

Ten Frequently Asked Questions About Implicit Measures and Their Frequently Supposed, But Not Entirely Correct Answers

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Self-report measures are often criticised for their susceptibility to self-presentation and their inability to capture mental contents that are inaccessible to introspection. Over the past decade, researchers have attempted to overcome these problems by means of *implicit measures*, which infer mental contents from participants' performance on experimental paradigms. In the present article I provide an overview of the currently available implicit measures and discuss 10 common assumptions about these measures. I argue that many of these assumptions are either inconsistent with the available evidence or theoretically problematic for conceptual reasons. Nevertheless, implicit measures have proven their usefulness in predicting behaviours that are difficult to predict with traditional self-report measures. Thus, even though implicit measures may not be able to provide the information that is sometimes attributed to these measures, they represent a valuable addition to the toolbox of psychological instruments in understanding the determinants of human behaviour.

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How pathetically scanty my self-knowledge is compared with, say, my knowledge of my room. There is no such thing as observation of the inner world, as there is of the outer world.

—Franz Kafka, *The Third Notebook*

What Kafka alluded to in the above quote is the impossibility of directly observing the holy grail of psychology: the inner world of human beings. Psychological entities, such as attitudes, emotions, beliefs, or motives, are not directly observable but have to be inferred from people's behaviours that are assumed to reflect these entities. However, Kafka's concern is even more far-reaching, in that he questioned our ability to observe our own inner mental life. This suspicion has been echoed by psychologists in the second half of the 20th century, who argued that we have no introspective access to the psychological processes that guide our own behaviour (e.g., Nisbett & Wilson, 1977). Instead, what is sometimes regarded as the "privilege of self-knowledge" may be nothing else than naïve theories about ourselves that are based on the same kinds of behavioural observations that form the basis of our knowledge about other individuals (Wilson & Dunn, 2004).

Needless to say, such introspective limits pose serious problems for the use of self-report measures in psychological research, and this problem seems even more far-reaching than the common concern about self-presentational distortions (e.g., Crowne & Marlowe, 1960; Paulhus, 1984). These issues have led psycholo-

gists to search for alternative means to peek into people's inner mental lives that do not rely on self-reports. One of the most significant advances in this regard has been the development of *implicit measures*. In contrast to traditional self-report measures, implicit measures infer mental contents from participants' performance on experimental paradigms, most often speeded categorization tasks. Over the past decade, implicit measures have inspired an overwhelming amount of research across all disciplines of psychology, which clearly attests to the popularity of these measures.

The main goal of the present article is to provide a brief overview of the currently available implicit measures and some frequently asked questions about these measures. The latter discussion is inspired by the deplorable disconnect between basic research on the mechanisms underlying implicit measures and the somewhat wider reception of research using these measures. Addressing 10 rather common assumptions about implicit measures, it is argued that many of these assumptions are either inconsistent with the available evidence or theoretically problematic for conceptual reasons. In the remainder of the article, I briefly discuss a more parsimonious interpretation of what implicit measures may actually tell us, which has important implications for the understanding of human behaviour.

Implicit Measures

The history of implicit measures dates back to earlier attempts to overcome the aforementioned problems of self-reports. One of the most prominent examples in this regard is the Thematic Apperception Test (TAT), which was particularly designed to assess implicit motives that are not accessible to introspection (for a review, see McClelland, Koestner, & Weinberger, 1989). Another prominent precursor is the emotional Stroop task, which became a popular instrument in research on psychopathology (for a review, see Williams, Mathews, & MacLeod, 1996). Even though these

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measures can be regarded as pioneers in the area of implicit measurement (for earlier approaches, see Webb, Campbell, Schwartz, & Sechrist, 1966), the type of implicit measures developed in the past decade differs from these precursors in one important aspect. Whereas the TAT and the emotional Stroop task are both concerned with individual mental concepts (e.g., achievement, anxiety), the more recently developed implicit measures are concerned with assessing mental associations between concepts (e.g., math-male; black-negative). The current review focuses primarily on the latter type of measures, which have gained an enormous level of popularity across various areas of psychology in the past decade.

Implicit Association Test

One of the most prominent implicit measures is the Implicit Association Test (IAT) developed by Greenwald, McGhee, and Schwartz (1998). The standard version of the IAT includes two binary categorization tasks that are combined in an association-congruent and an association-incongruent manner. For instance, the race IAT commonly used in research on racial prejudice involves a categorization of Black and White faces in terms of their race and a categorization of positive and negative words in terms of their valence. In a prejudice-congruent block, participants are asked to respond to Black faces and negative words with one key and to White faces and positive words with another key. Conversely, in the prejudice-incongruent block, participants are asked to respond to Black faces and positive words with one key and to White faces and negative words with another key. The rationale underlying the IAT is that quick and accurate responses in the task should be facilitated when the key assignments combine concepts that are strongly associated in memory. However, quick and accurate responses should be inhibited when the key assignment is association incongruent (for scoring procedures, see Greenwald, Nosek, & Banaji, 2003). The almost infinite number of possible dimensions that can be used in the IAT makes the task quite flexible in its application, including prejudice (e.g., Gawronski, Peters, Brochu, & Strack, 2008), stereotyping (e.g., Gawronski, Ehrenberg, Banse, Zukova, & Klauer, 2003), self-esteem (e.g., Greenwald & Farnham, 2000), self-concepts (e.g., Asendorpf, Banse, & Mücke, 2002), brand evaluations (e.g., Forehand & Perkins, 2005), phobic or anxiety-provoking stimuli (e.g., Teachman, Gregg, & Woody, 2001), alcohol (Wiers, Van Woerden, Smulders, & De Jong, 2002), and drugs (Wiers, Houben, & de Kraker, 2007), to name just a small subset of earlier applications. More recently, a number of procedural modifications have been proposed for the IAT, including IAT variants that make the task amenable for assessing associations of a single concept rather than relative associations of two concepts (Karpinski & Steinman, 2006) and variants that avoid blocked presentations of association-congruent and association-incongruent trials by combining them in a single block (Teige-Mocigemba, Klauer, & Rothermund, 2008; see also, Rothermund, Teige-Mocigemba, Gast, & Wentura, in press).

Evaluative Priming Task

Another prominent implicit measure is Fazio, Jackson, Dunton, and Williams' (1995) evaluative priming task (see also, Fazio,

Sanbonmatsu, Powell, & Kardes, 1986). This task employs the basic idea of sequential priming effects obtained in cognitive psychology (Neely, 1977), using priming effects on evaluative decisions as an indicator of automatic evaluation (for reviews, see Fazio, 2001; Klauer & Musch, 2003). In the standard paradigm, participants are briefly presented with a prime stimulus (e.g., a Black face) that is immediately followed by a positive or negative target word. Participants' task is to quickly determine whether the target word is positive or negative by pressing one of two response keys. To the degree that the prime stimulus leads to faster responses to positive words, the prime stimulus is assumed to be associated with positive valence. However, if the prime stimulus facilitates responses to negative words, it is assumed to be associated with negative valence (for scoring procedures, see Wittenbrink, 2007). The evaluative priming task can be used to assess evaluative responses to any type of object that can be presented as a prime stimulus in a sequential priming paradigm, and it has been successfully used with supraliminal (e.g., Fazio et al., 1995) and subliminal presentations of the primes (e.g., Olson, & Fazio, 2002). Even though the standard variant of the task typically employs evaluative decisions about positive and negative target words, procedural modifications that have been proposed include the pronunciation of positive and negative target words (Bargh, Chaiken, Raymond, & Hymes, 1996) and the naming of positive and negative pictures as target stimuli (Spruyt, Hermans, De Houwer, Vandekerckhove, & Eelen, 2007).

Semantic Priming Task

A somewhat less common, but very similar paradigm is Wittenbrink, Judd, and Park's (1997) semantic priming task. The basic setup of this measure is almost identical to Fazio et al.'s (1995) evaluative priming task, the only difference being that participants are presented with meaningful and meaningless letter strings as target stimuli and that participants' task is to determine as quickly as possible whether the letter string is a meaningful word or a meaningless nonword. To the degree that the presentation of a given prime stimulus facilitates quick responses to a meaningful target word, the prime stimulus is assumed to be associated with the semantic meaning of the target word (for scoring procedures, see Wittenbrink, 2007). For instance, in an application of the task to racial stereotypes, Wittenbrink et al. found facilitated responses to trait words related to the stereotype of African Americans (e.g., athletic, hostile) when participants were subliminally presented with the word *black* before the presentation of the target words. Different to Fazio et al.'s evaluative priming task, Wittenbrink et al.'s paradigm is primarily concerned with semantic rather than evaluative associations of a given object.

Affect Misattribution Procedure

A relatively recent, but already very popular measure is Payne, Cheng, Govorun, and Stewart's (2005) Affect Misattribution Procedure (AMP). In this task, participants are briefly presented with a prime stimulus, which is followed by a brief presentation of a neutral Chinese character (see also Murphy & Zajonc, 1993). The Chinese character is then replaced by a black-and-white pattern mask, and participants' task is to indicate whether they consider the Chinese character as visually more pleasant or visually less

pleasant than the average Chinese character. The typical finding is that the neutral Chinese characters tend to be evaluated more favourably when participants have been primed with a positive than when they have been primed with a negative stimulus. More interesting, even though this task may appear rather obvious and easy to control, priming effects in the AMP have been shown to be resistant against deliberate attempts to control the influence of the prime stimuli even when participants were given explicit information about how the prime stimuli may influence their responses in the task (Payne, Cheng, et al., 2005). As with Fazio et al.'s (1995) evaluative priming task, the AMP can be used to assess evaluative responses toward any kind of stimuli that can be used as primes in the task.

Extrinsic Affective Simon Task

Another interesting, but less common implicit measure is De Houwer's (2003a) Extrinsic Affective Simon Task (EAST). In the critical block of the task, participants are presented with target words (e.g., beer) that are presented in two different colors (e.g., yellow vs. blue) and positive and negative words that are presented in white ink colour. Participants are instructed to categorize the presented words in terms of their valence when they are presented in white ink colour, and to categorize them in terms of their ink colour when they are coloured. For instance, in an EAST application to evaluations of alcoholic beverages (e.g., De Jong, Wiers, van de Braak, & Huijding, 2007), participants may be presented with positive and negative words (e.g., spider, sunrise) presented in white ink colour and with names of alcoholic and nonalcoholic beverages (e.g., beer, juice) that are presented in yellow ink colour on some trials and in blue ink colour on others. Participants' task is to press a left-hand key when they see a white word of negative valence or a word printed in blue ink colour and to press a right-hand key when they see a white word of positive valence or a word printed in yellow ink colour. To the degree that participants show faster (or more accurate) responses to a coloured word (e.g., beer) when the required response to this word is combined with a positive as compared to a negative response, it is inferred that participants have positive associations with the object depicted by the coloured word. Even though the EAST originally has been designed as a measure of evaluative responses, a number of recent studies demonstrated its applicability to other domains, such as the assessment of self-related associations (e.g., Teige, Schnabel, Banse, & Asendorpf, 2004; see also, Schmukle & Egloff, 2006).

Go/No-Go Association Task

Nosek and Banaji's (2001) Go/No-Go Association Task (GNAT) has been inspired by the basic logic of the IAT (Greenwald et al., 1998) with an attempt to make the task suitable for an assessment of absolute associations of a single concept rather than relative associations of two concepts (see also, Karpinski & Steinman, 2006). In a nutshell, the GNAT uses a go/no-go task in which participants are asked to show a "go" response to different kinds of target stimuli (e.g., by pressing the space bar) and a "no-go" response to distracter stimuli (i.e., no button press). In one block of the task, the targets include stimuli related to the concept of interest (e.g., apples) and stimuli related to one pole of a given attribute dimension (e.g., positive words); the distracters typically include stimuli

related to the other pole of the attribute dimension (e.g., negative words). In a second block, the classification of the particular attribute poles as targets ("go") and distracters ("no-go") is reversed. GNAT trials typically include a response deadline, such that participants are asked to show a "go" response to the targets before the expiration of that deadline (e.g., 600 ms). The resulting data are analysed by means of signal detection theory (Green & Swets, 1966), such that differences in sensitivity scores (d') between the two pairings of "go" trials (e.g., apples-positive vs. apples-negative) are interpreted as an index of associations between the concept of interest and the respective attributes. Like the IAT, the GNAT is relatively flexible in its application, in that targets and distracters may include a large variety of concepts and attributes, including social groups (e.g., Nosek & Banaji, 2001), self-related associations (e.g., Boldero, Rawlings, & Haslam, 2007), and anxiety-provoking or phobic stimuli (e.g., Teachman, 2007).

Approach-Avoidance Tasks

A final class of implicit measures can be subsumed under the general label *approach-avoidance tasks*. The general assumption underlying these tasks is that positive stimuli facilitate approach reactions and inhibit avoidance reactions, whereas negative stimuli facilitate avoidance reactions and inhibit approach reactions. In the first published demonstration of such effects, Solarz (1960) found that participants were faster in pulling a lever toward them (approach) in response to positive compared to negative words. Conversely, participants were faster in pushing a lever away from them (avoidance) in response to negative compared to positive words. Expanding on these findings, Chen and Bargh (1999) showed that these effects emerged regardless of whether approach-avoidance responses were mapped with valence as the response-relevant stimulus feature (e.g., positive-approach, negative-avoidance vs. negative-approach, positive-avoidance) or the particular type of responses were mapped with a valence-irrelevant feature (e.g., approach to positive and negative words printed in yellow, avoidance to positive and negative words printed in blue). However, in contrast to earlier interpretations of these effects as being due to direct, inflexible links between motivational orientations and particular motor actions (e.g., Strack & Deutsch, 2004), accumulating evidence suggests that congruency effects in approach-avoidance tasks depend on the positive or negative meaning (i.e., positive vs. negative) that is assigned to a particular motor action (i.e., extensor contraction vs. flexor contraction) in the description of the task. For instance, Eder and Rothermund (2008) found that participants are faster in pulling a lever (flexor contraction) in response to positive words and faster in pushing a lever (extensor contraction) in response to negative words when the required motor responses were described as pull (i.e., positive meaning attributed to flexor contraction) and push (i.e., negative meaning attributed to extensor contraction). However, these effects were reversed when the same motor responses were described as upward (i.e., positive meaning attributed to extensor contraction) and downward (i.e., negative meaning attributed to flexor contraction; for related findings, see Markman & Brendl, 2005; Seibt, Neumann, Nussinson, & Strack, 2008). Even though most studies have used variations of the abovementioned standard paradigm, derivatives of that paradigm include approach-avoidance tasks with

left–right responses and visual depictions of their respective meanings (Brendl, Markman, & Messner, 2005) and variants in which motor movements are used to assess self-related associations (Schnabel, Banse, & Asendorpf, 2006).

Frequently Asked Questions About Implicit Measures

Implicit measures have been used in almost all subdisciplines of psychology. However, interpretations of what these measures can tell us sometimes go far beyond the available data. In the following sections, I discuss 10 questions and their frequently assumed, but not entirely correct, answers on what kind of information we can infer from implicit measures. Even though the conclusions drawn in this discussion are to a large degree shared by researchers that have investigated the mechanisms underlying implicit measures (for a review, see Wittenbrink & Schwarz, 2007), misconceptions about their meaning are still relatively common in the wider discourse about implicit measures.

Question 1: Do Implicit Measures Provide a Window to the Unconscious?

A common assumption about implicit measures is that these measures assess unconscious mental associations that are not accessible to conscious introspection (e.g., Banaji, Lemm, & Carpenter, 2001). This assumption is based on the methodological fact that implicit measures do not presuppose conscious introspection, as it is the case for traditional self-report measures. However, from a logical point of view, this does not necessarily imply that the associations assessed by implicit measures are indeed unconscious. The latter is an empirical question that needs to be tested as such (De Houwer, 2006; Gawronski & Bodenhausen, 2007). In fact, recent reviews indicate that there is quite some evidence to the contrary (e.g., Gawronski, Hofmann, & Wilbur, 2006; Gawronski, LeBel, & Peters, 2007). For instance, one finding that is commonly interpreted as evidence for the unconscious nature of the associations assessed by implicit measures is their weak correspondence to self-report measures (for a meta-analysis, see Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). However, low correlations to self-report measures can be due to a number of reasons other than lack of introspective access, including measurement error (e.g., Cunningham, Preacher, & Banaji, 2001), lack of conceptual correspondence (e.g., Hofmann, Gawronski, et al., 2005; see also Payne, Burkley, & Stokes, 2008), self-presentational concerns (e.g., Nosek, 2005), and many other factors (for a review, see Hofmann, Gschwendner, Nosek, & Schmitt, 2005). Moreover, recent research has shown that correlations between implicit measures and self-reported attitudes increase if participants are instructed to introspect on their feelings toward the attitude object (e.g., Gawronski & LeBel, 2008; see also, C. T. Smith & Nosek, 2007). These findings are quite difficult to explain by the unconsciousness account. If the associations assessed by implicit measures are indeed unconscious, it is certainly possible that introspection instructions influence the mean values of self-reported attitudes. However, an increase in correlations between the two measures seems rather surprising from an unconsciousness point of view (for a more elaborate discussion, see Gawronski et al., 2006).

Question 2: Do Implicit Measures Overcome the Problem of Social Desirability?

Another widespread assumption about implicit measures is that they overcome the problem of social desirability that has plagued the developers of self-report measures (e.g., Fazio et al., 1995). This speculation is based on the notion that it is much easier to adjust one's responses on self-report measures compared to implicit measures (e.g., Banse, Seise, & Zerbes, 2001; Egloff & Schmukle, 2002; Kim, 2003; Schnabel et al., 2006; Steffens, 2004). However, empirical research suggests that the situation is a little more complex. In a nutshell, the social desirability hypothesis implies that correlations between implicit measures and self-reports should be high when social desirability is low, whereas correlations between the two measures should be significantly reduced when social desirability is high (see Gawronski et al., 2007). Even though some studies found empirical support for this prediction (e.g., Nosek, 2005; Riketta, 2006), other studies failed to find any effect of social desirability (e.g., Egloff & Schmukle, 2003; Hofmann, Gawronski, et al., 2005) or even found the opposite pattern (e.g., Hofmann, Gawronski, et al., 2005; Riketta, 2006). Although the picture seems somewhat more straightforward for specific motivational influences such as motivation to control prejudiced reactions (see Gawronski et al., 2007), correlations between self-reports and implicit measures have been shown to vary as a function of several nonmotivational, cognitive factors, suggesting that the correspondence between implicit measures and self-reports is far more complex than just a matter of social desirability and self-presentation (for a review, see Hofmann, Gschwendner, et al., 2005).

Question 3: Are Implicit Measures Immune to Faking?

Another assumption, which is directly related to the last one, is that implicit measures are immune to faking. Obviously, the particular nature of implicit measures make them far less susceptible to faking than traditional self-report measures (e.g., Banse et al., 2001; Egloff & Schmukle, 2002; Kim, 2003; Schnabel et al., 2006; Steffens, 2004). However, empirical evidence suggests that they are not entirely immune to faking, such that deliberate attempts to control one's responses have been shown to alter the scores revealed by some implicit measures (e.g., Degner, in press; Fiedler & Blümke, 2005; Klauer & Teige-Mocigemba, 2007; Lowery, Hardin, & Sinclair, 2001; Schnabel et al., 2006; Steffens, 2004; Teige-Mocigemba & Klauer, in press; but see Payne, Cheng, et al., 2005). Typically, these effects are much smaller compared to those on self-report measures. However, to say that implicit measures are “immune” to faking seems inaccurate in the light of these findings.

Question 4: Can Implicit Measures Be Used as a Lie Detector?

Based on their lower susceptibility to faking, another common assumption about implicit measures is that they can be used as some kind of lie detector when a person is not willing to reveal a particular opinion or belief (e.g., Nier, 2005; Sartori, Agosta, Zogmaister, Ferrara, & Castiello, 2008). Needless to say, this assumption seems problematic in the light of the abovementioned

research, showing that deliberate attempts to fake responses can alter the scores revealed by implicit measures (e.g., Degner, in press; Fiedler & Blümke, 2005; Klauer & Teige-Mocigemba, 2007; Lowery et al., 2001; Schnabel et al., 2006; Steffens, 2004; Teige-Mocigemba & Klauer, 2008). Such effects imply the potential for omission errors such that implicit measures may fail to detect the sought-after “true response” (see Fiedler, Schmid, & Stahl, 2002). In addition, it is important to note that there can be ambiguity regarding the sources of the mental associations assessed by implicit measures. For instance, a number of studies tested whether implicit measures of child-sex associations can successfully identify convicted child molesters (e.g., Gray, Brown, MacCulloch, Smith, & Snowden, 2005; Nunes, Firestones, & Baldwin, 2007; see also, Kamphuis, de Ruiter, Janssen, Spiering, 2005). Results showed that implicit measures were indeed quite successful in discriminating between pedophiles and nonpedophiles. However, it is important to note that child-sex associations may have their roots in a number of factors other than pedophilia, for instance when a person has been the target of sexual abuse as child (see Gray et al., 2005). Such cases imply the risk of false alarms, which also challenge the suitability of implicit measures as a lie detector (see Fiedler et al., 2002). For these reasons, any claims that implicit measures could be used as some kind of lie detector should be treated with caution.

Question 5: Do Implicit Measures Reflect the “True Self”?

The questions pertaining to social desirability, faking, and lie detection all have the connotation that implicit measures may somehow reveal a person’s true attitudes, opinions, or beliefs, which this person may not be willing to disclose in a self-report measure (e.g., Fazio et al., 1995; Olson & Fazio, 2004). However, the abovementioned issues already indicated that such a claim is not without problems. In addition, it is important to note that there are two possible interpretations of what could be regarded as a person’s “true self,” and those interpretations directly contradict each other (Gawronski, Peters, & LeBel, 2008). The first interpretation implies that the “true self” is revealed when intentional control over one’s responses fails. This interpretation, which is in line with the notion implied by the abovementioned questions, suggests that any disruption of people’s success at controlling their behaviour (e.g., due to alcohol intoxication) reveals the true nature of a person (see Payne, Jacoby, & Lambert, 2005). The second possible interpretation stands directly in contrast to the first one, in that the “true self” is reflected in what a person consciously intends to do or say. From this perspective, any unintentional act is attributed to forces outside the person that may not be under control of the person’s “true self” (see Arkes & Tetlock, 2004). Thus, whereas the first interpretation equates the “true self” with unintentional behaviour, the second one equates the “true self” with intentional behaviour (Gawronski et al., 2008). As these interpretations are a matter of definition and cultural worldviews rather than empirical observation, any claims about the “true self” can be regarded as a matter of subjective preference for one or the other view. Thus, even though responses on implicit measures clearly fall into the unintentional spectrum of possible behaviours, any depiction of implicit measures as revealing the “true self” are

contingent on the subjectively preferred conceptualization of the “true self.”

Question 6: Do Implicit Measures Reflect Early Socialization Experiences?

Addressing potential sources of the associations assessed by implicit measures, there has been a strong intuition that these measures may tap early socialization experiences (e.g., Greenwald & Banaji, 1995; Rudman, 2004). In line with this assumption, there have been a number of studies that successfully related the associations assessed by implicit measures to different types of early childhood experiences. Such findings have been reported for attitudes toward smoking (Rudman, Phelan, & Heppen, 2007), attitudes toward overweight (Rudman et al., 2007), racial prejudice (Sinclair, Dunn, & Lowery, 2005), and self-esteem (DeHart, Pelham, & Tennen, 2006). However, qualifying the generality of the long-term socialization hypothesis, there are several studies that successfully induced variations in implicit measures with rather simple manipulations in the lab (e.g., Gawronski, Walther, & Blank, 2005; Gregg, Seibt, & Banaji, 2006). Thus, even though early socialization experiences may indeed be one potential source of the associations assessed by implicit measures, these associations can have their roots in a variety of factors other than early socialization experiences. Accordingly, interpreting observed variations in implicit measures as directly reflecting early socialization experiences implies a logical error, such that an empirically accurate “A implies B” relation (i.e., variations in early socialization experiences imply variations in implicit measures) is used to infer the reciprocal, in this case incorrect, relation “B implies A” (i.e., variations in implicit measures imply variations in early socialization experiences).

Question 7: Do Implicit Measures Reflect Highly Robust Associations?

A widespread assumption that is directly related to the last one is that implicit measures reflect mental associations that, once formed, are highly robust and stable over time (e.g., Wilson, Lindsey, & Schooler, 2000). This assumption is consistent with research showing that self-reported evaluations are sometimes more susceptible to attitude change manipulations compared to evaluations assessed by implicit measures (e.g., Gawronski & Strack, 2004; Gregg et al., 2006; Rydell & McConnell, 2006). However, there are also several studies that found exactly the opposite. In these studies, implicit measures showed evidence for change, whereas explicit measures did not (e.g., Gawronski & LeBel, 2008; Gibson, 2008; Karpinski & Hilton, 2001; Olson & Fazio, 2006). Moreover, a number of studies have shown that implicit measures can be highly context-sensitive (e.g., Dasgupta & Greenwald, 2001; Lowery et al., 2001; Rydell & Gawronski, in press; Wittenbrink, Judd, & Park, 2001), which further challenges the assumption that implicit measures reflect highly robust associations. Based on a comprehensive review of the available evidence, Gawronski and Bodenhausen (2006) argued that the particular pattern of contextually induced changes on self-report and implicit measures depends on (a) the type of process that is affected by a given manipulation, the activation of associations in memory, or the propositional validation of activated information;

and (b) whether changes in one process lead to indirect changes in the other one. This interplay of associative processes (reflected in implicit measures) and propositional processes (reflected in self-report measures) can produce a variety of predictable outcomes, including changes in implicit but not self-report measures (e.g., Gawronski & LeBel, 2008; Olson & Fazio, 2006), changes in self-report but not implicit measures (e.g., Gawronski & Strack, 2004; Gregg et al., 2006), corresponding changes in self-report and implicit measures (e.g., Gawronski & LeBel, 2008; Olson & Fazio, 2001), and even opposite effects on self-report and implicit measures (e.g., Rydell, McConnell, Mackie, & Strain, 2006). In addition, Gawronski and Bodenhausen's (2006) conceptualization specifies the conditions under which implicit measures do versus do not vary as a function of the context, which have been empirically confirmed in a recent study by Rydell and Gawronski (in press).

Question 8: Do Implicit Measures Simply Reflect Cultural Associations?

One concern that has been raised about implicit measures is that these measures may simply reflect cultural or extrapersonal associations that are not necessarily endorsed by the individual. This argument has been made at different levels of generality, ranging from criticisms of particular kinds of implicit measures (e.g., Olson & Fazio, 2004) to implicit measures in general (e.g., Arkes & Tetlock, 2004). However, in evaluating this criticism, there are a number of issues that need to be considered. First, implicit measures—by definition—do not assess the endorsement of evaluations or beliefs (De Houwer, 2006). Instead, these measures simply assess mental associations that may or may not be explicitly endorsed. As such, the objection that implicit measures assess associations that are not necessarily endorsed by the individual is true in a trivial sense. Second, the claim that only some of these associations are inherently personal whereas others are inherently extrapersonal (e.g., Olson & Fazio, 2004) implies that the representation of associations in memory can differ as a function of their source (Gawronski & Bodenhausen, 2006). Such a claim not only presupposes a theory of mental representation that allows for such differences; it also requires a precise and unambiguous definition of the terms *personal* and *extrapersonal*, as applied to mental associations. However, neither of the two requirements has been met so far (for a discussion, see Gawronski et al., 2008), which makes conceptual claims about the personal versus extrapersonal nature of the associations assessed by implicit measures problematic.

Question 9: How Reliable Are Implicit Measures?

Moving from conceptual to methodological questions, a common question from psychometricians concerns the reliability of implicit measures. In the context of the first question, I already have pointed out that low correlations between implicit measures and traditional self-reports can be due to measurement error. Unfortunately, large proportions of measurement error seem to be a critical issue for quite a number of implicit measures, showing internal consistency scores that are clearly unsatisfactory from a psychometric point of view (e.g., Banse, 1999, 2001; Bosson, Swann, & Pennebaker, 2000; Cunningham et al., 2001; Olson &

Fazio, 2003; Teige et al., 2004). The only two measures that have consistently shown reliability estimates that are acceptable from a psychometric point of view (e.g., Cronbach's alpha values in the range of .80) are the IAT (Greenwald et al., 1998) and the AMP (Payne, Cheng, et al., 2005). Another problem in this context is that it is still not common practice to report reliability estimates for implicit measures, which makes the evaluation of a given research finding rather difficult. Adherence to the conventions typically employed for other measures would certainly be helpful in this regard.

Question 10: Are All Implicit Measures Created Equal?

A final assumption is that implicit measures are generally interchangeable, such that all implicit measures will produce the same outcome, at least as long as these measures employ the same materials (e.g., Sherman, Rose, Koch, Presson, & Chassin, 2003). This assumption is incorrect for at least two reasons. First, implicit measures differ to the extent to which they assess category-related or exemplar-related associations (Olson & Fazio, 2003). For example, the standard variant of Fazio et al.'s (1995) evaluative priming task does not require participants to process the category membership of a given prime stimulus (e.g., to explicitly categorize a black face as Black), making the task more amenable to idiosyncratic features of the prime rather than the category of that prime (e.g., Livingston & Brewer, 2002; Olson & Fazio, 2003). This situation is different in the IAT (Greenwald et al., 1998), which explicitly requires participants to categorize the presented stimuli in terms of their category membership (e.g., Olson & Fazio, 2003). Thus, the findings revealed by the two measures may sometimes diverge, due to the different associations they assess (i.e., exemplar related vs. category related). Second, different implicit measures employ different kinds of mechanisms to assess mental associations (De Houwer, 2003b). Thusly, to the degree that a given manipulation interacts with these mechanisms, implicit measures that are based on different mechanisms may show different effects of the same manipulation (Gawronski, Deutsch, LeBel, & Peters, 2008). Even though research on this question is still scarce, there is evidence that otherwise identical implicit measures that are based on different mechanisms can show opposite effects of the same experimental manipulation (e.g., Deutsch & Gawronski, 2009; Gawronski & Bodenhausen, 2005). As such antagonistic effects may often be due to secondary variations in the mechanism underlying these measures rather than genuine variations in the to-be-assessed construct, replications with multiple-different measures would be helpful to establish the precise nature of a given effect.

What Can We Learn From Implicit Measures?

Given the problems with the reviewed assumptions, one may naturally ask the question: What can we learn from implicit measures? Drawing on generalised dual-process models of human information processing, several theorists argued that implicit measures provide a proxy for the activation of associations in memory regardless of whether these associations are regarded as accurate or inaccurate. Traditional self-report measures, in contrast, are assumed to reflect the outcome of a propositional validation process, which aims at assessing the (subjective) validity of these

associations (e.g., Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004; see also Beevers, 2005; Lieberman, Gaunt, Gilbert, & Trope, 2002; Sloman, 1996; E. R. Smith & DeCoster, 2000). Even though implicit measures do not provide an entirely pure reflection of activated associations (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005), this rather simple conceptual distinction between associative and propositional processes has been applied successfully to the determinants of variations in self-report and implicit measures (Gawronski & Bodenhausen, 2006) as well as the relation of self-report and implicit measures to overt behaviour (Strack & Deutsch, 2004).

The most notable finding in this context is that activated associations assessed by implicit measures can influence overt behaviour, even when these associations are rejected as invalid in standard self-report measures. This notion is most prominently reflected in research showing that implicit measures predict spontaneous behaviours that are difficult to predict with standard self-report measures (e.g., Asendorpf et al., 2002; Egloff & Schmukle, 2002; Fazio et al., 1995; McConnell & Leibold, 2001). In line with these findings, implicit measures have also been shown to be superior over self-report measures in predicting behaviour under conditions of reduced cognitive capacity (e.g., Hofmann, Gschwendner, Castelli, & Schmitt, 2008; Hofmann, Rauch, & Gawronski, 2007). Other studies have shown that implicit measures sometimes explain behavioural variation over and above the variation explained by self-report measures (e.g., Perugini, 2005), which provides further evidence for the impact of activated associations on behaviour. Moreover, research adopting an individual difference approach suggests that implicit measures may be better predictors of behaviour for people preferring intuitive over analytical processing styles (e.g., Conner, Perugini, O’Gorman, Ayres, & Prestwich, 2007) and for individuals with low working memory capacity (e.g., Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008). In addition, activated associations assessed by implicit measures have been shown to bias the processing of ambiguous information (e.g., Hugenberg & Bodenhausen, 2003, 2004), and these biasing influences seem to occur outside of conscious awareness (e.g., Gawronski, Geschke, & Banse, 2003; see also, Galdi, Arcuri, & Gawronski, 2008). Finally, there is an accumulating body of research showing that discrepancies between activated associations assessed by implicit measures and explicitly endorsed beliefs assessed with self-report measures can produce unique psychological states that promote behaviours aimed at reducing these discrepancies. For instance, Jordan, Spencer, Zanna, Hoshino-Browne, and Correll (2003) found that individuals who displayed a particular pattern of self-esteem discrepancies in self-report and implicit measures showed enhanced levels of defensive behaviour. In a similar vein, Petty, Tormala, Briñol, and Jarvis (2006) showed that individuals who displayed attitudinal discrepancies in self-report and implicit measures were more likely to engage in elaborate processing of attitude-relevant information (see also Briñol, Petty, & Wheeler, 2006). Taken together, these findings indicate that even though implicit measures may not provide the type of information that is sometimes attributed to these measures, they represent a valuable addition to the toolbox of psychological instruments to peek into people’s inner mental life, which is essential in understanding the determinants of human behaviour.

Résumé

Les mesures autorapportées sont souvent critiquées pour leur susceptibilité à la désirabilité sociale et leur incapacité à capturer les contenus mentaux inaccessibles à l’ introspection. Au cours de la dernière décennie, les chercheurs ont tenté de remédier à ces problèmes avec des *mesures implicites*, qui permettent d’ inférer les contenus mentaux à partir de la performance des participants en contexte expérimental. Dans le présent article, je propose un survol des mesures implicites actuellement disponibles et je discute de 10 postulats communs à propos de ces mesures. J’ avance que plusieurs de ces postulats sont soit inconsistants avec les données disponibles, soit problématiques sur le plan théorique pour des raisons conceptuelles. Néanmoins, les mesures implicites ont prouvé leur utilité pour prédire les comportements difficiles à prédire avec les mesures autorapportées traditionnelles. Ainsi, même si les mesures autorapportées ne permettent pas d’ obtenir certaines informations qui leurs sont parfois attribuées, elles constituent un ajout valable à l’ éventail des instruments de mesure psychologiques visant à comprendre les déterminants du comportement humain.

Mots-clés : processus associatifs, mesures implicites, instruments de mesure, méthodes, validité

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