Enhancing the Conceptualization and Measurement of Implicit and Explicit Affective Evaluations: A Case Study in Disordered Eating

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Abstract

Affective evaluations (i.e., evaluations of affectively evocative stimuli) play important roles in many behaviors, including clinically relevant behaviors like disordered eating. Understanding automatic and controlled affective evaluations can enhance prediction and treatment of more deliberate versus more impulsive clinical behaviors, respectively. However, methodological and theoretical shortcomings cloud the implicit affective evaluation literature, particularly as applied in clinical psychology. This article aims to improve the clinical science of implicit and explicit affective evaluation by capitalizing on theoretical and methodological advancements drawn from implicit social cognition. We recommend three key enhancements to the affective evaluation literature: improve the structural comparability between indirect and direct measures, assess evaluations on both valence and arousal dimensions of affect, and carefully characterize and select stimuli. Additional improvements to analytic approaches (e.g., mixed effects modeling and process dissociation) are also recommended. Such efforts will advance our theoretical understanding of the relative contributions of automatic and controlled processes to clinically relevant affective evaluation, thereby informing assessment and improving intervention. Applying advanced methodologies of implicit cognition to clinical phenomena will also reiterate and reinforce the use of these advances in social psychology.

Enhancing the Conceptualization and Measurement of Clinically Relevant Implicit and Explicit Affective Evaluations: A Case Study in Disordered Eating

Most of us have eaten mindlessly − when an engrossing movie grabs our attention, we may be surprised to find we have emptied the popcorn bucket accidentally. Most of us have also eaten mindfully − when savoring a glass of wine, we might consciously appreciate its nuances and flavors. These are but two examples of how affective evaluations of food can determine eating behavior. Indeed, research finds that we are more likely to approach (Chen & Bargh, 1999) and consume (e.g., Drewnowski, Henderson, Levine, & Hann, 1999) foods that we evaluate positively. In the current review, we examine how methodological insights from implicit social cognition can inform the study of affective evaluations of food in clinical populations, and in turn, how applications in clinical psychology can inform theory and measurement in social psychology.

The processes underlying affective evaluations (i.e., evaluations of affectively evocative stimuli) fall along a spectrum from purely automatic to purely controlled, and a number of dual process models have been proposed to explain the interactive influences of these processes (e.g., Jacoby, 1991; Strack & Deutsch, 2004). Automatic affective evaluations play a role in many clinical phenomena beyond the domain of eating behavior, such as addictive disorders (Wiers & de Jong, 2006), post-traumatic stress disorder (Lindgren, Kaysen, Werntz, Gasser, & Teachman, 2013), and others (for a review see Roefs et al., 2011). We can be in a better

position to understand, predict, and treat clinical disorders when we understand the automatic and controlled affective processes underlying disordered behaviors (e.g., Payne, Jacoby, & Lambert, 2005).

Conversely, basic research in social cognition can benefit from rigorous clinical investigations of automatic and controlled affective processes, as clinical phenomena often differ from normative social behavior in degree, not kind. For example, the types of behaviors examined (and the methods by which they are examined) differ minimally between social psychologists interested in self-regulation (e.g., Hofmann, Rauch, & Gawronski, 2007) and clinical psychologists interested in understanding the extremes of eating and weight-related behavior (e.g., Roefs & Jansen, 2002). Thus, while this is a paper about ways to improve clinical research in the domain of disordered eating behavior, we hope that the considerations outlined here will prove useful to social psychologists by reiterating cutting edge advances in implicit measurement through their application to clinically relevant phenomena.

The field of social cognition has examined extensively the circumstances under which implicit and explicit evaluations or attitudes converge and diverge. A number of models explain the interplay of deliberative and automatic processes in implicit and explicit evaluation, including the MODE model (Fazio, 1990), the associative–propositional evaluation model (Gawronski & Bodenhausen, 2006), and the meta–cognitive model (Petty, Briñol, & DeMarree, 2007). Implicit and explicit evaluations should diverge when there are social pressures demanding an explicit response that might differ from implicit reactions (e.g., Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997); when individuals fear social judgment for their responses (e.g., Loersch, McCaslin, & Petty, 2011); and when situational (e.g., alcohol consumption, working memory load, and emotion suppression) or dispositional (e.g., working memory capacity) moderators render reliance on controlled processes more difficult (e.g., Friese & Hofmann, 2009; Friese, Hofmann, & Schmitt, 2008; Friese, Hofmann, & Wänke, 2008; Hofmann & Friese, 2008; Hofmann, Friese, & Roefs, 2009; Hofmann, Friese, & Strack, 2009; Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008; Hofmann et al., 2007). However, uncontrolled method variance might be contributing to this theoretically expected implicit–explicit divergence in the disordered eating literature. If indirect and direct measures differ substantially in terms of their administration format, then the observed divergences may reflect methodological differences, rather than differences in the constructs of implicit and explicit evaluations (Payne, Burkley, & Stokes, 2008).

In other words, methodological and theoretical shortcomings limit the existing applications of implicit measurement to the study of clinically relevant affective evaluations. Fortunately, approaches commonly used in the social cognition literature can address these limitations. We briefly critique the literature on disordered eating as a test case for illustrating more general methodological and theoretical concerns about implicit measurement in clinical psychology. We then pull from the social cognition literature to highlight three critical theoretical and methodological issues in the disordered eating literature: measurement concerns, incomplete examination of affective dimensions, and poorly characterized and selected stimuli. How readily can we compare the results of indirect and direct measures? Which dimension(s) of affect matter: valence, arousal, or both? And could our stimulus selection processes be clouding the conclusions we draw? Addressing these crucial issues will advance our knowledge of the processes underlying affective evaluations and enhance our prediction and understanding of both clinical and social phenomena. Our recommendations provide more conservative tests of theories specifying the conditions under which divergence between implicit and explicit processes would emerge. The measurement concerns we will highlight below involve two measurement strategies – indirect and direct – that help us to understand processes that fall along a continuum from fully automatic to fully controlled. Indirect measures (i.e., tasks on which the construct of interest is inferred from

participant behavior, such as the implicit association test [IAT; Greenwald, McGhee, & Schwartz, 1998]; De Houwer, 2006) are thought to assess relatively more automatic processes, and direct measures (i.e., tasks that require participants to report, assess, or rate the construct of interest; De Houwer, 2006) are thought to assess relatively more controlled processes.

Here, we use implicit and explicit as synonyms for automatic and controlled, respectively (De Houwer, 2006). Wholly automatic evaluations lack efficiency; awareness (of the stimulus, one's evaluation thereof, or the cause of one's evaluation); intention (i.e., the intent to initiate the evaluation); and control (i.e., the ability to cease or override evaluation once started; Bargh, 1994). Controlled evaluations, in contrast, may require cognitive resources for their implementation, may operate consciously and/or intentionally, and/or can be volitionally controlled (Bargh, 1994; Moors & De Houwer, 2006). Notably, processes may demonstrate one or more feature of automaticity or control and are rarely characterized by all four features. Because affective evaluation processes fall along a spectrum from fully automatic to fully controlled, we use the modifier "relatively more" when describing presumed automatic or controlled affective evaluations.

Much of the disordered eating literature has assumed that indirect measures assess only automatic processes, and direct measures assess only controlled processes. However, this *process purity assumption* is problematic; performance on almost any task involves both relatively more automatic and relatively more controlled processes (e.g., Jacoby, 1991; Sherman, 2008). Moreover, which process predominates is influenced by the extent to which respondents have the opportunity and inclination to resist their automatic response (Fazio, 1990).

Similarly, eating behavior can range from extremely spontaneous and impulsive to highly deliberate and restrictive. The American Psychiatric Association recognizes several eating disorder diagnoses, including anorexia nervosa, bulimia nervosa, binge eating disorder, and other specified eating disorder (i.e., clinically significant cases that fail to meet formal diagnostic criteria; American Psychiatric Association, 2013). The disordered eating literature also considers unhealthy eating patterns that fail to meet diagnostic criteria but nevertheless impact sufferers' well-being (e.g., dietary restraint, in which people both chronically diet in an attempt to suppress their weight, and overeat in ways that are similar to binge eating; Herman & Polivy, 1980). Thus, we will examine food-related affective evaluations along a spectrum of eating pathology that includes non-clinical samples, from disinhibited eating behaviors (e.g., those with binge eating disorder and bulimia nervosa as well as restrained eaters and those who eat in response to environmental or emotional cues; Masheb & Grilo, 2006; van Strien, Frijters, Bergers, & Defares, 1986) to successfully restrictive eating behaviors (e.g., those with anorexia nervosa, those who successfully diet). The continuum of automatic and controlled affective evaluations can inform our understanding of the disordered eating spectrum; normative eating patterns; and related, socially relevant constructs such as self-regulation. However, the inferences we can draw from this literature are clouded by uncontrolled method variance resulting from procedural discrepancies in measurement strategies, overlooked affective dimensions, and messily characterized stimuli.

These theoretical and methodological shortcomings matter. Identifying the roles of automatic and controlled affective evaluations can improve prediction of spontaneous and deliberative eating behaviors (Cameron, Brown-Iannuzzi, & Payne, 2012; Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). For normative eating, spontaneous eating behavior might include consuming potato chips in front of the television, whereas deliberative eating behavior might include declining a slice of birthday cake in favor of the salad one packed for lunch. For disordered eating, disinhibited eating behaviors often involve losing control over consumption during a binge eating episode, whereas restrictive eating behaviors include deliberately and successfully restricting food intake even to the point of starvation.

Importantly, addressing methodological problems can influence what kinds of interventions are used (e.g., Rothman, Sheeran, & Wood, 2009), as therapeutic approaches targeting automatic behaviors differ from those targeting controlled behaviors (Friese, Hofmann, & Wiers, 2011; Moldovan & David, 2012). For instance, attention-based interventions may reduce impulsive eating (e.g., Kemps, Tiggemann, Orr, & Grear, 2014) through retraining of automatic processes, whereas mindfulness interventions may reduce impulsive eating (e.g., Katterman, Kleinman, Hood, Nackers, & Corsica, 2014) by enhancing executive control. Additionally, what we infer about affective evaluations on the basis of coarsely selected or limited stimulus sets may overlook important nutritional characteristics such as fat content, sugar content, or level of processing, which potentially influence affective evaluation. Finally, social psychologists may benefit from such advances in clinical science, as the relevance of underlying processes or nutritional characteristics to disordered eating behavior likely extends to normative variants of eating behavior.

There is some support for the dual-process conceptualization of food-related affective evaluations. Roefs and colleagues (2011) reviewed the literature on implicit associations relevant to disordered eating. Generally, they identified more negative evaluations of foods (with occasional preferences for low-calorie foods) among people who successfully restrict their eating, including those with anorexia nervosa and mixed evaluations among disinhibited eaters. Healthy participants' implicit food-related affective evaluations only sometimes differed from those of obese participants, chronic failed dieters, and those who eat in response to environmental cues. This work suggests that indirectly and directly measured affective evaluations sometimes converge to predict self-reported consumption (Conner, Perugini, O'Gorman, Ayres, & Prestwich, 2007, exp. 2).

Still, indirect and direct measures diverge more frequently than they converge (see Roefs et al., 2011). When the findings diverge, typically the direct measure better predicts the outcome of interest, which could suggest that controlled processes may be especially important (e.g., Spruyt, Hermans, De Houwer, Vandekerckhove, & Eelen, 2007, exp. 1), at least in contexts that afford opportunities and motivation to rely on controlled processes (Fazio, 1990). An additional explanation may be at work: If *self-reported* affective evaluations predict *self-reported* behavior, then this common feature of measurement (i.e., self-report) may produce or increase a relationship. And if you compare a Likert scale index with an IAT index, then discrepancies between these implicit and explicit measures may reflect the many methodological differences between these measurement strategies (e.g., response scale and administration method), as well as the differing contributions of automatic and controlled affective evaluations of foods. We will return to this issue shortly.

Improving the Study of Affective Evaluation in the Disordered Eating Literature

Three key modifications would significantly advance the field of clinically relevant implicit evaluations: improving the structural fit and comparability between indirect and direct measures, examining multiple dimensions of affect, and selecting well-characterized multidimensional stimuli. Here, we focus on the eating-related literature, but we anticipate that the following suggestions would improve the study of affective evaluations across many content areas within clinical and social psychology.

Increasing Structural Fit Between Indirect and Direct Measures

Very often in the clinical literature, direct self-report measures relying on Likert scale ratings are juxtaposed with indirect reaction-time tasks. For example, in one of the seminal papers addressing eating- and weight-related affective evaluations, Roefs and Jansen (2002) contrasted explicit 9-point palatability ratings with an IAT. Other work pairs an IAT with explicit bipolar rating

scales (e.g., Richetin, Perugini, Prestwich, & O'Gorman, 2007) or single target IATs with questionnaires assessing eating behavior (e.g., Bongers, Jansen, Houben, & Roefs, 2013).

This task dissociation approach compares an indirect and a direct measure and assumes that the former indexes implicit processes while the latter indexes explicit processes. Sometimes this task dissociation approach is combined with examinations of moderators that should only influence automatic or controlled processes, such as when self-regulatory resources are manipulated to see if automatic candy attitudes better predict candy consumption when regulatory resources are low (as predicted by the MODE model; Hofmann, Rauch & Gawronski, 2007; Fazio, 1990). Examining such moderators provides greater nuance in the investigation of dual process models of affective evaluations of foods but does not address the discrepancies between indirect and direct measurement strategies that can contribute to implicit-explicit dissociations.

Weak associations between indirect and direct measures are often interpreted as evidence that implicit and explicit processes diverge strongly. But poor structural fit can also contribute to such divergence (e.g., Payne et al., 2005; Payne, Jacoby, & Lambert, 2005). For example, an unimpressive relationship between a food IAT and an explicit Likert scale rating of food could result from true differences between implicit and explicit affective evaluations of food, or from uncontrolled method variance associated with different response scales, administration methods, stimuli to be evaluated, et cetera. In contrast, we could draw stronger inferences about the relevance of a dual process model to food-related affective evaluations if our indirect and direct affective evaluation tasks were highly comparable. If the indirect and direct measures only differ on the process dimension of interest – e.g., intentionality – but not in terms of measurement particularities, then we can make stronger and more valid claims about dual processes of affective evaluation.

One example of more comparable indirect and direct measurement strategies is provided by the affect misattribution procedure (AMP). The AMP draws upon well-established principles of affect misattribution to index implicit attitudes (Payne et al., 2005). The AMP successfully converges with explicit attitudes and predicts behavioral outcomes (Cameron, Brown-Iannuzzi, & Payne, 2012), and it has been used to address clinical questions about smoking (Payne, McClernon, & Dobbins, 2007) and alcohol consumption (Payne, Govorun, & Arbuckle, 2008). We focus on the AMP as an example of how to achieve structural correspondence for three reasons. First, published work has shown how to achieve such structural fit with the AMP (Payne et al., 2008), providing a good example for future work. Second, the AMP focuses specifically on affective evaluations, making it pertinent to clinically relevant affective evaluations. Third, the AMP is a modern, highly versatile indirect measure with convergent and predictive validity comparable to other measures such as the IAT (Cameron et al., 2012).

Although it was originally developed to assess implicit affective evaluations, the AMP can assess implicit and explicit affective evaluations using two structurally similar conditions that differ only in their instructions (Payne et al., 2005; Payne et al., 2008; Payne & Lundberg, 2014). In both indirect and direct versions of the task, participants see a briefly presented photo followed by a briefly presented and masked Chinese character, which serves as a neutral stimulus. On the indirect AMP, participants are instructed to rate the valence (pleasant/unpleasant) of the Chinese character and to avoid allowing the photo to influence their rating. A misattribution mechanism underlies the indirect AMP, such that affect elicited automatically by the photo is mistakenly applied to evaluations of the Chinese character (e.g., Gawronski & Ye, 2013). Automatic (i.e., unintentional and unconscious) affective evaluations of the photos can be inferred from indirect AMP performance when misattributions occur despite instructions to prevent effects of the photos (Payne, Jacoby, & Lambert, 2005; Payne & Bishara, 2009).

The direct AMP is nearly identical to the indirect AMP except for one feature: intentionality. In the direct AMP, participants are instructed to directly evaluate the prime photographs and to ignore the influence of the Chinese characters. Thus, the two AMPs differ only in whether

evaluation of prime images is intentional (direct) or unintentional (indirect; see Woodward & Treat, 2015 for an illustration of improved structural fit using the AMP). By controlling all other potential sources of method variance, inferences about dual processes from dissociations between the two measures are more valid and justified. In sum, using such comparable indirect and direct measures allows for more rigorous inferences about dual processes of affective evaluations, because methodological artifacts are ruled out as explanatory possibilities. To the degree that past work on dual processes in clinical contexts uses indirect and direct measures with low structural fit, it is difficult to establish why previously observed dissociations actually occur.

The structural constraints of many other widely used implicit measures, such as the IAT, may not lend themselves as readily to structural fit enhancements. However, new measures may be developed by reducing differences between indirect and direct assessments that are unrelated to theoretical distinctions between implicit and explicit evaluations. For instance, Likert scale ratings of foods could be administered with and without time pressure, to match indirect and direct measures on all but the automaticity feature of resource efficiency (e.g., Ranganath & Nosek, 2008).

Attending to structural fit helps to minimize uncontrolled method variance, which in turn may increase correlations between indirect and direct measures. Such increased co rrelations are simply a byproduct of increased measurement comparability, and appropriately restrict explanatory possibilities. Payne and colleagues (2008, exp. 3) demonstrated this point by examining correlations among indirect and direct AMP tasks assessing evaluations of alcohol and race. They found significant correlations between indirect and direct measures of the same construct (race or alcohol), but no significant correlations across constructs, even when the methods were identical (e.g., indirect race and indirect alcohol evaluations). When our indirect and direct assessments are more structurally similar, discrepancies between the results of these measures are more likely to reflect differences at the level of affective *processes*. Improved structural fit thus provides a more conservative test of dual process models, because we can specify which feature(s) of automaticity differ between our implicit and explicit evaluations, and we can be sure that their differences are not unduly inflated by method variance unrelated to our theoretical constructs.

Improving structural fit is a critical step forward for making more valid inferences about dual processes. However, even structurally similar indirect and direct assessments of affective evaluations do not provide pure estimates of automatic and controlled processes (e.g., De Houwer, 2006; Jacoby, 1991; Payne, 2008). Both implicit attitudes and executive control could drive performance on indirect measures such as the indirect AMP or the IAT; the same could be said for performance on direct measures such as a direct AMP or self-report scale. Improving structural fit would be a major step forward, one that to date has not been fully appreciated within social or clinical psychology. Estimation of formal process-dissociation models (Jacoby, 1991; Payne, 2008; Payne & Cameron, 2014) using multinomial modeling (Batchelder & Riefer, 1999; Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005; Payne & Bishara, 2009; Riefer & Batchelder, 1988) would further strengthen our inferences by providing quantitative estimates of the interactive contributions of automatic and controlled processes to performance on a single task.

Examination of Valence and Arousal Dimensions of Affect

Our knowledge of affective evaluations is obscured further by the nearly exclusive attention paid to the positive–negative *valence* dimension of affect. Most existing models of affect also converge on an independent *arousal* dimension (i.e., degree of activation or motivational intensity; e.g., Lang, 1995; also Russell, 2003), yet the majority of research on affective evaluations in social and clinical psychology has focused on the former at the expense of the latter. Each

dimension of affect can contribute to our understanding of clinically relevant affective evalua-tions. For example, food craving occurs when the affective evaluation of that food includes positive *valence* and some degree of *arousal* (e.g., Craeynest, Crombez, Koster, Haerens, & De Bourdeaudhuij, 2008).

This conceptualization of food craving echoes that of another predominant theory of craving and food incentive. The theory of food reward proposed by Berridge (1996) holds that two independent neural processes determine interest in eating: liking and wanting. Liking results from the processing of hedonic pleasantness (e.g., sweet tastes), while wanting is more akin to appetite or incentive salience, in that wanted foods become attention-grabbing or craved (though not necessarily consciously; Robinson & Berridge, 2008; Berridge, Ho, Richard, & DiFeliceantonio, 2010). Both processes can be automatic in the sense that they can occur without conscious awareness (Berridge, 1996). Wiers and colleagues (2002) illustrated the importance of assessing the arousal dimension in a test of liking and wanting in alcohol addic-tion. Arousal evaluations measured with an arousal IAT significantly differed between heavy and light drinkers, particularly among men, while all participants showed an indirect negative evaluation of alcohol on the valence IAT. In other words, wanting (akin to arousal) − but not liking (akin to valence) − distinguished light and heavy drinkers. To the extent that craving for food resembles craving for other addictive substances (e.g., Gearhardt et al., 2011), we can learn more about food-related affective evaluations by assessing both arousal and valence dimensions (see Wiers & de Jong, 2006 for a review that unpacks the importance of both valence and arousal to the study of addictive behavior).

The food-related implicit affective evaluation literature also supports further investigation of the arousal dimension of affect. Within two studies of severely obese, overweight, and normal-weight youths, Craeynest and colleagues (2008) explored the effects of stimulus arousal on implicit affective evaluations. Both studies found that all youths, regardless of weight, associated arousal more with high-fat than with lean food images, and associated high-fat foods with both positive and negative high arousal (Craeynest et al., 2008, exp. 1 and 2). The potential impor-tance of stimulus arousal, in addition to valence, is echoed in an affective priming paradigm study of undergraduate women, which found that implicit affective evaluations of food images reliably differed between BMI groups only on trials with high-arousal target words (Czyzewska & Graham, 2008). Pending replication, these findings demonstrate the utility of examining both the arousal and the valence dimensions of clinically relevant affective evaluations.

Enhanced Selection of Stimuli

Word stimuli are used commonly throughout the food-related affective evaluation literature, though images would likely enhance the ecological validity and generalizability of this research (e.g., Veenstra & de Jong, 2010), and working with actual foods would move research even further in the direction of ecological validity. Individuals rarely interact with foods in writing; menus and food magazines are littered with photos. Imagine seeing an enticing slice of cake versus reading the name of its recipe. The visual cue is more compelling than the verbal descrip-tion. Images more effectively activate automatic affective responses than words because images tap into the semantic systems where affect is processed more directly than words (e.g., Bradley & Lang, 2007; De Houwer & Hermans, 1994). Word stimuli may not adequately capture the processes that inform real-world judgments about what to eat, given how frequently these decisions are informed by visual cues.

Additionally, stimuli are rarely well characterized within this literature: many potential stimulus aspects are unspecified or uncontrolled for both word and image stimuli. Recently, efforts have been made to develop taxonomies of foods (e.g., Foroni, Pergola, Argiris, Rumiati,

2013), but often distinctions among foods are imprecise. Food stimuli may be classified as high-versus low-calorie (e.g., Spring & Bulik, 2014) or as healthy versus unhealthy (e.g., Perugini, O'Gorman & Prestwich, 2007), leaving fat, fiber, sugar, and sometimes caloric content unspecified. Not all high-calorie or high-fat foods are created equal, however. For example, restrained and unrestrained eaters differ in their responses to cookies but not to pizza, both of which are presumed to be high in both fat and calories but which differ in sugar content (Fedoroff, Polivy, & Herman, 2003). This suggests that properties beyond fat- and calorie-content or overall unhealthiness may influence affective evaluations. Instead, stimuli should vary along multiple reasonably independent relevant dimensions, such as degree of processing, fat content, and sugar content (e.g., Gearhardt, Treat, Hollingworth, & Corbin, 2012; Rizk & Treat, 2013; Woodward & Treat, 2015), or perhaps normative valence and arousal ratings (Bradley & Lang, 2007).

One can simultaneously examine participant-specific and stimulus-specific predictors of affective evaluations, as well as their interactions, by incorporating nutritional or normative affective information about carefully selected stimuli into mixed-effects analytic procedures. For example, careful selection of stimuli that vary largely independently along fat and sugar dimensions would allow us to use mixed-effects analyses to determine whether sugar or fat content more strongly influences affective evaluations across participants (see Fedoroff et al., 2003; Gearhardt, Rizk, & Treat, 2014). We also could assess whether these nutrient-specific effects vary as a function of individual differences (i.e., whether participant-specific and stimulus-specific predictors interact to predict affective evaluations). For example, perhaps the effect of foods' fat content on affective evaluations is stronger for those who restrict their eating, relative to those who do not. Perhaps the effect of binge eating on affective evaluations is specific to high-sugar foods. Such food-specific and participant-specific hypotheses can be tested when we rely on more comprehensive and well-controlled stimulus selection procedures and analyze data using mixed-effects methods.

A Template for Affective Evaluation Research

A researcher interested in conducting a well-controlled study of implicit and explicit affective evaluations of food stimuli would want to take the following steps:

First, she ought to consider the paradigmatic features of indirect and direct measures, by selecting or constructing measures that are as structurally similar to one another as possible. Doing so will reduce uncontrolled method variance and strengthen our inferences about the primary theoretical constructs of interest. After maximizing structural fit, process dissociation or multinomial modeling could be employed to decompose the influences of underlying processes of automatic and controlled evaluation on task performance, to the extent that such models are available. In the current paper, we have focused on structural fit as an initial step at controlling method variance; process dissociation is a subsequent step that we strongly endorse to enhance the construct validity of our indices when feasible (for review, see Payne & Cameron, 2014). Incorporating these advances in implicit measurement will allow a more valid and precise evaluation of dual process theories about clinically relevant affect evaluations. Critically, although much prior work makes dual process claims about affective evaluations in clinical contexts, this work may not license strong inferences to the extent that structural fit between indirect and direct measures is poor. Moreover, illustrating the theoretical advantages of these measurement advances in clinical contexts may reinforce and reiterate the use of these advances in social psychology, where they are still not readily applied.

Second, the researcher ought to assess both pleasant-unpleasant valence evaluations and activating-unactivating arousal evaluations. Affect involves valence *and* arousal, and an

appropriate treatment of implicit affective evaluations requires assessing both. This claim applies both to clinical psychology and to social psychology, where arousal may play important roles in clinical behaviors (e.g., Berridge, 1996) and normative social processes (Cheng, Ottati, & Price, 2013). Assessing both primary affective dimensions will provide a more nuanced characterization of the construct of interest. For instance, one could imagine that pleasant and activating evaluations could signify craving for a particular food, while unpleasant and activating evaluations could reflect disgust or learned taste aversion. Our researcher would not be able to address these questions without assessing both affective dimensions.

Finally, she would benefit from employing a large number of food images with known nutritional and affective properties so that nutrient-specific questions could be asked. Our researcher would be well powered to detect nutrient-specific, as well as individual-specific, effects if she were to utilize a mixed-effects modeling approach to analyze data from a sufficiently large sample. Indeed, she would even be well positioned to determine whether individual differences, such as different forms of eating pathology, influence affective evaluations of only food with certain properties.

Our researcher's efforts to minimize measurement discrepancies between indirect and direct measures, to assess the two primary affective dimensions, to select a wide array of image stimuli with known properties, and to utilize cutting edge analytic models would result in a methodologically rigorous investigation of dual process models of affective evaluation from which she could draw stronger inferences.

Conclusion

Understanding the roles of automatic and controlled aspects of clinically relevant affective evaluations has the potential to enhance our understanding and prediction of clinical and social phenomena. However, a number of theoretical and methodological limitations constrain the strength of our inferences about the role of affective evaluation in psychopathology. These include poor structural fit, inattention to the arousal dimension of affect, and poorly characterized and selected stimuli. We have recommended improvements to structural fit, examination of both arousal and valence dimensions of affective evaluation, and the use of more ecologically valid and well-characterized image stimuli. Improving structural fit moves us closer to obtaining estimates of the relative contributions of underlying automatic and controlled processes, as well as a clearer understanding of the relevance of single versus dual process models to clinically relevant affective evaluations. Advances in the theory and methods of affective evaluation are likely to enhance our understanding of and our ability to treat disorders, and to provide a basis for a more rigorous approach to examining many clinical and social issues, more generally. In seeing how these analytical advances can invigorate theory and practice in clinical psychology, social psychologists may also become more likely to incorporate these advances into their own work.

Adopting these recommendations will allow us to address more complex questions about clinically relevant affective evaluations with greater certainty. Determining whether a single or dual process model best describes the role of affective evaluations in psychological disorder not only can drive theoretical developments but also can inform which interventions might work best for whom. We agree with Payne, Jacoby and Lambert (2005) that identifying the process model appropriate for affective evaluations "is as relevant to pragmatics as it is to processes", and we further suggest that theories about and interventions for psychopathology could benefit from the adoption of these methodological, theoretical, and analytical strategies (p. 410).

Acknowledgement

Short Biographies

Halley Woodward is a doctoral candidate in Clinical Psychology within the Psychological and Brain Sciences department at University of Iowa and is completing her clinical internship at Central Iowa VA Healthcare System. Her two primary research lines address basic processes underlying disordered eating. One examines a variety of influences on women' self-evaluations in the context of disordered eating. The other investigates nomothetic and idiographic correlates of implicit and explicit affective evaluations of foods. She received a BA in Psychology from Bard College and an MA in Clinical Psychology from University of Iowa.

Daryl Cameron is an assistant professor in Psychological and Brain Sciences at the University of Iowa. His research focuses on causes and consequences of empathy and compassion and on using implicit measurement and formal modeling to understand individual differences in empathy and moral judgment. His research on moral emotions and implicit cognition has appeared in Journal of Personality and Social Psychology, Psychological Science, and Personality and Social Psychology Review and has been funded by multiple grants from the National Science Foundation. He holds a BA in Philosophy and Psychology from the College of William and Mary (2006) and a PhD in Social Psychology from University of North Carolina at Chapel Hill (2013).

Teresa Treat is an associate professor in Psychological and Brain Sciences at University of Iowa. Her research program leverages the theoretical, measurement, and computational models of contemporary cognitive science to investigate the role of cognitive processing in the development, maintenance, and modification of numerous clinical problems, including sexual aggression between acquaintances and disordered eating. Her most recent work focuses on the development and evaluation of learning paradigms for the modification of clinically relevant cognitive processing. She received a joint PhD in Clinical Science and Cognitive Science at Indiana University.

Note

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