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What do memory data tell us about the role of contingency awareness in evaluative conditioning?☆

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ABSTRACT

Evaluative conditioning (EC) refers to the effect that pairings of a conditioned stimulus (CS) with a valenced unconditioned stimulus (US) lead to changes in the evaluation of the CS. There have been recurring debates about whether EC requires awareness of the contingency between CSs and USs during learning. We argue that the memory performance data obtained in the standard paradigm remain ambiguous about the role of contingency awareness during the encoding of CS–US pairings. First, memory performance data are unable to distinguish between encoding-related versus retrieval-related effects. Second, the relation between memory performance and evaluation is correlational, which limits conclusions about causal relations between memory performance and EC effects. These ambiguities imply that any possible data pattern can be interpreted in at least two different ways. It is concluded that a resolution of the current debate requires alternative approaches in which contingency awareness is experimentally manipulated during the encoding of CS–US pairings.

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Introduction

Some people like spinach; others detest it. Some prefer Coke over Pepsi; others like Pepsi better than Coke. Some are attracted to ambitious people; others prefer a mate with family values. In general, our evaluations of objects and individuals play a significant role in everyday life, because they influence decisions which products we are going to buy or who we are going to date or marry. Even though automatic evaluative reactions can help us navigate through a world of complex decisions (Ferguson & Zayas, 2009), they can also have undesired effects when they promote behaviors that are dysfunctional for our health and well-being, such as addictive behaviors or phobic reactions. Not surprisingly, one of the most important questions in psychology is where these evaluations come from and what factors lead to changes in evaluative responses.

Over the past three decades, social psychologists have become increasingly interested in the role of conditioning mechanisms as a source of people's likes and dislikes (for reviews, see De Houwer, Thomas, & Baeyens, 2001; Jones, Olson, & Fazio, 2010; Walther, Weil, & Düsing, 2011). In a typical evaluative conditioning (EC) paradigm, a neutral conditioned stimulus (CS) is repeatedly paired with either a positive or a negative unconditioned stimulus (US). The common result is that the CS acquires the valence of the US, such that CSs that have been paired with positive USs acquire a positive valence and CSs that have been paired with negative USs acquire a negative valence (for a meta-analysis, see Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). Even though EC paradigms have originally been used to study the formation of attitudes toward novel objects, there is accumulating evidence that EC paradigms are also effective in changing existing attitudes toward familiar objects, including attitudes toward social groups (e.g., Karpinski & Hilton, 2001; Olson & Fazio, 2006), the self (e.g., Baccus, Baldwin, & Packer, 2004; Dijksterhuis, 2004; Grumm, Nestler, & von Collani, 2009), continents (e.g., Gawronski & LeBel, 2008), and consumer products (e.g., Gibson, 2008).

One of the reasons why the EC paradigm has attracted so much attention is that EC effects have been claimed to occur in the absence of conscious awareness of the contingency between the CS and the US (e.g., Baeyens, Eelen, & van den Bergh, 1990; Field & Moore, 2005; Fulcher & Hammerl, 2001; Jones, Fazio, & Olson, 2009; Olson & Fazio, 2001, 2002; Walther & Nagengast, 2006). The presumed independence of contingency awareness is not only theoretically important, in that it may distinguish EC from other variants of conditioning, such as Pavlovian signal learning (see De Houwer et al., 2001; Walther, Nagengast, & Trasselli, 2005); it also raises some interesting questions about whether people are consciously aware of the sources of their preferences (see Gawronski, Hofmann, & Wilbur, 2006; Wilson, Dunn, Kraft, & Lisle, 1989). On the one hand, one could argue that the ability to learn object-valence contingencies

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outside of conscious awareness is a highly functional capacity that facilitates context-appropriate action. On the other hand, it also implies the disturbing possibility that we might be helpless to resist the influence of those who try to manipulate us outside of our awareness (e.g., Dijksterhuis, Smith, van Baaren, & Wigboldus, 2005; Karremans, Stroebe, & Claus, 2006).

In addition to these questions, the role of contingency awareness in EC has become a central issue in the ongoing debate between the proponents of dual-process and single-process theories (for a review, see Gawronski & Creighton, in press). Drawing on the distinction between associative and propositional processes, some dual-process theorists have proposed two distinct mechanisms by which attitudes can be formed and changed: (a) an associative mechanism in which objects and events become automatically linked by virtue of their mere co-occurrence and (b) a propositional mechanism that involves a conscious validity assessment of propositionally represented statements (e.g., Gawronski & Bodenhausen, 2006; Rydell & McConnell, 2006). This distinction has been challenged by single-process theorists who argued that the acquisition of new information is generally mediated by propositional processes, and that there is no empirical evidence for the existence of a distinct associative process of automatic link formation (e.g., Kruglanski & Gigerenzer, 2011; Mitchell, De Houwer, & Lovibond, 2009). Because EC is often treated as a prototypical example of associative learning, the question of whether EC effects can occur in the absence of contingency awareness has important implications for the debate about dual-process and single-process theories.[1]

Although the assumption that EC does not require contingency awareness is rather widespread in the social psychological literature, its validity has been challenged by several studies that found EC effects only when participants were able to report the contingency between the CS and the US (e.g., Bar-Anan, De Houwer, & Nosek, 2010; Dawson, Rissling, Schell, & Wilcox, 2007; Dedonder, Corneille, Yzerbyt, & Kuppens, 2010; Pleyers, Corneille, Luminet, & Yzerbyt, 2007; Stahl & Unkelbach, 2009; Stahl, Unkelbach, & Corneille, 2009). These findings not only fueled controversies about the learning mechanisms that underlie EC effects (e.g., De Houwer, 2009; Gawronski & Bodenhausen, 2006, 2009; Hofmann et al., 2010; Jones et al., 2010; Kruglanski & Gigerenzer, 2011; Mitchell et al., 2009); they also sparked disputes about the proper way of measuring contingency awareness in EC studies (e.g., Jones et al., 2009; Pleyers et al., 2007).

In the present article, we argue that the currently dominant approach of studying contingency awareness in EC remains ambiguous as to whether contingency awareness during the encoding of CS–US pairings is or is not required for EC effects to occur (see also De Houwer, 2001; Field, 2000). This argument is based on three methodological observations. First, the standard paradigm to study contingency awareness assesses subsequent memory performance in correctly identifying CS–US pairings rather than contingency awareness during the encoding of CS–US pairings. Second, the relation between memory performance and evaluation data in this paradigm is correlational rather than experimental, which implies that the causal direction of the obtained relations remains ambiguous. Third, these characteristics entail that any data pattern can be interpreted in at least two different ways, one implying that contingency awareness is necessary and the other one implying that contingency awareness is not necessary for EC effects to occur. To overcome these ambiguities, we endorse the development and use of experimental approaches in which contingency awareness is manipulated during the encoding of CS–US pairings.

Ambiguities in the standard paradigm

Memory versus awareness

To investigate the role of contingency awareness in EC, researchers typically include a free recall or recognition task in which participants are asked to identify the US with which a given CS has been paired in the preceding learning task. In some studies, researchers distinguished between participants who did versus did not show evidence for contingency memory (e.g., Fulcher & Hammerl, 2001). Other researchers argued that this participant-based approach is suboptimal and that contingency awareness should be studied on an item basis for each individual CS (e.g., Pleyers et al., 2007). Irrespective of how contingency awareness is determined for a given data set, it is important to note that both data analytic strategies are based on memory performance data that are assessed after the presentation of CS–US pairings. That is, researchers tend to assess participants' subsequent performance in correctly identifying the CS–US pairings of the learning task. These data are typically interpreted as reflecting participants' awareness of CS–US contingencies during encoding of the relevant pairings. If EC effects are found in the absence of accurate memory for the CS–US contingencies, it is inferred that attitudes can be influenced by CS–US pairings outside of conscious awareness (e.g., Baeyens et al., 1990; Field & Moore, 2005; Fulcher & Hammerl, 2001; Jones et al., 2009; Walther & Nagengast, 2006). If, however, EC effects are found only when participants show accurate memory for the CS–US contingencies, it is assumed that attitudes remain unaffected by CS–US pairings unless participants are consciously aware of these pairings during encoding (e.g., Dawson et al., 2007; Dedonder et al., 2010; Pleyers et al., 2007; Stahl & Unkelbach, 2009; Stahl et al., 2009).

In a critical analysis of the literature on unconscious learning, Shanks and St. John (1994) argued that awareness checks of this kind have to meet two criteria to reliably distinguish between conscious and unconscious learning. First, it is important to establish that the obtained effects on the primary criterion measure (i.e., evaluation) are indeed driven by the same information that the experimenter aims to assess with the awareness measure (*information criterion*). Second, the awareness measure must have the same sensitivity to the learned information as the primary criterion measure (*sensitivity criterion*). According to Shanks and St. John, learning effects on the primary criterion measure in the absence of effects on the awareness measure provide valid evidence for unconscious learning only when both conditions are met. With regard to the use of memory measures in EC research, Shanks and St. John further noted that "the information criterion does not raise particular problems, because there is little doubt that the information the subjects learn (the contingency between CS and US) corresponds to what the awareness test asks them to report" (p. 377).[2] Thus, granted that the employed measures of contingency memory are sufficiently sensitive, Shanks and St. John's analysis would suggest that the standard paradigm is well-suited to establish whether EC effects do or do not require awareness of CS–US contingencies.

Counter to this conclusion, we argue that performance on subsequently administered memory tasks remains ambiguous as to the whether the obtained effects reflect encoding-related or retrieval-related processes. For example, memory for CS–US contingencies in an EC paradigm could be low because participants did not recognize the relevant contingencies during encoding. Alternatively, memory

[1] It is important to note that not all dual-process theories of attitudes propose two conceptually distinct learning mechanisms. For example, Fazio's (2007) MODE model distinguishes between automatic and controlled processes in the *expression* of attitudes, but it remains agnostic about whether the *formation* of attitudes occurs through a single process or two distinct processes.

[2] According to Shanks and St. John (1994), the information criterion is more relevant for other variants of learning that have been claimed to occur outside of conscious awareness, such as artificial grammar learning.

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