldi, & Schoen, 2020), repeated endorsement of illogical answers is thought to indicate a lack of attention to, or understanding of, the assessment and its instructions. Respondents who endorse too many illogical answers should be removed from the sample prior to hypothesis testing (James & LeBreton, 2012; LeBreton et al., 2020).

Exemplary conditional reasoning measure: Conditional reasoning test for aggression

The Conditional Reasoning Test for Aggression (CRT-A; James et al., 2005) currently stands as the most researched conditional reasoning test. Its theoretical underpinnings lie in the conditional reasoning theory of the motive to aggress, which suggests that the motive to aggress (i.e., the desire to inflict harm upon others) inherently conflicts with a person's desire to hold a favorable view of themself (James et al., 2005; James & LeBreton, 2010). The dissonance created by the two competing desires presents a conflict for the individual. JMs for the motive to aggress allow a person to rationalize aggressive behavior and reduce that conflict between the desire (i.e., need/motive) to behave aggressively and the desire to view oneself favorably. One example of a JM for the motive to aggress is the *hostile attribution bias*. A person with a hostile attribution bias is primed to see others as hostile or threatening. Therefore, aggressive behavior may be rationalized as self-defense (Crick & Dodge, 1994; James et al., 2005). A key argument of conditional reasoning theory in relation to the implicit motive to aggress is that aggressive and nonaggressive individuals will come to different conclusions about what constitutes rational behavior, but both will come to the same conclusion about their own behavior and believe that it is rational, sensible behavior (James & LeBreton, 2012). An illustrative item from the CRT-A is presented in Fig. 1.

The stem of the conditional reasoning item in Fig. 1 includes premises illustrating the logic of the "eye for an eye" philosophy. The inference task is to select the answer which represents the "biggest problem" with this philosophy. Response option B is designed to measure non-aggressive reasoning and thinking and serves to invalidate the eye for an eye philosophy. In contrast, response option D was developed to measure the *retribution bias* and the *potency bias* and provides an answer that weakens but does not fully invalidate the eye for an eye philosophy. The remaining response options, A and C, are inductively

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The old saying "an eye for an eye" means that if someone hurts you, then you should hurt that person back. If you are hit, then you should hit back. If someone burns your house, then you should burn that person's house.

Which of the following is the biggest problem with the "eye for an eye" plan?

A.   It tells people to "turn the other cheek."
B.   It offers no way to settle a conflict in a friendly manner.
C.   It can only be used at certain times of the year.
D.   People have to wait until they are attacked before they can strike.

FIG. 1 Example item from the CRT-A. Option B illustrates the logical-prosocial response, and option D illustrates the logical-aggressive response. Options A and C are considered illogical because they cannot logically be inferred from the premise. Copyright © 2019; reproduced with permission of Stonerowe, LLC.

implausible answers that are included as "distractor" responses that also serve to maintain the face validity of the CRT-A as a measure of cognitive skills.

The CRT-A consistently predicts important outcomes related to deviance. In a series of roughly a dozen studies, scores on the CRT-A were found to be associated with a range of outcome variables including lower ratings of overall performance at work from supervisors, greater absences from class and from work, lying, theft, disruptive attrition, cheating, physical aggression, verbal aggression, and other acts of work and non-work deviance (James & LeBreton, 2010). Baysinger, Scherer, and LeBreton (2014) found that groups characterized by higher levels of psychopathy and higher scores on the CRT-A are more likely to experience greater average levels of frustration with, and negative regard for, their group members. Schoen (2015) found that higher scores on the CRT for achievement motivation predict creative performance even when controlling for other factors that predict creativity, like self-report achievement motivation. Higher scores on the CRT-A have been linked to individual states, such as sleepiness at the time of assessment and perception of threat in ambiguous social situations (Barber & Budnick, 2015). For a more detailed summary of CRTs, the interested reader is directed to James and LeBreton (2010, 2012) and LeBreton et al. (2020).

State of the field of conditional reasoning measures

One area that has received considerable attention related to the quality of CRT principles is its applicability across samples. Previous efforts to determine whether scores on conditional reasoning measures are resistant to variance as a function of demographics are promising. For example, James et al. (2005) found that, across seven different samples including full-time workers, part-time workers, and undergraduates, mean scores on the conditional reasoning test for aggression did not significantly differ between black respondents and white respondents. In a more direct test of measurement

equivalence/invariance, Ko, Thompson, Shim, Roberts, and McIntyre (2008) examined the extent to which scores on the CRT-A demonstrated differential item functioning (DIF) due to gender. These authors found only one item showed DIF, and the severity was quite mild. A Croatian version the CRT-A was developed which showed psychometric characteristics similar to those obtained in U.S. samples; however, substantial DIF was detected across items measuring hostile attribution bias and victimization by powerful others bias (Galić, Scherer, & LeBreton, 2014a, 2014b). Gadelrab (2018) developed and tested an Arabic version of the CRT-A in a sample of 1046 Egyptian full-time workers, which revealed factor analysis results that were consistent with conditional reasoning theory and classical test theory characteristics that were similar to those obtained in U.S. samples.

Still, noticeably absent from the literature is the study of demographic invariance of scores on conditional reasoning tests other than the CRT-A. Future research efforts should seek to identify whether the psychometric properties of various iterations of conditional reasoning measures exist as a function of key demographics.

Major advantages of conditional reasoning measures

Because conditional reasoning measures do not require any interpretive scoring or coding, this indirect measurement system is regarded as a more modern, objective method of measuring implicit motives than tests like the PSE (James et al., 2005; Uhlmann et al., 2012). Rather, assessments are scored according to respondents' selection of JM-based reasoning or non-JM-based reasoning. Initial tests indicate that CR measures are generally resistant to faking, and scores on CR measures are more resistant to socially desirable responding than self-report measures (Bowler & Bowler, 2014; Bowler, Bowler, & Cope, 2013; Kovačić, Galić, & Ružojčić, 2018; LeBreton, Barksdale, Robin, & James, 2007; Wiita, Meyer, Kelly, & Collins, 2017; Wright, 2017). Additionally, "distractor" responses to items on conditional reasoning tests serve as a built-in validity check, in that if respondents select too many "illogical" choices (i.e., one of the response choices that does not logically follow from the item's set of premises), their data is removed from the analysis (James et al., 2005; James & LeBreton, 2010, 2012).

Critiques of conditional reasoning measures

The CRT-A has overwhelmingly received the most attention in terms of testing its psychometric adequacy and predictive validity toward different outcomes. However, in addition to the CRT-A, conditional reasoning measurement systems exist for the measurement of the motive for power (Galic et al., 2020; James et al., 2013), achievement motivation and fear of failure (Bing et al., 2007; James, 1998), integrity (Fine & Gottlieb-Litvin, 2013), addictive

personality (Bowler et al., 2013), and creative personality (Schoen, Bowler, & Schilpzand, 2018), each of which has a less substantial evidence base regarding its psychometrics and validity. Furthermore, as researchers continue to promote new adaptations of the CRT for measuring justification mechanisms for constructs beyond implicit motives like depression and toxic leadership (James & LeBreton, 2012), continued testing of the rigor and appropriateness of this measurement system for these constructs is warranted.

In addition, we recommend that future research efforts examine how different testing environments, different time limits, different testing formats (paper vs computer), and different sequencing of items may influence scores on conditional reasoning tests, as well as the stability of scores on these tests assessed over time. For example, in a study of 276 college students who completed the CRT-A twice (with a 2-month gap between testing) found test–retest correlation of 0.82 (James & LeBreton, 2012), which is generally viewed as a sufficient level of reliability. Other than this particular study, however, we failed to find any additional research that has specifically examined the test–retest reliability of conditional reasoning tests. Therefore, a critical opportunity for future research exists in this arena. Researchers should examine whether scores on conditional reasoning tests vary as a function of time and seek to determine how they may vary at different time intervals (i.e., determine test–retest reliability when the CRT is taken twice within the same session vs when it is taken again months later).

Predictive validity of conditional reasoning measures

Evidence suggests that conditional reasoning tests of implicit motives are not only predictive of different outcomes than direct (e.g., self-report) measures of motives, they also generally predict relevant outcomes above and beyond self-report measures. For example, James and McIntyre (2000) found that scores on the CRT-A had greater predictive validity in terms of aggression and counterproductive work behaviors (CWBs) than self-report measures of aggression and CWBs, which was explained by the low likelihood of respondents to accurately self-report their standing on socially undesirable traits and behaviors. In a study of basketball players, those who self-reported as aggressive were more likely to engage in overtly aggressive behaviors (e.g., hard fouls, fights), while players who self-reported as non-aggressive but scores high on the CRT-A were more likely to engage in passive-aggressive behaviors (e.g., obstructing others, not passing the ball to an open player; Frost et al., 2007). Integrating these results along with other empirical studies, several meta-analytic reviews have concluded that scores on the CRT-A tend to be predictive of CWBs and other forms of dysfunctional/toxic behaviors (Berry, Carpenter, & Barratt, 2011; James & LeBreton, 2012).

A test of the CRT for achievement motivation found that scores predicted creative performance even when controlling for other factors that predict creativity, like self-reported achievement motivation (Schoen, 2015). Galić (2016) found that scores on the CRT-A were unrelated to scores on self-report measures of Dark Triad traits (Machiavellianism, narcissism, and psychopathy), HEXACO personality traits (honesty-humility, emotionality, extraversion, conscientiousness, and openness to experience), and trait self-control, but they were still valid predictors of CWB-related attitudes and self-reported deviance (Galić, 2016).

Application of various measurement systems for understanding the implicit personality

Projective measures

Researchers across different fields and backgrounds of psychology have benefited from the use of projective measures of implicit motives. In Industrial-Organizational psychology, projective measures have been applied to job satisfaction, motivation, and work stress. In an empirical study of age differences in motivation and stress at work, older workers reported lower job satisfaction when their implicit and explicit motives for affiliation were incongruent. This effect was stronger when implicit affiliation motive scores were higher than their explicit affiliation scores, supporting their prediction that the fulfillment of implicit motives is important for well-being at work and job satisfaction, particularly for older workers (Hertel et al., 2013). Physiology-based research has also benefited from the use of projective measures of implicit motives. For example, Dufner, Arslan, Hagemeyer, Schönbrodt, and Denissen (2015) reported that when participants were presented with positive affiliative stimuli, their implicit affiliation motive scores on the PSE converged with positive affect as recorded through facial muscular activity measured with electromyography.

Finally, researchers in areas of social psychology have used projective techniques to study group dynamics and social decisions. In a study of how the implicit power motive is related to perceptions of the instrumentality of dominance and submissiveness in others, respondents viewed pairs of facial images and selected which of the individuals in the images they would prefer to become the leader of their group for a hypothetical group task (Stoeckart, Strick, Bijleveld, & Aarts, 2018). The researchers found that higher implicit power motive scores on the PSE were predictive of a greater selection of dominant-looking faces vs submissive-looking faces for the role of their leader, which indicated that the implicit power motive is related to making social decisions based on perceived instrumentality for gaining influence over others (Stoeckart et al., 2018).

Response latency measures

Response latency tests have both originated in and been used largely in the domain of social bias/attitude research. Thus, many interested in exploring aspects of the implicit personality beyond implicit attitudes and beliefs may hesitate to consider tests like the IAT in their research or applications. However, the empirical foundation of the IAT and its flexibility and use across many domains beyond social bias indicates its utility as a *technology* with substantial implications for implicit personality assessment. For instance, beyond racial, ethnic, and other demographic biases, the IAT procedure has been adapted for measuring self-concept, self-esteem, and identity, political affiliations, legal, moral, and consumer decision-making tendencies, and other domains all relevant to understanding the implicit personality (Kurdi et al., 2019; Nosek et al., 2011). Associations detected via these tests have been found to predict not only self-reported attitudes and beliefs (when insight is high and social influence and the incentive to malinger are low; Hofmann et al., 2005) but also important real-life decision-making and behavioral outcomes relevant to social justice advocates, policy makers, researchers, and clinicians (Greenwald et al., 2009; Uhlmann et al., 2012). Similarly, while displaying good long-term reliability, the IAT has also been found to be sensitive to manipulations of or changes in individuals' (momentary) attitudes, though more research is needed (perhaps in large naturalistic experimental designs) to determine if response latency tests can capture deeper shifts in longstanding aspects of the implicit personality. We encourage researchers interested in the implicit personality to use and extend the research base of the IAT and other response latency measures (e.g., the Go/No-Go task, priming tasks) to understudied implicit personality domains, given its reliability, validity, resistance to faking, and incremental validity over direct measures of the same constructs.

Recruitment, selection, forensic evaluations, team dynamics, and intergroup relations may be especially relevant domains for the use of response latency tests. The IAT, for instance, has shown resilience to faking and empirical methods to correct for faking have been developed, suggesting that evaluators interested in assessing implicit personality attributes that may be socially reprobate (e.g., aggression, race bias) may benefit in particular from this measurement technology. Similarly, contexts revolving around successful intra and intergroup interaction may benefit from response latency tests in order to provide insight into tensions that may occur given certain predispositions or biases possessed by group members. The IAT may also be useful in detecting changes in individuals' attitudes and implicit personality traits after interventions designed to improve positive self-, in-group, or out-group-relevant attitudes (e.g., diversity trainings in occupational settings; psychotherapy focused on improving self-esteem).

The theoretical underpinnings of response latency tests remain hazy, as it has remained difficult to determine what internal, cognitive, and/or

psychophysiological process engenders differences in response times. Though response latency as a measurement tool is consistent with prevailing associative cognitive network theories, what truly gives rise to varied response times remains equivocal. However, as many researchers have argued (e.g., Gregg & Klymowsky, 2013), the substantiated reliability, predictive validity, and utility of these tests not only provides support to their putative mechanisms but also makes their use worthwhile despite their uncertain theoretical foundation. Still, further research on other potential mechanisms of response latency (e.g., salience, exposure effects; De Houwer, 2006; De Houwer et al., 2005) is warranted.

Conditional reasoning measures

The early success of conditional reasoning as a technique for studying the implicit personality makes salient the fact that implicit motives are able to be captured by studying a person's deliberate, rational thinking and beyond free associations and imaginative content (projective measures) as well as beyond automatic, uncontrolled responses to stimuli (response latency). Conditional reasoning measures have been successful at predicting relevant behavioral/objective outcomes and also show promising psychometric qualities, resistance to faking, and ease and objectivity of scoring (James & LeBreton, 2012). These qualities suggest CRTs may be quite useful across a range of contexts, such as clinical, forensic, social, and occupational arenas, especially when evaluators are interested in supplementing or corroborating self-reported deviant tendencies or attitudes such as aggression.

Additional research should certainly be completed to gain a greater understanding of how the independence of predicted outcomes manifests in terms of conditional reasoning tests and direct measures of the same constructs. Because most, though not all, work appears to utilize the CRT-A for predicting aggressive behaviors, we suggest that researchers specifically examine CRTs for other motives, such as power and achievement, and study how behavioral outcomes related to scores on those measures differ from scores on self-report measures of power and achievement.

Implications and future directions

Together, the extant measurement devices for assessing the implicit personality reveal three important aspects of how the implicit personality appears to function and lead to a range of behavioral outcomes. First, projective, response latency, and conditional reasoning tasks each show evidence of incremental predictive power over and above direct measures of similar constructs. This consistent finding is central to the ongoing argument for the importance of measuring the implicit personality, in order to capture the

entirety of personality-relevant processes that influence human behavior (James & LeBreton, 2012).

Second, these assessment tools confirm the need to utilize indirect forms of measurement to tap into the implicit personality. Whereas the results of self-report measure of personality constructs are susceptible to malingering, faking, social acceptability pressures, and lack of insight, indirect measures like the IAT and CRT appear especially able to circumvent these issues and reliably detect aspects of the implicit personality independent of these threats to validity. It is worth noting that the incremental validity of implicit personality assessment may be *positively* associated with their correlation with direct measures in a counterintuitive way (i.e., increasing incremental validity with increasing strength of the association between indirect and direct measures), perhaps implying that implicit processes directly affect explicit processes, consequently influencing behavior (e.g., Frost et al., 2007; Greenwald & Banaji, 2017; Kurdi et al., 2019), a worthwhile avenue for future research.

Third, the finding that different reliable and valid methods of implicit personality assessment tend not to have strong correlations with each other appears to reflect the multifaceted and complex nature of the implicit personality. In the same way that objects closer in an individual's visual field may have no relation to objects farther away, yet a clear picture of all of these is necessary to navigate the physical world, we would argue (as have others, e.g., James & LeBreton, 2012) that assessing the totality of the implicit personality also relies on various lenses set to different focal points on the internal world of the individual. Projective measures capture implicit motives through respondents' free interpretations of ambiguous stimuli, indicating that implicit motives may be inherent in the imaginative content a person produces. Response latency measures capture implicit motives through the speed of activation or accessibility of a construct in respondents' minds, introducing a temporal component that appears important to understanding how implicit motives are activated or aroused. Finally, conditional reasoning measures demonstrate how implicit motives are reflected in respondents' reasoning processes, indicating that there is a cognitive component of implicit motives that can be reliably measured and quantified. We argue that it is possible that each class of indirect measurement discussed in this chapter is capturing a unique dimension of the implicit personality. Thus, one would not expect these measures to necessarily be correlated, despite the importance of using both to fully understand implicit processes relevant to aggression.

We suggest the following considerations with regard to implicit personality assessment. First, assessors should take into account the limitations of specific types of indirect measures for the purposes of the research or application at hand. For instance, some forms of measurement may be particularly suited for contexts in which rapid or online assessment is necessary (e.g., the Brief IAT), while others may be particularly useful for providing rich data that can be scored according to multiple domains of interest (e.g., the PSE). Second, assessors should avoid interpreting test results in a specific and circumscribed

way, given limited evidence to date that an *individual respondent's* score on an indirect test can be used to predict a *specific* behavior or outcome for that individual. Instead, the state of the science indicates the utility of implicit personality measurement for group or between-person comparative implications (e.g., which individuals will be more likely than others to engage in certain behaviors) or guidance for assessors for subsequent intervention or assessment (e.g., high levels of implicit aggression may guide referral to human resources to prevent workplace CWBs).

In looking forward to the next era of implicit personality assessment, we also preview several new measures and methods of indirect assessment that have been developed and used in recent years. Although the general consensus currently suggests that indirect measures should measure constructs indirectly, what constitutes "indirect" assessment may be broad. For instance, Yovel and Friedman (2013) have conceptualized a self-report implicit association test that purports to measure attitudes indirectly. The Questionnaire-based Implicit Association Test (qIAT) measures the speed of association on differing test items (i.e., single-word statements vs sentence-long statements and true-vs-false self-related statements), and initial tests have shown high levels of both convergent validity with an explicit measure of extraversion and discriminant validity against explicit measures of traits not related to extraversion. The benefits of personality assessments that utilize similar direct methods of measuring implicit constructs are still unknown and require further investigation.

New innovations in technology are promising for the future of implicit personality research. Developments in technology and artificial intelligence promote greater accuracy and precision of indirect measures and increase their ability to be conducted remotely, indirectly, and unobtrusively. For example, computerized text analysis offers researchers the ability to easily assess traits, attitudes, and motives from excerpts of speech (i.e., interviews, social media posts). One clear advantage to computerized scoring approaches is the elimination of undue rater influence and bias on scoring. Researchers have used word-processing software to analyze the mental states and processes of individuals, behavioral outcomes related to patterns in language, and societal implications that can be inferred from speeches of world leaders and presidents (Bhattacharya, Yang, Srinivasan, & Boynton, 2016; Jordan & Pennebaker, 2017; Matsumoto & Hwang, 2013), media sources and news outlets (Rashkin, Choi, Jang, Volkova, & Choi, 2017; Sevincer, Wagner, Kalvelage, & Oettingen, 2014), and even Tweets from Twitter users (Coppersmith, Harman, & Dredze, 2014; Ritter, Preston, & Hernandez, 2014).

One text analysis program that is increasing in use to measure implicit motives is the Linguistic Inquiry and Word Count (LIWC) software developed by Pennebaker, Francis, and Booth (2001). LIWC includes two main features: a word-processor and a set of construct-specific dictionaries. Researchers may upload text files into the program, and the software analyzes each word in the text and compares it to the dictionary of interest. LIWC's dictionaries are

collections of words that define or relate to a construct. For example, LIWC's latest 2015 update includes a dictionary titled "Drives." Subdictionaries exist under this dictionary for affiliation, achievement, and power motives, which have each demonstrated reasonably high concurrent validity with scores on indirect measures of the same constructs, such as the TAT and the Picture Story Exercise (Fetterman, Boyd, & Robinson, 2015; Schultheiss, 2013).

Current criticisms of computerized text analysis as a method of implicit personality measurement include it being empirically driven, potentially at the cost of an underlying theory, and that it depends on word frequency rather than word context. Although research has established significant relationships between the words people use and a range of traits and behavioral outcomes, little is known about why these phenomena occur. For example, Robinson, Navea, and Ickes (2013) found that certain features of students' self-introductions written at the beginning of a semester predicted their performance in a college course. Greater use of commas and quotation marks, more words reflecting certainty (e.g., "always," "never"), more words related to negative emotion (e.g., "hurt," "nasty"), and fewer words related to ingestion (e.g., "dish," "pizza") were significantly related to higher final grades. Another study found that, when asked to write about teasing they experienced from others, males were more likely to use more third-person pronouns and focus more on the perpetrator of the teasing than females (Kowalski, 2000). Similarly, an adaptation of computerized text analysis to the Adult Attachment Interview, which assesses implicit mental models of adult relationships, found that third-person pronouns tended to be associated with increasingly nuanced understanding of mental states, while first- and second-person pronouns were associated with the opposite (Fertuck, Mergenthaler, Target, Levy, & Clarkin, 2012). Although together these findings are promising, more theoretical development is needed as we adapt indirect measures to the new statistical techniques afforded us by the rapid development of technology and computerized text processing.

Summary

Direct forms of personality measurement, such as self-report assessments and interviews, are useful tools for assessing how individuals see themselves or how they wish to present themselves to others. These insights are important to personality psychology as a whole, particularly for constructs that are theorized to primarily operate consciously or to be accessible through introspection. However, relying on the assumption that individuals are able and willing to accurately report on their attitudes and motives leads to an incomplete understanding of the human personality. Indirect measures are valuable tools in conditions where the construct or aspects of the construct of interest are not accessible through introspection or when pressure to appear socially desirable is high. Including indirect measures of implicit personality helps to fill gaps likely to emerge if researchers were to rely solely on measures of explicit personality.

In this chapter, we overview the goals, criteria, and benefits of assessing the implicit personality. We reviewed and evaluated the state of the science regarding three streams of indirect assessment, namely, projective, response latency, and conditional reasoning tests. Our review indicates that, although considerable advancements have been made, measurement of the implicit personality is still a work in progress. Research that provides evidence of the validity of newer indirect measures (particularly through experimental research) is still lacking, and unanswered questions persist about the theoretical basis of popular indirect measures like the implicit association test and about the inferences that can be drawn from congruence and divergence of scores on implicit and explicit measures of the same constructs. We hope that this review serves as a constructive framework for addressing these enduring questions and as a useful tool for those interested in further exploration of this exciting—and often overlooked— side of the human personality.

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