Implicit social cognition: From measures to mechanisms

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Abstract

Most of human cognition occurs outside of conscious awareness or conscious control. Some of these implicit processes influence social perception, judgment and action. The last fifteen years of research in implicit social cognition can be characterized as the *Age of Measurement* because of a proliferation of measurement methods and research evidence demonstrating their practical value for predicting human behavior. Implicit measures assess constructs that are distinct, but related, to self-report assessments, and predict variation in behavior that is not accounted for by those explicit measures. The present state of knowledge provides a foundation for the next age of implicit social cognition – clarification of the mechanisms underlying implicit measurement and how the measured constructs influence behavior.

Origins of Implicit Social Cognition

It is easy to believe that there is more going on in people's minds than they say; it is not easy to believe that there is more going on in my mind than I say. This disjoint illustrates the compelling quality of introspective experience. To be the owner of one's mind is a privileged position - both in having exclusive access to conscious experience, and in the self-assured feeling that *one's mind* and *one's conscious experience* refer to the same thing. And yet, mental *experience* and mental *operations* are not the same thing. One's beliefs about why a behavior was performed need not have any relation to its actual cause, and people's reports of the causes of their behavior can be stated confidently and incorrectly simultaneously [1]. Greenwald and Banaji [2] introduced the term *implicit social cognition* for describing cognitive processes that occur outside of conscious awareness or conscious control in relation to social psychological constructs - attitudes, stereotypes, and self-concepts.

Greenwald and Banaji [2] called for an increased use of implicit measures as essential for the investigation of implicit social cognition. Implicit measures attempt to capture psychological causes of social perception, judgment, and action that may not be accessible through introspective experience or be reported when asked, even if the respondent could report them accurately. The remarkable proliferation of implicit measurement procedures, and the application of those procedures to content domains across psychology and related fields, creates a daunting task for an effective review. The 15 years following Greenwald and Banaji's review could be labeled the *Age of Measurement*. A veritable cottage-industry

developed and tested the utility of methods and measures for assessing implicit social cognition. There now exist approximately two dozen measurement procedures to which the label "implicit" is routinely applied (for reviews, see [3–6]). Table 1 presents a list of notable implicit measurement methods used in social cognition research, and their approximate complete and current use represented by citation patterns of the originating articles. Among these, sequential priming procedures (e.g., [7–9]) and the Implicit Association Test (IAT; [10–12]) provide the bulk of accumulated research evidence. Further, the procedures - especially the IAT - have been adapted to measure a wide variety of mental contents including attitudes [13], stereotypes [14], self-esteem [15,16], and self-concepts [17,18], across a wide variety of topics such as consumer decision-making [19,20], mental health [21,22], and political behavior [23,24].

The present review makes a laser slice through the now voluminous literature with a unique focus on pragmatic validity – what does implicit measurement provide that is not already available with explicit measurement [25]? Also, we extract initial insights from the emerging era of implicit social cognition research that clarifies the cognitive processes contributing to performance of implicit measures and production of behavior that escapes awareness or control – the *Age of Mechanism* [3,26,27]. This necessarily gives short-shrift to large and important areas of interest including: in-depth examinations of the measurement procedures themselves [4,9,28,29], formation, malleability and change [30–33] applications to other disciplines, and implications for law, public policy, and organizational practices [34–38]. The accumulated evidence shows that implicit measures can provide information that is distinct from self-report and uniquely predicts social behavior.

The Mind Beyond What Is Self-Reported

What is available to consciousness is a small portion of what occurs in the brain; and, what is accessed in any given moment can be relevant or irrelevant to the actual factors influencing judgment and action [1,39]. Identifying the causal link between thoughts and behavior is an inference process that may operate in self-judgment much like it operates in judging others [40–42], and the link itself may even be illusory [43]. As a consequence, measurement that does not rely on introspective experience is not just pragmatically useful, it is theoretically essential for clarifying the mental mechanisms underlying social behavior. This is not to say that self-report is never accurate, just that its accuracy is uncertain and may be based on information distinct from the actual causes of behavior.

A variety of factors limit the value of introspectively derived explicit measurement [44]. People may have **limits in their motivation** to report mental content of which they are aware; **limits in their opportunity** to report the mental content, as, for instance, the circumstances of measurement might constrain what is reported; **limits in their ability** to translate mental contents into a report; as well as **limits in their awareness**, the mental content may simply be inaccessible to introspection.

Implicit measures address all of these factors. The label "implicit" is applied to a variety of procedures and processes that share a common theme - they are not direct, deliberate, controlled, intentional self-assessments. An implicit measure assesses mental content without requiring awareness of the relation between the response and the measured content [25]. This descriptive definition does not commit to the specific psychological processes that influence implicit measurement. Indeed, it is clear that implicit measures engage a variety of psychological processes [29,30]. Further, each measurement procedure may assess a unique constellation of process and content. The inclusive definition of "implicit" is a "lumping" strategy that prioritizes the rapid accumulation and comparison of evidence from a variety of methodological approaches (Age of Measurement). On the other hand, the emerging Age of

Mechanism is a "splitting" strategy that prioritizes the more slowly developing precision of terms and operative processes – method by method.

Implicit Measures Assess Something Different than Self-Report

The signature feature of implicit measurement procedures is that they assess mental content indirectly. The response is used to *infer* the mental content rather than itself indicating the mental content. For example, in the Affect Misattribution Procedure (AMP; [45]) prime stimuli, such as Black and White faces, are flashed briefly before presentation of unfamiliar Chinese pictographs. Participants are instructed to ignore the primes and rate whether the pictographs are more or less pleasant than the average pictograph. Despite the instruction to ignore the primes, evidence suggests that pictograph ratings are reliably influenced by them [45]. The AMP has an unusual feature compared to most implicit measures because the dependent variable is an explicit rating of the content of interest – evaluation of pleasantness. Although the direct response is a rating of the pictograph, the measure is indirect because the assessment is whether the race of the face primes influenced those direct ratings. If respondents failed to follow the instructions and rated the Black and White faces directly instead of the pictographs, then the assessment would no longer be implicit (Bar-Anan, Y., & Nosek, B. A., unpublished data). Most other implicit measures infer mental content using response latency or categorization errors as the dependent variables (see Box 1 for an example).

Box 1

Example of an implicit measurement procedure: The Go/No-go Association Task (GNAT)

A Go/No-go Association Task (GNAT; [46]) measuring racial attitudes presents Black and White faces and pleasant and unpleasant words one at a time for about 600 milliseconds each. In two different blocks of response trials, participants search for items representing two of the four categories and ignore the rest. One response block requires responding to White faces and pleasant words, the other to Black faces and pleasant words. Every time an item from a target category appears, the participant hits the space bar to "catch" the item before it disappears. Missing a target item or falsely responding to a distracter item constitutes an error. If the two target categories are strongly associated in memory, then it should be easier to catch the target items within the time limit than if the categories are weakly associated. The differential ability to catch targets and ignore distracters between the response blocks is an indirect assessment of the association between pleasantness and white faces compared to black faces. This variation based on accuracy rates can be easily adapted to compare average response latency between the two blocks by extending the response deadline to one in which the respondent can "catch" most target stimuli, but will just take longer to respond when the target concepts are not associated.

Indirect assessment relieves the requirement that the respondent be able to report the associated mental content. For most implicit measures, the construct of interest is *inferred* through a within-subject experimental design - comparing behavioral performance (e.g., response latency, categorization errors) between conditions (i.e., different primes or response configurations) [47]. This bears little resemblance to explicit measurement (self-report) in which the content is assessed directly – the response reflects content.

It may therefore not be surprising that the AMP, and other implicit measures, can reveal effects that are very different from explicit measurement of the same content. Take, for example, the assumed prototype for illustrating dissociation between implicit and explicit

measurement – racial attitudes. Researchers have noted dramatic changes in explicit attitudes and stereotypes about African Americans from the pre-civil rights era to the early 21st century in the United States with negative stereotypes about African Americans declining and attitudes becoming increasingly egalitarian [48,49]. In a study with more than 700,000 respondents, the modal self-report response to "Who do you prefer, black people or white people?" was "I have no preference" ([29], Cohen's d=0.36, explicit preference for whites over blacks). While many people endorse egalitarian views explicitly, they could still have experience with negative stereotypes about African Americans in everyday life. Such experience could result in negative evaluations being encoded implicitly, even if they are counter to one's consciously endorsed beliefs [50,51]. In the same large sample, performance on an IAT measuring associations of black and white faces with good and bad words indicated that more than 70% associated *good* with white faces more easily than with black faces (Cohen's $d = 0.86$, implicit preference for whites over blacks). In that sample, the IAT and self-reported racial preference measure were moderately positively correlated, r=.31, indicating some shared variance and substantial independent variance. Finally, a meta-analysis of the IAT predicting behavior found that IATs measuring racial attitudes or stereotypes predicted race-relevant behaviors more strongly (average r=.236) than did self-report measures (average r=.118) [52].

Despite the status of racial attitudes as the prototype for the difference between implicit and explicit assessments, these data illustrate a rather modest degree of dissociation [53]. Mean effect sizes are different, but in the same direction. The implicit-explicit correlation is not perfect, but it is positive. Both implicit and explicit measures predict criterion variables, just to differing degrees.

Implicit Measures Are Construct-Valid Assessments of Social Cognition

While the prior data challenges the notion of racial attitudes providing the prototype case of dissociation, its differential mean effects, intercorrelation, and relations with criterion variables *is* representative of the accumulated evidence of simultaneous dissociation *and association* between implicit and explicit measures [13,33,54–56]. This provides initial evidence for convergent and discriminant validity of implicit constructs. Their association facilitates interpretation of the measures as assessing a common core construct – e.g., racial attitudes. Their dissociation facilitates interpretation of the measures as assessing distinct forms of that core construct – i.e., implicit racial attitudes and explicit racial attitudes. Note that this is not a commitment to two distinct representations in memory. Distinct constructs could emerge from different processes on the same content [53,56].

This evidence, however, is not sufficient validation. It could be, for example, that the lack of perfect correlation is merely a consequence of different construct-irrelevant influences producing measurement error. Explicit measures, for example, are sensitive to response strategies - like a tendency to select extreme values - that are unlikely to affect implicit measures [57]. Likewise, implicit measures that use response latency as a dependent variable are sensitive to average speed of responding and other extraneous influences that are less likely to affect explicit measures [9,12,27,29]. Further, implicit measures use indirect methods of assessment. As a consequence, the directly measured response produces extraneous variation weakening the valid assessment of the indirectly measured construct-of-interest. For example, in the AMP, participants rate the pleasantness/unpleasantness of Chinese pictographs directly to measure the effect of the primes on pleasantness ratings indirectly. To the extent that the pictographs actually have some influence on the ratings, this will reduce the relative impact of the primes on assessment and negatively impact measurement validity. Finally, even if the content is similar, procedural design factors influence what is assessed. For example, evaluative priming tends to be more sensitive to the individual stimulus characteristics, while the IAT is more sensitive to their category

membership [58–60]. Likewise, increasing the similarity of the measurement procedures between implicit and explicit assessments increases their correlation [61].

If it were only reliability and procedural factors that accounted for lack of perfect relations between implicit and explicit measures, then there would be little justification for considering them assessments of distinct social cognition constructs. If, however, there were construct-relevant influences that accounted for variation in correspondence between implicit and explicit measures, then interpreting them as assessments of distinct, but related constructs would have firmer grounding.

Many perspectives anticipate that part of the reason that implicit measures show distinctiveness from self-report is that the former are more vulnerable to cultural influence – e.g. how the culture – not me – evaluates African Americans. One form of cultural influence is cultural knowledge, what a person reports as the cultural, average, or aggregate beliefs and attitudes about a topic that may or may not be consistent with his or her personal feelings. Across 95 topics (N=107,709), variation in people's explicit beliefs about what the culture thinks was unrelated to implicit evaluations of those topics, while one's own explicit attitudes were consistently related to the implicit evaluations (median r=.36; see [62–64] see for a debate on relevant theoretical and empirical issues). This finding is a challenge for perspectives that embrace cultural influence as part of what makes implicit constructs distinct from explicit ones [51,65] and those suggesting that cultural knowledge should be interpreted as a construct-invalid extraneous influence on implicit measurement [64,66] Culture may have an impact on implicit measurement, but through a mechanism that is unrelated to introspective assessments of one's culture.

Multiple other moderating influences have been identified as accounting for some of the discrepancy between implicit and explicit measures, at least for attitudes. Self-presentation strategies influence explicit measures more than implicit measures [4,13], constructs with a strong, elaborated representation in memory show stronger consistency than weaker, unelaborated representations [13], evaluations that are distinct from what is perceived as the cultural norm elicit stronger implicit-explicit relations than ones that are perceived as normative [13], and representations that have a simple, bipolar structure [67] elicit stronger implicit-explicit consistency than unipolar representations, perhaps increasing the consistency of automatic activation and influence on later processing [13,33,54]. These factors account for a significant portion of variation in implicit-explicit correspondence that ranges from strongly positive in some cases (r=.70, Democrats versus Republicans) to weakly positive in other cases (r=.18, Short people versus Tall people, [62]).

Implicit Measures Predict Something Different than Self-Report Does

Implicit measures predict behavior across a variety of topics and, in many cases, predict variation in behavior that is not accounted for by explicit measures [52,68,69]. For example, stronger implicit associations of self with death prospectively predicted suicidal ideation and actual attempts [21,70], implicit preferences for White people compared to Black people predicted voting for John McCain versus Barack Obama in the 2008 U.S. Presidential election [10,71,72], nations with stronger average implicit associations of science with male than female have larger performance gaps favoring men in science and math [73], and Swedish hiring managers' implicit racial bias predicted interview invitations for Swedish versus Arab-Muslim applicants [74]. A meta-analysis of 184 predictive validity studies using the IAT found positive predictive validity across all evaluated domains [52]. Also, the IAT showed predictive validity that was independent of corresponding explicit measures. Finally, at an absolute level, explicit measures were more predictive for some domains (consumer behavior, political preferences), and implicit measures were more predictive for other domains (interracial and intergroup behavior). These observations confirm that neither

implicit nor explicit measures have an advantage in being the "truer" measure of one's thoughts and feelings [51] – both are valid assessments of unique aspects of social cognition.

With substantial evidence for the unique predictive validity of implicit measures, the next question is to clarify under what conditions implicit measures predict behavior. As with the earlier described constraints on introspection, the unique predictive validity of implicit measures beyond self-report should be affected by the motivation, opportunity, ability, and awareness to report the psychological content and processes that guide behavior.

Motivation—People may have an implicit reaction toward a topic but refrain from reporting it because they do not agree with their own reaction, or do agree, but do not want to express it [13,75]. Such self-presentation factors appear to influence self-report, but influence implicit measures to a lesser degree [8,29]. In conditions where self-presentation concerns are high – such as prejudice and stereotyping domains – implicit measures tend to predict behavior better than explicit measures [52]. Likewise, an implicit response is more likely to predict behavior among those who are not motivated to change it compared to those who are motivated to override or alter the reaction [76,77].

Opportunity—Dual-process models interpret the distinction between implicit and explicit measures as the difference in the relative influence of automatic versus controlled, spontaneous versus deliberate, or impulsive versus reflective processing [78,79]. Implicit measures predict behavior to a greater extent if people do not have an opportunity to interrupt automatic processes because the behavior occurs spontaneously [80–82], or they are otherwise distracted or cognitively busy with other activities [83].

Ability—Even if a person had the motivation to alter their implicit response, and had the opportunity to do it, they might not be able to do so if they are temporarily depleted after another demanding task [84], are engaged in promotion-oriented processing styles that rely more on automatic responses [85], have low working memory capacity [86], have low levels of impulse control [87], or even just do not know how to undo the influence.

Awareness—If a person is not aware of the implicit content, the behavioral response, or the link between the content and the response, then it may not matter if the person has motivation, opportunity and ability to prevent an implicit reaction from influencing behavior because they do not know to instigate control or corrective actions. For example, implicit political attitudes among undecided voters predict their subsequent position and vote [23,88], and implicit political identity as Democrat or Republican predicted self-proclaimed Independents' partisan political judgments despite little perception of such influence (Hawkins, C. B. & Nosek, B. A., unpublished data).

Evidence for the factors moderating the predictive validity of implicit measures is still in its growth phase with new illustrations challenging the comprehensiveness of proposed models. For example, a factor that does not fit easily into the above taxonomy is that stronger implicit-explicit relations appear to lead to stronger prediction of behavior for both measures [52]. This may be a function of the underlying processes being mutually reinforcing for guiding behavior, whereas conflict between them is disruptive for subsequent processing and predictive validity of both implicit and explicit measures. The accumulating evidence will surely lead to refinements in models that can anticipate the relative contributions of implicit and explicit measures in the prediction of behavior.

What Do Implicit Measures Measure?

The foregoing sections emphasize pragmatic validity of implicit measures – what do they do? An obvious complementary question – is what do implicit measures measure? To a reductionist, the latter question may be a prerequisite for answering the former. To others, the questions are interdependent (knowing what they do informs what they are measuring and vice versa), or independent (e.g., one could have a comprehensive understanding of what a measure predicts while understanding nothing about the mechanisms that produce the measure). An example of the latter perspective is research applications that rely on introspection and self-report [25]. The mental processes that produce conscious experience for introspection are largely a mystery. Despite that, introspection is used productively in self-report measurement for investigating hypotheses about human behavior. Regardless of one's meta-theoretical perspective about the relation between what implicit is and what implicit does, understanding the mechanisms underlying measures is useful for building scientific knowledge.

Knowledge about what implicit measures measure is less mature than knowledge about what they do. Even so, notable progress has been made in dual-process theories about the independent or interactive influence of implicit and explicit processes, defining taxonomies of the components of "implicit" and automaticity, and clarifying the mechanisms that contribute to performance on implicit measurement procedures.

Dual-process theories—There are probably as many dual-process theories of human cognition as there are implicit measurement methods [78,89]. Common across the theories is the description of qualitatively distinct processes or systems, one of which is reflective, rule-based, propositional, systematic, deliberate, controlled, conscious, or explicit, and another that is impulsive, associative, heuristic, spontaneous, automatic, unconscious, or implicit [31,78,79]. The development of implicit measures has accelerated the proliferation and refinement of dual-process theories because they provide a framework for anticipating how and when implicit and explicit processes may predict behavior independently or interactively. Most of the theoretical perspectives are general enough that there are few occasions to draw specific, competing predictions between them. They do, however, provide organizing frameworks toward a more refined understanding of the role of implicit processes in judgment and action, and may eventually merge into a common, theoretical framework.

Parsing "implicit"—A likely prerequisite for effective refinement of dual-process theories, and understanding of what implicit measures measure, is the creation of taxonomies that specify the distinct components of the heterogeneous "implicit" concept. Bargh [90] offered a taxonomy parsing automaticity into awareness, intention, controllability, and efficiency. A lack of awareness of a process might, for example, have different implications for understanding behavior than a lack of ability to control the process. Likewise, each implicit measurement method may be influenced by a unique combination these components. Moors and De Houwer [91] offered a more comprehensive, and complex, taxonomy with dozens of combinations of automaticity features. And, others have suggested that implicit and automaticity are not necessarily synonyms [25], requiring additional considerations for understanding the relationship between these concepts. Illustrating the interdependence of theory and measurement, taxonomies develop interactively with the accumulation of research evidence. The most useful taxonomies balance parsimony and explanatory power by prioritizing those features that have distinct implications for understanding behavior. We can anticipate that the taxonomy of "implicit" will continue to sharpen with the accumulation of research evidence about which distinctions have implications for predicting behavior.

Mechanisms of measurement methods—Reinforcing the heterogeneity of the concept "implicit," implicit measures are comprised of a heterogeneous family of procedures. The psychological processes that produce implicit effects may differ across procedures; each may reveal distinct components of implicit social cognition. For example, De Houwer [92] categorized measurement procedures on the basis of whether they engaged stimulus-stimulus (S-S) compatibility – similarity among features of the presented stimuli – or stimulus-response (S-R) compatibility – similarity between a feature of the stimulus to be judged and the response that needs to be emitted. Based on that analysis, Gawronski and Bodenhausen [93] found that an intervention to change implicit cognitions appeared differentially effective depending on whether the implicit measure manipulated S-S versus S-R compatibility. Selection and application of a single measurement procedure will produce theory and evidence that is constrained by its idiosyncratic features, illustrating the value of using diverse measurement methods.

Relatedly, each measurement procedure is influenced by multiple psychological processes and assesses distinct psychological content. For any given research application, different combinations of these processes may be influential. Multinomial models of implicit measures provide intriguing evidence of the processes that influence performance on implicit measures, and how particular processes are more or less sensitive to change under different conditions [27]. For example, the quad-model of the IAT identifies four distinct processes contributing to task performance – activation of associations, overcoming biasing effect of associations to make the correct response, controlled processing, and guessing [26]. The model has been applied to understand how each of these parameters might contribute to differences observed between individuals or situations. One study, for example, provided evidence that the stronger implicit preference for whites over blacks exhibited by elderly adults compared to younger adults is a function of greater difficulty in overcoming bias – a failure to inhibit the automatic response – among the elderly, rather than stronger associations [94].

These examples illustrate the importance of understanding the components of implicit processes and their operation in measurement procedures. Continuing innovation in the clarification of what implicit measures measure will inform predictions about how they form, change, and influence behavior.

Concluding remarks

Greenwald and Banaji's [2] call for greater use of implicit measures to advance theory and evidence about human thought and behavior was prescient or effective. Fifteen years later, implicit measures enjoy heavy use in social cognition research. The invention of evaluative priming [7] and the Implicit Association Test [10], in particular, spurred an accelerated accumulation of evidence and theoretical insights for the value of implicit measurement in understanding social behavior. The field is now transitioning from its breakout phase of discovery toward second-generation questions such as: Under what conditions will implicit cognitions form, change, and predict behavior?; How do implicit and explicit processes interact?; What taxonomies of implicit or automatic content and processes are useful for theory and explanation?; And, what innovations to measurement methods can help capitalize on key operative processes, and minimize influence of extraneous factors of measurement? Progress on such questions would provide the evidentiary basis of a theory of how and when implicit social cognition influences behavior.

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Table 1

Implicit measurement procedures used in social cognition research[a]

Procedure	Ref.	Total times cited (% of total citations)	Times cited in 2010 (% total 2010 citations)
Affect Misattribution Procedure (AMP)	[45]	172 (2.7)	36 (4.8)
Approach-Avoid Task (AAT)	[95]	38 (0.6)	12 (1.6)
Breadth-based Adjective Rating Task (BART)	[96]	8 (0.1)	1 (0.1)
Brief Implicit Association Test (BIAT)	[97]	38 (0.6)	17 (2.3)
Evaluative Movement Assessment (EMA)	[98]	31 (0.5)	5 (0.7)
Extrinsic Affective Simon Test (EAST)	[99]	289 (4.6)	28 (3.7)
Go/No-Go Association Task (GNAT)	[46]	324 (5.2)	42 (5.6)
Implicit Association Procedure (IAP)	[100]	32 (0.5)	6 (0.8)
Implicit Association Test (IAT)	[10]	2740 (43.6)	372 (49.6)
Implicit Relational Assessment Procedure (IRAP)	[101]	35 (0.6)	8 (1.1)
Linguistic Intergroup Bias (LIB)	[102]	251 (4.0)	18 (2.4)
Name-Letter Effect (NLE)	[103]	196 (3.1)	13 (1.7)
Recoding Free IAT (IAT-RF)	[104]	10 (0.2)	3 (0.4)
Sequential Evaluative Priming (EP)	[7]	1236 (19.7)	87 (11.6)
Sequential Priming/Lexical Decision Task (LDT)	[105]	525 (8.4)	34 (4.5)
Single Block IAT (SB-IAT)	[106]	21 (0.3)	8 (1.1)
Single-Target Implicit Association Test (ST-IAT)	[107]	133 (2.1)	32 (4.3)
Sorting Paired Features (SPF)	[108]	18 (0.3)	6 (0.8)
Stereotypic Explanatory Bias (SEB)	[109]	81 (1.3)	6 (0.8)
Stimulus Response Compatibility Task (SRCT)	[110]	104 (1.7)	16 (2.1)
Total citations		6282 (100)	750 (100)

[a] The inclusion/exclusion boundary for implicit measures in social cognition research is fuzzy. The procedures presented here received attention in the Handbook of Implicit Social Cognition [3,9,12] and have been used at least once outside of the original publication. Some methods in use in other fields are virtually unused in social cognition research (e.g., Emotional Stroop), some procedures have never been used outside of their original publication or have very limited application, and some measures are very similar derivations of measures presented here (e.g., changes to stimuli or instructions without changing the procedural characteristics), and so are not defined uniquely. Total citations (Google Scholar, Jan 24, 2011) is a proxy for use. Please note, however, that many citations of the originating articles are not application of the procedure, and some uses of the procedure occur without citing the seminal publication. Also, the seminal publication (Ref., 2nd column) was identified as particular for application to social cognition research. For example, sequential priming was in use in other fields prior to Fazio et al.'s 1986 article [7], but this, and Fazio et al.'s later 1995 article [8; cited 1188 times total, 107 times in 2010] are widely understood to be the originating articles for evaluative priming. Finally, applications of new procedures require some time to become citing articles. New procedures, in particular, may increase in usage dramatically from what is presented here.