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Automatic Evaluation

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ABSTRACT—***Humans continuously evaluate aspects of their environment (people, objects, places) in an automatic fashion (i.e., unintentionally, rapidly). Such evaluations can be highly adaptive, triggering behavioral responses away from threats and toward rewards in the environment. Even in the absence of immediate threats and fleeting rewards, the ability to automatically evaluate aspects of the environment enables individuals to effortlessly make sense of their world without depleting limited and valuable cognitive resources. We discuss two lines of research on automatic evaluation: The first demonstrates that people can evaluate a stimulus even when they are not conscious of the stimulus and thus unaware of having evaluated it. The second line of work shows that even when people are conscious of a stimulus, they may evaluate it without intending to do so. We end by discussing current theoretical questions regarding this topic.***

One of the most essential abilities of any organism is the ability to evaluate aspects of the environment as threatening or rewarding. Indeed, a wide range of living things—from amoebas to humans—possess at least some rudimentary form of this capacity. Amoebas, for instance, move away from bright lights, demonstrating behaviorally their detection of a harmful presence. Since the mid-1980s, researchers interested in human information processing have been investigating whether evaluation of environmental stimuli can proceed automatically—that is, extremely rapidly (within milliseconds); without intention; and, at times, without awareness that the evaluation occurred or even of the stimulus being evaluated (see De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009; Petty, Fazio, & Briñol, 2009).

The ability to evaluate stimuli automatically is crucial for acting quickly in response to threats and rewards. Consider the benefit of being able to remove one's hand from a hot stove even before consciously realizing the hotness, and even before consciously registering that one is touching a stove. Automatic evaluations provide this kind of highly relevant, quickly delivered information about appropriate behavioral responses to our environment. The tendency to evaluate stimuli rapidly and unintentionally can be viewed as a background monitoring system operating even while individuals are engaged in some other task. From an evolutionary account, such an ability presumably enabled ancestral humans to engage in one task, such as enjoying food, while also being able to respond to a quickly approaching predator.

Even in more mundane situations, the automatic evaluation of stimuli is instrumental in helping individuals make sense of their world. It can facilitate decision making, for example, by allowing people to assess which aspects of the environment offer sufficient rewards to justify spending the effort and energy necessary to obtain them (e.g., Bijleveld, Custers, & Aarts, in press).

Empirical evidence on automatic evaluation comes from two largely separate literatures. The literature on subliminal perception demonstrates that even when people do not consciously perceive a given stimulus, they evaluate it. In such cases, the evaluation must by necessity be unintentional given that the person is unaware of the stimulus itself. This research provides quintessential evidence that evaluative processes can unfold automatically—rapidly and without the person's intention to evaluate. The second line of work comes from the attitudes literature. This work also speaks to the automaticity of evaluative processes by showing that when people consciously perceive a stimulus they evaluate it even when not intending to do so.

EVALUATING NONCONSCIOUSLY PERCEIVED STIMULI

Behavioral Evidence

Research on subliminal perception provides empirical support that people can evaluate the goodness or badness of a subliminal (i.e., consciously unidentifiable) stimulus. For example, in the widely used sequential evaluative priming paradigm (Fazio, Sanbonmatsu, Powell, & Kardes, 1986), participants are shown a series of trials, each of which consists of the presentation of a prime stimulus followed by a target stimulus. The target is semantically unrelated to the prime and is unambiguously positive or negative in connotation (e.g., words such as "delightful" or "painful"). Participants' task is to classify the valence of the

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target. Research using this paradigm has shown evidence of evaluative priming; namely, the classification of targets is easier (i.e., faster, more accurate, or both) when targets share (versus do not share) the same valence with primes. The evaluative priming phenomenon is commonly interpreted as showing that primes are automatically evaluated and that these evaluations in turn influence the classification of subsequently presented targets.

In research that examines the evaluation of subliminal stimuli, primes are rendered consciously imperceptible by using a number of techniques (e.g., masks, short prime exposure). Even though primes are imperceptible, they influence the ease with which targets are classified, suggesting that the primes have indeed been evaluated. The evaluation of subliminal stimuli not only occurs for words but extends to human faces and images of objects, and it affects a range of subsequent outcomes such as mood states, behaviors, and judgments.

Neuroscience Evidence

Research from cognitive neuroscience using functional magnetic resonance imaging (fMRI) has routinely implicated the critical role of the amygdala in the evaluation of subliminal stimuli. The amygdala is best known for its role in the processing of emotion, especially (but not exclusively) fear. Studies have shown that subliminally presented fearful and angry faces (compared with neutral or happy faces) more strongly activate the amygdala, indicating evaluation in the absence of conscious awareness (e.g., Morris, Öhman, & Dolan, 1998).

The amygdala appears to be crucial for initial evaluative judgments, as it is highly sensitive to cues of environmental threat as well as reward (Breiter et al., 1996). The amygdala's connections to other brain regions involved in directing cognitive and motor processes (Armony & LeDoux, 2000) allows for these automatic evaluations to quickly translate into responsive behaviors (e.g., moving away from threat; Hyman, 1998). Additionally, the amygdala plays a significant role in the formation of memories and conditioned learning, especially that involving fear, which is highly relevant to automatic evaluations given that most preferences are learned rather than inborn (Rozin & Millman, 1987).

Assessing the Perceptibility of Prime Stimuli

Although the most common approach for assessing whether a "subliminal" stimulus is in fact imperceptible is to ask participants to state the content of the prime, such self-reports of perceptibility are limited. Commonly used presentation techniques (e.g., short prime durations, masking) make primes difficult to see. As a result, perceivers tend to be underconfident in their ability to accurately identify these stimuli, treating uncertainty as evidence of lack of perceptibility (e.g., Hannula, Simons, & Cohen, 2005). Thus, some studies claiming to show unconscious evaluation may be instead assessing evaluation at very low levels of conscious awareness. More rigorous behavioral (rather than subjective) methods of assessing perceptibility to assess whether evaluation occurs without conscious awareness are needed.

EVALUATING CONSCIOUSLY PERCEIVED STIMULI

Behavioral Evidence

Most of the work in the attitudes literature using the sequential priming paradigm (Fazio et al., 1986) presents primes supraliminally (i.e., consciously visible). Even though participants are asked to ignore the primes, they show evidence of having evaluated them (via the evaluative priming effect). Because the time between the presentation of the prime and the target is too short (usually less than 300 milliseconds) to allow for strategic and effortful responding, it has been assumed that any effect of the prime on responses to the target is automatic. Other paradigms (e.g., the Implicit Association Test; Greenwald, McGhee, & Schwartz, 1998) that measure people's automatic evaluation of stimuli yield similar evidence of unintentional evaluation. Even paradigms that do not explicitly ask participants to classify the evaluative meaning of targets, such as the lexical decision task, have produced similar results, providing further support that evaluation occurs without intention.

Neuroscience Evidence

The recording of event related potentials (ERP) is a neurophysiological technique that offers high temporal resolution, providing a millisecond-to-millisecond record of the brain's neurophysiological responses associated with the processing of a stimulus. As such, this technique reveals how quickly the brain makes evaluative discriminations. This kind of research consistently finds that the valence of various types of stimuli (words, faces, objects), presented either subliminally or supraliminally, is encoded in under a quarter of a second after the onset of the prime (for a review, see Compton, 2003), with faces typically evaluated more quickly than objects, which in turn are evaluated more quickly than words.

OUTSTANDING QUESTIONS

Are Evaluations Themselves Nonconscious?

Do the empirical findings described so far necessarily indicate that people are not conscious of evaluations triggered by stimuli? For example, even with subliminally presented stimuli, the person may experience a fleeting sense of the positivity or negativity of each stimulus. Consistent with this possibility, work on subliminal face priming has found effects on a person's mood state. Although the subliminal stimuli are evaluated without any conscious awareness, the evaluative response to those stimuli is consciously experienced and reportable, as evidenced by changes in reported mood. On the other hand, in work using the sequential priming paradigm and other commonly used para-

digms, multiple prime-target trials are presented in quick succession, making any conscious experience of the evaluative nature of the prime unlikely or at best ephemeral.

The question of whether people are aware of evaluations themselves is even more applicable in the research using supraliminal primes because people are in fact conscious of the prime stimuli. As a result, they may be more likely to become conscious of the evaluations unintentionally activated by the primes. However, if participants do not *intend* to evaluate the primes, then it may be that at least in some cases they do not become *conscious* of their evaluative connotation.

We contend that people may become conscious of the *product* of the evaluation process and not necessarily conscious of the process itself or of the intention to perform it. This is similar to noticing that you removed your hand soon *after* the immediate response of pain. To date, the extent to which the evaluative product is accessible to consciousness (and the experimental conditions in which this is likely to occur) is unclear and remains open to continued empirical investigation (e.g., De Houwer et al., 2009).

What Is Evaluated Automatically?

Are some aspects of one's environment more likely than others to be evaluated automatically? From an evolutionary account, features of one's environment relevant to survival and reproduction are likely candidates for receiving preferential treatment when it comes to evaluation. Indeed, research shows that fear-eliciting stimuli, such as angry faces, snakes, and spiders, are more likely than other types of stimuli to activate amygdalar responses (Öhman & Soares, 1998).

Behaviors are not, however, governed only by needs related to survival and reproduction. People also strive to achieve personal short- and long-term goals, which influence the stimuli in the environment to which they attend (see Dijksterhuis & Aarts, in press). Stimuli that are relevant to temporarily activated goals or long-term chronic goals are more likely to receive attention (even if they are not noticed consciously) and in turn will be evaluated in terms of goodness and badness (for a discussion of the independence between attention and consciousness, see Dehaene, Changeux, Naccache, Sackur, & Sergent, 2006; Dijksterhuis & Aarts, in press). For example, when people are thirsty, they are more likely to spontaneously notice objects related to drinking (e.g., cups, bottles) than they are when they are not thirsty (Aarts, Dijksterhuis, & de Vries, 2001).

Moreover, goals not only determine which stimuli are attended to, they also determine whether they will be evaluated positively or negatively. Stimuli relevant to obtaining a currently active (versus inactive) goal are evaluated automatically in a more positive fashion. For example, students who have been subliminally reminded of their academic goals will evaluate subliminally presented words such as "library," "study," and "books" more positively (Ferguson, 2008).

What Is Automatic About Automatic Evaluation?

The majority of work on automatic evaluation has operationalized "automatic" in terms of speed of processing and a lack of intention. However, what about other characteristics that are sometimes interpreted as evidence for automaticity (i.e., efficiency, uncontrollability)? Although there has been relatively less research on whether evaluation can be controlled (i.e., stopped), recent work does suggest that in some cases it can be, depending on the method used to assess it (for a review, see De Houwer et al., 2009). In terms of efficiency, a few studies show that evaluative priming specifically can proceed even when processing resources are consumed elsewhere, suggesting that it is a relatively efficient process (e.g., Klauer & Teige-Mocigemba, 2007).

Are Automatic Evaluations a Uniform Construct?

Although the present review has focused primarily on research using the sequential evaluative priming paradigm, evidence for automatic evaluation comes from a variety of different measures (see Petty et al., 2009). Measures of automatic evaluation do not always correlate with one another. This weak method convergence has sparked discussions about what each measure of automatic evaluation captures (e.g., see De Houwer et al., 2009). Currently, it is unclear whether the phenomenon of automatic evaluation reflects a uniform process (and the variability across measures caused by measurement error), or a more complicated, heterogeneous process (and different measures capture different components).

Are Automatic Evaluations Bipolar or Unipolar?

It is commonly assumed that environmental stimuli are evaluated as *either* good *or* bad. However, might stimuli be evaluated with respect to goodness and badness independently? Cacioppo and Berntson (1994) argue that although behaviors may be limited to an approach-versus-avoidance dimension with indifference or indecision in the middle, the underlying psychological mechanisms that give rise to behavior reflect two processes, one appetitive and the other aversive. In the initial stages of perception, individuals engage in a series of rapid evaluations with both aversive and appetitive evaluations occurring in parallel. Only after a person begins to formulate specific behavioral responses toward the stimuli are the distinct aversive and appetitive evaluations integrated. It should be noted that many techniques for assessing automatic evaluation do not address this issue given that they capture *relative* evaluation. That is, they assess whether a stimulus activates good relative to bad, rather than assessing activation of good and activation of bad independently.

Automatic Versus Deliberate Evaluation

A topic that has received little attention in the literature is how deliberate evaluation and automatic evaluation differ in terms of

underlying processes and triggering causes. Some social cognitive researchers have suggested that, generally speaking, deliberate processes may occur in the same way as automatic processes, regardless of differences in awareness, intention, effort, and control. However, other work on varieties of nonconscious versus conscious processing would suggest that deliberately making an evaluative judgment should (and perhaps must) introduce some differences at the subjective level, and possibly at the functional as well (see Dehaene et al., 2006). Consistent with this position, research shows that the way people automatically evaluate stimuli may at times be at odds with the way they would evaluate those same stimuli given more time and thought. For example, whereas people may exhibit initially negative reactions to stigmatized group members, their more intentional evaluations can be more positive. Research is ongoing to examine the source(s) for such dissociations in measures of evaluations (e.g., see Petty et al., 2009).

Dual-process theories (e.g., Gawronski & Bodenhausen, 2006) provide a framework for understanding both automatic and deliberative evaluations. According to such theories, evaluations can emerge from one of two systems in the mind: a propositional (deliberative) system or an associative (automatic) system. Whereas evaluations that depend on propositional knowledge are often conscious, intentional, and endorsed by the person, evaluations that proceed from an associative system are often unconscious, unintentional, and sometimes at odds with the person's more deliberate evaluations. Research from a variety of perspectives is investigating how both automatic and deliberate evaluations are generated (e.g., see Wojnowicz, Ferguson, Dale, & Spivey, in press).

CONCLUSION

Automatic evaluations—those that occur unintentionally, rapidly, and, at times, without conscious awareness—allow individuals to respond quickly to threats and rewards present in an ever-changing environment. The next generation of empirical inquiry on automatic evaluation will require addressing when it happens, how it happens, what consequences it may have, how it interacts with other knowledge structures, and whether and how it can be controlled.

Recommended Reading

De Houwer, J., Teige-Mocigemba, S., Spruyt, A., & Moors, A. (2009). (See References). A thorough overview of various theoretical and methodological issues concerning implicit measures of evaluation.

Fazio, R.H., Sanbonmatsu, D.M., Powell, M.C., & Kardes, F.R. (1986). (See References). A historical classic—the first paper to empirically demonstrate automatic evaluations.

Petty, R.E., Fazio, R.H., & Briñol, P. (Eds.). (2009). (See References). A comprehensive review for readers who wish to expand their knowledge on automatic evaluations.

Wittenbrink, B., & Schwarz, N. (2007). *Implicit measures of attitudes*. New York: Guilford. A comprehensive review of the theory and research concerning the measures of automatic evaluations.

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