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WHAT DO I KNOW ABOUT IT VERSUS HOW DO I FEEL ABOUT IT? A THEORETICAL ANALYSIS OF RESPONSE PROCESSES IN EVALUATIVE CONDITIONING

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Evaluative conditioning (EC) is defined as the change in the evaluation of a conditioned stimulus (CS) due to its pairing with a valenced unconditioned stimulus (US). Because EC involves the *acquisition* of evaluative responses, previous EC research has paid relatively little attention to the processes involved in the *expression* of evaluative responses. Drawing on research on response processes underlying evaluative judgments, we argue that EC effects on evaluative judgments can be mediated by the use of (1) recollective memory for events involving the CS or (2) one's spontaneous affective reaction toward the CS. Because the two proximal outcomes of CS-US pairings can have independent effects on evaluative judgments as a distal outcome, influences on expression-related processes can lead to inaccurate conclusions when they are attributed to acquisition-related processes. Our analysis suggests that a deeper understanding of EC requires a broader theoretical approach that includes both acquisition-related and expression-related processes.

Keywords: affect-as-information, attitudes, evaluative conditioning, evaluative judgment, recollective memory

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Imagine you are participating in a consumer survey and you are asked to rate your satisfaction with a product you own. Unless you have a previously prepared answer to this question, you would have to generate a judgment on the basis of information that seems relevant for your evaluation. One way to approach this task is to think about your personal experiences with the product and base your judgment on the evaluative quality of the recalled experiences. Another way is to observe your spontaneous affective reaction when you think about the product and base your judgment on the evaluative quality of your affective response. Although the two types of information will often lead to the same outcome, their impact on evaluative judgments can be independent in the sense that people may rely on either recollective memories or affective reactions (or both).

In the current article, we apply this idea to a particular phenomenon in the literature on attitude formation and change: evaluative conditioning (EC). According to De Houwer (2007), EC can be defined as the change in the evaluation of a conditioned stimulus (CS) due to its pairing with a valenced unconditioned stimulus (US). Deviating from the traditional focus on the learning mechanisms underlying EC effects (for reviews, see Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010; Jones, Olson, & Fazio, 2010), our theoretical investigation starts at the opposite end with an analysis of the processes underlying the expression of evaluative judgments. Drawing on research and theorizing on response processes underlying social judgments (Strack, 1992), we argue that evaluative judgments about a CS can be based on two kinds of information: (1) recollective memory for prior events involving the CS and (2) one's spontaneous affective reaction toward the CS. Our main argument is that previous EC research has paid insufficient attention to the processes involved in the expression of conditioned evaluative responses, which can lead to premature (and potentially incorrect) conclusions about the processes underlying their acquisition. Expanding on our analysis, we discuss implications for mental process theories of EC, showing how a broader theoretical approach that includes expression-related processes can advance EC research on acquisition-related processes.

ACQUISITION VERSUS EXPRESSION

From a functional-cognitive view (De Houwer, 2011), EC can be regarded as a learning phenomenon, in that it involves effects of the history of a CS (i.e., its pairings with a US) on evaluative responses toward the CS (De Houwer, Gawronski, & Barnes-Holmes, 2013). This conceptualization is consistent with traditional approaches that focus primarily on the processes involved in the *acquisition* of conditioned evaluative responses. Yet, deviating from this dominant focus, EC researchers have become increasingly interested in the processes underlying the *expression* of conditioned evaluative responses (Gast, Gawronski, & De Houwer, 2012). This broader perspective has been inspired by the insight that many studies on the learning mechanisms underlying EC effects tend to conflate the two stages,

implying that some findings that have been attributed to learning mechanisms may in fact be due to processes involved in the expression of evaluative responses.

The most prominent example of such ambiguities is research on the role of contingency awareness (cf. Shanks & St. John, 1994). EC has been claimed to be distinct from other types of conditioning effects, in that it can occur without awareness of CS-US contingencies (see De Houwer, Thomas, & Baeyens, 2001; Walther, Nagengast, & Trasselli, 2005). For decades, the role of contingency awareness in EC has been examined with measures of memory performance by investigating the relation between EC effects and participants' ability to identify the US (or the valence of the US) that had been paired with a given CS. To the extent that EC effects occur in the absence of accurate memory for CS-US pairings, it is typically argued that EC effects do not require contingency awareness (e.g., Baeyens, Eelen, & van den Bergh 1990; Fulcher & Hammerl, 2001; Jones, Fazio, & Olson, 2009; Olson & Fazio, 2001; Walther & Nagengast, 2006). In contrast, if EC effects occur only when participants are able to identify the US (or the valence of the US) that had been paired with a given CS, it is argued that EC effects do require contingency awareness (e.g., Pleyers, Corneille, Luminet, & Yzerbyt, 2007; Stahl & Unkelbach, 2009; Stahl, Unkelbach, & Corneille, 2009).

A major problem with either of these conclusions is that performance on memory tasks is non-diagnostic regarding the role of contingency awareness during encoding. As discussed in detail by Gawronski and Walther (2012), memory-based approaches are suboptimal, because (1) the relation between memory performance and EC effects is merely correlational, and (2) performance on memory tasks is influenced by both encoding-related and retrieval-related processes. These two aspects imply that either outcome can be reinterpreted in terms of the opposite theoretical view. For example, if EC effects occur in the absence of accurate memory for CS-US pairings, it could be argued that participants simply forgot the details of the pairings by the time of testing, although awareness of the pairings at the time of encoding is an essential precondition for EC effects. Conversely, if EC effects occur only when there is accurate memory for CS-US pairings, it could be argued that participants use their evaluative response to the CS as a basis to guess the nature of the US it had been paired with (e.g., Bar-Anan & Amzaleg-David, 2014), although awareness of the pairings during encoding is not required for EC effects. According to Gawronski and Walther (2012), stringent tests of either hypothesis require experimental approaches that systematically manipulate awareness of CS-US pairings during encoding, ideally including online measures of awareness as manipulation checks (see also Sweldens, Corneille, & Yzerbyt, 2014). Although other features of automatic processing have been studied with experimental designs testing the resource-dependence (e.g., Pleyers, Corneille, Yzerbyt, & Luminet, 2009) and controllability (e.g., Gawronski, Mitchell, & Balas, 2015) of the learning mechanisms underlying EC, there is hardly any research that investigated the role of contingency awareness in an experimental fashion (for a notable exception, see Dedonder, Corneille, Bertinchamps, & Yzerbyt, 2014).

EC WITH RECOLLECTIVE MEMORY

Does this mean that previous findings on the relation between memory performance and EC effects have no implications for our understanding of EC? We don't think so! However, different from earlier interpretations in terms of processes involved in the acquisition of conditioned evaluative responses, we argue that relations between memory performance and EC effects are more informative about the processes underlying the expression of conditioned evaluative responses. Rather than reflecting the role of contingency awareness during encoding, we argue that relations between memory performance and EC effects reflect the use of recollective memory for prior events involving the CS for evaluative judgments about the CS. From this perspective, the knowledge that a CS repeatedly co-occurred with a positive or negative US serves as the basis for a corresponding evaluative judgment, thereby leading to systematic covariations between EC effects and memory performance.

There are three lines of research that are consistent with this interpretation. The first one involves experimental manipulations of contextual conditions during the encoding of CS-US pairings, showing parallel effects on memory performance and evaluative judgments. For example, investigating effects of mental resources, Pleyers et al. (2009) found that cognitive load during the encoding of CS-US pairings reduced both recollective memory for the pairings and EC effects on evaluative judgments. This finding was replicated by Dedonder, Corneille, Yzerbyt, and Kuppens (2010) using unfamiliar stimuli as CSs instead of familiar stimuli. Similarly, Kattner (2012) demonstrated that an experimental manipulation of attention during the encoding of CS-US pairings had parallel effects on memory performance and EC effects on evaluative judgments, in that both were significantly reduced when attention was directed away from CS-US contingencies. Examining the impact of procedural features, Kattner, Ellermeier, and Tavakoli (2012) found that an experimental manipulation of US duration showed parallel effects on memory performance and EC effects on evaluative judgments, in that both were reduced for shorter US presentations.

One potential interpretation of these findings is that memory performance and EC effects show parallel effects simply because they have the same antecedent (i.e., encoding of CS-US pairings) and this common antecedent is influenced by the reviewed factors (e.g., cognitive load during encoding). According to this interpretation, there is no direct relation between memory performance and evaluative judgments; their systematic covariation is simply due to their shared causal relation to a common third variable (i.e., CS-US pairings). Yet, an alternative interpretation is that the reviewed factors influence evaluative judgments via memory-related processes, such that any factor that reduces recollective memory for CS-US pairings (e.g., cognitive load) attenuates EC effects that result from the use of recollective memory for evaluative judgments about the CS. According to this interpretation, memory performance and evaluative judgments show parallel ef-

fects, because recollective memory functions as a mediator of EC effects on evaluative judgments. Thus, to the extent that the reviewed factors influence recollective memory for CS-US pairings as a proximal outcome of CS-US pairings, they should also influence evaluative judgments of the CS as a distal outcome (cf. Muller, Judd, & Yzerbyt, 2005).[1]

Preliminary evidence for the latter interpretation comes from a second line of research that has used experimental manipulations of retrieval conditions after the encoding of CS-US pairings. This line of research has shown that experimental factors that reduce memory performance after encoding can lead to corresponding reductions in EC effects on evaluative judgments. A well-known finding in the memory literature is that memory performance decreases as a function of increasing delays between encoding and retrieval. Consistent with this finding, Gast, De Houwer, and De Schryver (2012) showed that memory for CS-US pairings was lower several days after the encoding of the pairings than immediately after encoding. Although CS evaluations were measured only in the delayed session, EC effects on evaluative judgments were related to memory performance at the time of measurement, not to memory performance immediately after encoding (see also Gast & Kattner, 2016).

Finally, a third line of research that is consistent with our hypothesis concerns the influence of subjective beliefs about CS-US pairings. For example, research by Bar-Anan, De Houwer, and Nosek (2010) suggests that the relation between memory judgments and EC effects is driven, not by participants' actual memory performance, but their subjective beliefs about which type of US was paired with a given CS. To the extent that these beliefs are incorrect, evaluative judgments of the CSs tend to reflect the valence of whatever CS-US pairings participants falsely remember rather than their objective co-occurrences. Similar findings have been reported by Kattner and Ellermeier (2011) who found that objective contingencies and US density jointly influenced subjective perceptions of CS-US contingencies, which in turn predicted the size of EC effects on evaluative judgments (see also Kattner, 2014). Although beliefs about co-occurrences (Bar-Anan et al., 2010) and beliefs about contingencies (Kattner & Ellermeier, 2011) are conceptually distinct, either of these findings suggests that subject beliefs about CS-US pairings play a central role for EC effects on evaluative judgments. Together, the three lines of evidence are consistent with the hypothesis that EC effects on evaluative judgments can be mediated by the use of recollective memories for prior events involving the CS, and such influences may occur regardless of whether these memories are accurate or inaccurate.

1. Note that the *mediator* hypothesis is different from the common use of memory performance as a *moderator* of EC effects. Both recollective memory and evaluative judgments are measured outcomes of the same antecedent (i.e., CS-US pairings), which leads to conceptual problems when one outcome (e.g., recollective memory) is treated as a moderator of the other outcome (e.g., evaluative judgments). The current hypothesis is different, in that one variable is treated as a *proximal outcome* of CS-US pairings (i.e., recollective memory) that mediates effects on a *distal outcome* (i.e., evaluative judgments).

EC WITHOUT RECOLLECTIVE MEMORY

Although there is considerable evidence that EC effects on evaluative judgments tend to vary as a function of memory performance, a number of studies suggest that EC effects can also be independent of memory performance (e.g., Baeyens et al., 1990; Fulcher & Hammerl, 2001; Jones et al., 2009; Olson & Fazio, 2001; Walther & Nagengast, 2006). These findings have sparked debates about the most appropriate way to measure recollective memory for CS-US pairings. For example, Pleyers et al. (2007) have argued that the relation between memory performance and EC effects should be analyzed at the item-level for individual CS-US pairings instead of the participant-level by categorizing them on the basis of their memory performance. According to Pleyers et al., participant-based analyses can sometimes reveal EC effects in the absence of recollective memory, even when item-based analyses of the same data show significant EC effects only for CS-US pairings that were correctly remembered. Pleyers et al. explained these inconsistencies by arguing that EC effects in the absence of accurate memory reflect an artifact of an inappropriate method to analyze memory data in EC. Yet, counter to this claim, there are some studies that revealed EC effects in the absence of accurate memory using item-based analyses (e.g., Balas & Gawronski, 2012). These results suggest that, in addition to the use of recollective memory for CS-US pairings, EC effects on evaluative judgments can be mediated by other proximal outcomes that are independent of recollective memory.

In our view, the most compelling evidence for memory-independent EC effects has been presented by Hütter, Sweldens, Stahl, Unkelbach, and Klauer (2012). Using a multinomial modeling approach, Hütter et al. found that CS-US pairings can influence evaluative responses even when participants are unable to remember the valence of the US that had been paired with a given CS. Moreover, whereas a one-day delay between encoding and measurement led to a significant reduction in the model parameter for recollective memory, the model parameter for evaluative responses in the absence of recollective memory remained unaffected by the delay. Similar findings have been reported by Förderer and Unkelbach (2013) and Fulcher and Cocks (1997), who found significant reductions in memory performance as a function of time without corresponding reductions in EC effects on evaluative judgments. Together, these findings indicate that EC effects on evaluative judgments can be independent of recollective memory, suggesting a potential role for other mediators beyond the use of recollective memory for prior events involving the CS.

SPONTANEOUS AFFECTIVE REACTIONS AS AN ALTERNATIVE MEDIATOR

We argue that one's spontaneous affective reaction toward the CS might function as an alternative mediator of EC effects on evaluative judgments over and above the use of recollective memory for CS-US pairings. Although recollective memory

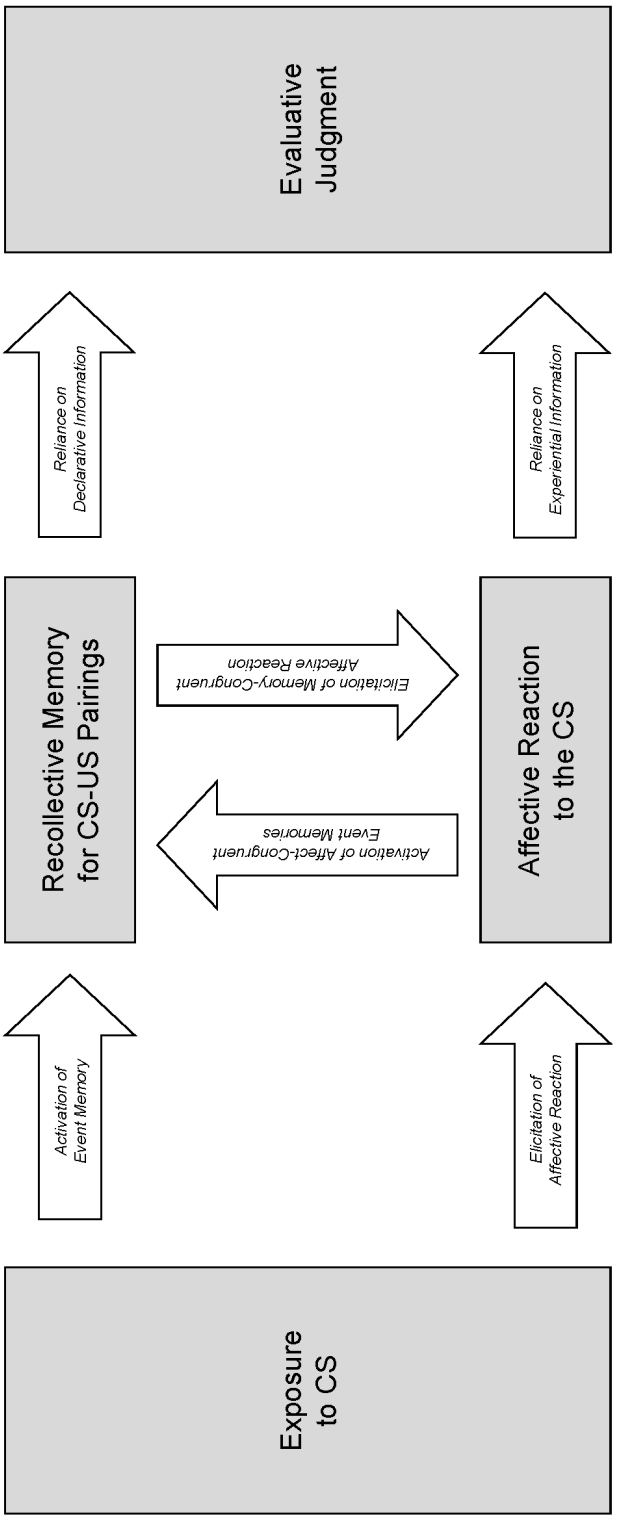

FIGURE 1. Hypothesized interplay of recollective memory for CS-US pairings and spontaneous affective reactions to the CS in the generation of an evaluative judgment about the CS. Recollective memory for CS-US pairings and spontaneous affective reactions to the CS are assumed to represent proximal outcomes of CS-US pairings that mediate EC effects on evaluative judgments as a distal outcome.

TABLE 1. Results of Multiple Regression Analysis Predicting EC Effects on Evaluative Judgments by EC Effects on an Implicit Measure, Motivation to Prevent the Influence of CS-US Pairings, Recollective Memory for CS-US pairings, and their Interactions

	B	*SE*	*t*	*p*
Intercept	1.375	.122	11.273	< .001
AFF	.388	.127	3.048	.003
MOT	-.627	.125	-4.994	< .001
MEM	.576	.127	4.546	< .001
AFF × MEM	.097	.158	.613	.540
MEM × MOT	-.538	.161	-3.343	.001
AFF × MOT	-.003	.135	-.022	.983
AFF × MEM × MOT	-.047	.193	-.242	.809

Note. AFF = EC effect on implicit measure; MOT = motivation to prevent the influence of CS-US pairings; MEM = recollective memory for CS-US pairings. Combined data from Gawronski, Balas, and Creighton (2014), Experiments 1 and 2 (N = 240)

and affective reactions tend to be strongly intertwined, their influence on evaluative judgments can be independent in the sense that people may rely on either recollective memories or affective reactions (or both) when making an evaluative judgment. Moreover, factors that influence recollective memories may not necessarily influence affective reactions (e.g., impaired memory for CS-US pairings as a function of time without reduction in affective reaction to the CS), while factors that influence affective reactions may not necessarily influence recollective memories (e.g., reduced affective reaction to the CS as a function of habituation without reduction of recollective memory for CS-US pairings). Such asymmetric influences can lead to dissociations between the two proximal outcomes of CS-US pairings in addition to dissociations in terms of their use for evaluative judgments (see Figure 1).

Although the distinction between recollective memory and affective reactions seems relatively straightforward at the conceptual level, the lack of process-pure measures makes it notoriously difficult to empirically distinguish between the two. Nevertheless, the conceptual distinction offers a valuable framework for interpreting the findings of EC studies that included implicit measures of evaluative responses to the CS in addition to measures of recollective memory and evaluative judgments (cf. Gawronski & De Houwer, 2014). From a functional-cognitive view, implicit measures do not capture a special kind of mental construct (e.g., mental associations), but a particular type of evaluative response (De Houwer et al., 2013). This type of evaluative response differs from other kinds of evaluative responses (e.g., evaluative judgments on self-report measures) in terms of the processing constraints imposed by their measurement instruments. For the purpose of the current analysis, one of the most significant findings in the literature on implicit measures is that evaluative judgments converge to the responses captured by implicit measures when participants are encouraged to rely on their spontaneous affective reactions (e.g., Dohle, Keller, & Siegrist, 2010; Gawronski & LeBel,

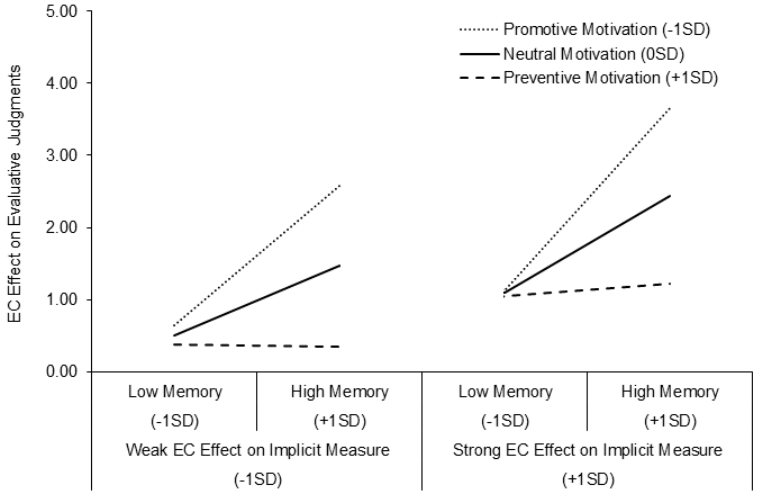

FIGURE 2. EC effects on evaluative judgments as a function of EC effects on an implicit measure, self-reported control motivation (promotive, neutral, preventive), and recollective memory for CS-US pairings.

The depicted pattern shows a main effect of EC effects on the implicit measure and a two-way interaction of recollective memory and control motivation in the prediction of EC effects on evaluative judgments. Combined data from Gawronski, Balas, and Creighton (2014), Experiments 1 and 2 (N = 240).

2008; Grumm, Nestler, & von Collani, 2009; Jordan, Whitfield, & Zeigler-Hill, 2007; Scarabis, Florack, & Gosejohann, 2006; Smith & Nosek, 2011; see also Smith & De Houwer, 2015). This finding suggests that (1) people subjectively experience their responses on implicit measures as spontaneous affective reactions and (2) they can flexibly adjust their reliance on these reactions when making an evaluative judgment.

Applied to the current question, several EC studies using implicit measures are consistent with the idea that recollective memory for CS-US pairings and spontaneous affective reactions to the CS can function as independent mediators of EC effects on evaluative judgments. The central pattern implied by this assumption is that (1) EC effects on evaluative judgments are independently predicted by measures of memory for CS-US pairings and EC effects on implicit measures; (2) the predictive relations of the two measures have distinct functional properties, in that the moderators of one do not necessarily influence the other; and (3) experimentally induced changes in one mediator are associated with parallel changes in EC effects on evaluative judgments without corresponding changes in the other mediator (cf. Muller et al., 2005).

In one study by Gawronski, Balas, and Creighton (2014), participants were instructed to either prevent or promote the impact of CS-US pairings on their responses toward the CSs before they were presented with the pairings. Participants in a control group were asked to simply watch the pairings. Results showed that EC effects on evaluative judgments were moderated in line with the control in-

structions. However, memory performance and EC effects on an implicit measure were unaffected by control instructions, with the two measures being uncorrelated. More important for the current question, EC effects on evaluative judgments were independently predicted by memory performance and EC effects on the implicit measure (see Table 1). Furthermore, whereas the predictive relation of the implicit measure was unaffected by participants' motivation to prevent or promote the impact of CS-US pairings, the predictive relation of the memory measure depended on participants' control motivation. Specifically, the predictive relation of memory performance decreased when participants were motivated to prevent the impact of CS-US pairings on their evaluative responses and increased when participants were motivated to promote their impact. There were no interactions involving the implicit measure, which predicted EC effects on evaluative judgments regardless of control motivation and memory performance. In terms of the current framework, these results suggest that control motivation systematically influenced the reliance on recollective memory for CS-US pairings for evaluative judgments about the CS, but it did not influence the use of spontaneous affective reactions to the CS (see Figure 2). Together, these results are consistent with the idea that recollective memory for CS-US pairings and spontaneous affective reactions to the CS represent distinct proximal outcomes of CS-US pairings that independently mediate EC effects on evaluative judgments.

In a follow-up study by Gawronski et al. (2015), participants were instructed to use one of three specific strategies to prevent the impact of CS-US pairings on their responses toward the CSs: (1) suppression of emotional reactions to the US, (2) reappraisal of the valence of the US, and (3) facial blocking of emotional responses. Participants in a control group were asked to simply watch the pairings. Results showed that EC effects on evaluative judgments were significantly reduced by the three control strategies, and this reduction was mediated by parallel reductions in memory performance. Interestingly, EC effects on an implicit measure remained unaffected by the three control strategies. Moreover, EC effects on evaluative judgments were independently predicted by memory performance and EC effects on the implicit measure. In terms of the current framework, these results are consistent with the idea that recollective memory for CS-US pairings and spontaneous affective reactions to the CS can function as independent mediators of EC effects on evaluative judgments. Specifically, the obtained pattern of results suggests that the three control strategies influenced EC effects on evaluative judgments by impairing recollective memory for CS-US pairings. Yet, the three control strategies did not seem to reduce spontaneous affective reactions to the CSs, which served as an independent basis for evaluative judgments about the CSs.

THE USE OF RECOLLECTIVE MEMORY AND SPONTANEOUS AFFECTIVE REACTIONS

In the case of EC, recollective memory and spontaneous affective reactions usually have corresponding effects on evaluative judgments, in that both lead to more fa-

vorable evaluations of CSs that had been paired with positive USs compared with CSs that had been paired with negative USs. Nevertheless, it seems possible that people can flexibly adjust their use of the two kinds of information, in that they may base their evaluative judgments of a CS on either their recollective memory for CS-US pairings or their spontaneous affective reaction to the CS, or both (see Strack, 1992). This assumption has important implications for the boundary conditions of EC effects on evaluative judgments.

One prediction that can be derived from our analysis is that EC effects on evaluative judgments should depend on participants' reliance on affective reactions when CS-US pairings are encoded under conditions that undermine recollective memory for the pairings. Preliminary evidence for this hypothesis comes from a study by Gawronski and LeBel (2008), who investigated the impact of introspection foci on EC effects resulting from CS-US pairings with subliminally presented USs. Consistent with the current prediction, EC effects on evaluative judgments were limited to conditions when participants were instructed to rely on their feelings toward the CSs; there was no significant EC effect on evaluative judgments when participants were instructed to rely on their knowledge about the CSs (see also Kendrick & Olson, 2012). Because the CS-US pairings involved subliminal presentations of the USs, recollective memory for the pairings was presumably impaired by suboptimal processing conditions during encoding. Hence, a potential impact of CS-US pairings on evaluative judgments was limited to the mediating role of spontaneous affective reactions, which should be disrupted when participants rely on their knowledge about the CSs rather than their feelings toward the CSs. Consistent with this interpretation, an implicit measure showed significant EC effects regardless of instructions to focus on feelings versus knowledge. Moreover, EC effects on the implicit measure were significantly correlated with EC effects on evaluative judgments when participants were instructed to focus on their feelings, but not when they were instructed to focus on their knowledge (see also Grumm et al., 2009).

Another prediction of our account is that a focus on feelings versus knowledge may not necessarily moderate the overall size of EC effects when the CS-US pairings are encoded under conditions that support recollective memory for the pairings. Under such conditions, a focus on feelings versus knowledge should moderate whether the impact of CS-US pairings on evaluative judgments is mediated by spontaneous affective reactions to the CS or recollective memory for CS-US pairings (i.e., moderated mediation; cf. Muller et al., 2005). Specifically, instructions to rely on feelings should enhance the mediating role of affective reactions in the effect of CS-US pairings on evaluative judgments and reduce the mediating role of recollective memory. Conversely, instructions to rely on knowledge should enhance the mediating role of recollective memory in the effect of CS-US pairings on evaluative judgments and reduce the mediating role of affective reactions. This novel prediction remains to be tested.

THE RELATION BETWEEN RECOLLECTIVE MEMORY AND SPONTANEOUS AFFECTIVE REACTIONS

Two central arguments of our analysis are that (1) recollective memory for CS-US pairings and spontaneous affective reactions toward a CS are two conceptually distinct outcomes of CS-US pairings, and (2) either of these proximal outcomes may function as a mediator for EC effects on evaluative judgments as a distal outcome. Yet, despite their independence at the conceptual level, recollective memory and affective reactions may often interact at the empirical level (see Figure 1). On the one hand, recollective memories for CS-US pairings may elicit a spontaneous affective reaction to the CS that is in line with the valence of the US (see Gawronski & Bodenhausen, 2006). On the other hand, the spontaneous affective reaction elicited by the CS may activate recollective memories that are congruent with the valence of the spontaneous affective reaction (see Parrott & Spackman, 2000). Nevertheless, recollective memory and affective reactions can also be independent, in that either of the two outcomes may occur without the other.

First, it is possible that CS-US pairings influence spontaneous affective reactions to the CS even when people are unable to remember the details of the pairings that have led to the affective response (cf. Johnson, Hashtroudi, & Lindsay, 1993). This idea resonates with research showing that people often hold attitudinal preferences without being able to verbalize the critical events that caused these preferences (for reviews, see Gawronski & Bodenhausen, 2012; Wilson, Dunn, Kraft, & Lisle, 1989). Preferences of this kind have been claimed to have their roots in the spontaneous affective reaction that is elicited by a stimulus, which influence judgments and decisions to the extent that people rely on their feelings (e.g., Millar & Tesser, 1986; Wilson & Dunn, 1986).

Second, people may sometimes remember the details of the CS-US pairings and use their recollective memories for evaluative judgments about the CS even when the pairings were ineffective in influencing spontaneous affective responses to the CS. Preliminary evidence for this hypothesis comes from a study by Dedonder et al. (2014) who investigated the effect of CS-US pairings with foveal versus parafoveal presentations of the CSs. Their results showed parallel effects on recollective memory for CS-US pairings and EC effects on evaluative judgments, such that both were significantly different from zero only for foveal, but not parafoveal, presentations. Yet, spontaneous affective reactions to the CSs on an implicit measure remained unaffected by the pairings regardless of whether the pairings involved foveal or parafoveal presentations of the CSs. Although interpretations of such null effects are notoriously difficult in the absence of independent evidence for the validity of the implicit measure, they are consistent with the hypothesis that CS-US pairings can sometimes lead to EC effects on evaluative judgments via the use of recollective memories even when there is no effect on spontaneous affective reactions.

RECOLLECTIVE MEMORY AND DEMAND EFFECTS

An important question in this context is whether the second type of asymmetry may be better described as a demand effect. After all, it is possible that such patterns reflect the strategic use of recollective memories to express evaluative judgments that are consistent with the inferred expectancy of the experimenter. In fact, a similar argument could be made for all instances of EC effects on evaluative judgments that are mediated by recollective memory for CS-US pairings. We fully agree that demand effects would be characterized by such a mediation pattern. However, the mere occurrence of this mediation pattern does not necessarily indicate the presence of a demand effect. From a functional-cognitive view (De Houwer, 2011), it is important to distinguish between causal effects of environmental stimuli on behavioral responses (i.e., functional level of analysis) and the mental processes and representations that mediate these effects (i.e., cognitive level of analysis). Despite the widespread use of the term *effect* to describe demand compliance, it is not a behavioral effect but a mental process account of how stimuli in the environment (e.g., pairings of a CS with a valenced US) influence behavioral responses (e.g., changes in the evaluative response to the CS).

From this perspective, the basic effect that needs to be explained is still the same: the change in the evaluation of a CS due to its pairing with a US. Instead, the primary difference is located at the cognitive level, in that the same behavioral effect is claimed to be driven by a different mental process. In contrast to traditional mental process accounts, explanations in terms of demand compliance attribute EC effects to participants' inferences about the expectancy of the experimenter during the expression of evaluative judgments. Because either mechanism implicates recollective memory for CS-US pairings, it is possible that relations between memory performance and EC effects on evaluative judgments reflect participants' inferences about the expectancies of the experimenter and their reliance on recollective memories to confirm this expectancy when they make an evaluative judgment. However, this possibility does not imply that all memory-related EC effects are driven by demand compliance. After all, inferences about the expectancy of the experimenter are just one mental process explanation of EC effects that implicates the use of recollective memory (see De Houwer, 2007). Thus, although demand compliance involves the use of recollective memory for evaluative judgments, a relation between EC effects and memory performance does not permit the reverse inference that the obtained changes in evaluative judgments are due to demand compliance. Such an inference would be an instance of the logical fallacy of affirming the consequent, in which the presence of *X* is inferred from the observation of *Y* on the basis of the conditional *if X, then Y* (see Gawronski & Bodenhausen, 2015a). Nevertheless, the mere existence of two alternative explanations requires additional checks to rule out demand compliance in the expression of evaluative judgments. Although one might be tempted to use implicit measures for this

purpose, our analysis suggests that they are not really useful for this endeavor, because they capture a distinct proximal outcome of CS-US pairings that can be independent of recollective memory for the pairings.[2]

THE JOINT OPERATION OF THE TWO MEDIATORS

In the preceding sections, we have already reviewed existing evidence that experimentally induced impairments of memory performance lead to corresponding reductions in EC effects on evaluative judgments (e.g., Dedonder et al., 2010; Gast, De Houwer, et al., 2012; Kattner, 2012; Kattner et al., 2012; Pleyers et al., 2009). We also reviewed several studies showing that experimentally induced impairments of memory performance do not always lead to parallel reductions in EC effects on evaluative judgments (e.g., Förderer & Unkelbach, 2013; Fulcher & Cocks, 1997; Hütter et al., 2012). To reconcile this inconsistency, we proposed that CS-US pairings may influence spontaneous affective reactions to the CS, which can serve as an alternative mediator of EC effects on evaluative judgments.

Preliminary evidence for this hypothesis can be found in the reviewed study by Gawronski et al. (2015) who found that experimentally induced reductions in recollective memory led to corresponding reductions in EC effects on evaluative judgments. Yet, EC effects on an implicit measure were unrelated to recollective memory and unaffected by the experimental manipulation. Nevertheless, both memory performance and EC effects on the implicit measure independently predicted EC effects on evaluative judgments (see also Gawronski et al., 2014). Together, these results are consistent with our hypothesis that recollective memory for CS-US pairings and spontaneous affective reactions to the CS can function as independent mediators of EC effects on evaluative judgments. Nevertheless, more research is needed to understand the conditions under which CS-US pairings influence evaluative judgments via recollective memory for CS-US pairings, spontaneous affective reactions to the CS, or both. Importantly, these conditions may include acquisition-related as well as expression-related factors, suggesting that a broader view that includes both stages can lead to a more advanced understanding of EC that goes far beyond the dominant focus on acquisition-related process.

An important issue in this context concerns the nature of the stimuli used as USs. Although the majority of EC studies has used USs that can be assumed to elicit a sufficiently strong affective reaction (e.g., valenced images, auditory stimuli, olfactory stimuli; see Hofmann et al., 2010, for a meta-analysis), it has become common to use visually presented word stimuli as USs (e.g., Dijksterhuis, 2004; Olson & Fazio, 2001; Zanon, De Houwer, Gast, & Smith, 2014). Although EC effects have been obtained with either type of stimuli, words seem less likely to elicit a strong affective reaction, which may reduce the likelihood of EC effects that are mediated

2. Note that these considerations address the role of demand compliance during the expression of evaluative judgments. They do not address the more complicated issue of demand compliance during the encoding of CS-US pairings, which can influence recollective memory, spontaneous affective reactions, and evaluative judgments through acquisition-related processes.

by a transfer of affective reactions to the CS. For example, an image of a snake may elicit a pattern of physiological reactions that is quite different from the one that is elicited by the word *snake*. Similarly, an image of a kitten may elicit pleasant feelings that are not necessarily experienced in response to the word *kitten*. Thus, whereas spontaneous affective reactions to the CS may mediate EC effects on evaluative judgments when the CS-US pairings involved affectively arousing USs, CS-US pairings involving words as USs seem rather unlikely to influence evaluative judgments via spontaneous affective reactions to the CS. This conclusion is consistent with evidence showing that EC effects on evaluative judgments tend to be more pronounced for USs that elicit high levels of arousal than USs of identical valence that elicit low levels of arousal (Gawronski & Mitchell, 2014).[3]

Another important question is whether spontaneous affective reactions to the CSs can vary without corresponding variations in recollective memory for CS-US pairings. Although the difference between images and words may serve as a basis for such an investigation, there are several other differences between the two kinds of stimuli that are confounded with their differential capacity to elicit affective reactions (e.g., visual complexity). Thus, a stronger test of our theoretical claims is to directly manipulate the elicitation of affective reactions to the US during encoding of the CS-US pairings without undermining participants' ability to remember the pairings. Yet, such a manipulation seems much more difficult compared to a manipulation of recollective memory.

In an attempt to influence the elicitation of affective reactions to the USs during the encoding of CS-US pairings, Gawronski et al. (2015) explored the effectiveness of three emotion-focused strategies in preventing the acquisition of conditioned preferences: (1) suppression of emotional responses to the US, (2) reappraisal of the valence of the US, and (3) facial blocking of emotional responses. As we noted earlier in this article, all three strategies reduced EC effects on evaluative judgments by impairing recollective memory. However, neither strategy was effective in reducing EC effects on an implicit measure. Although these findings question the effectiveness of the three strategies in preventing EC effects by inhibiting the elicitation of affective reactions to the USs during encoding, it is worth noting that they do not challenge the hypothesized contribution of affective reactions. After all, the implicit measure showed significant EC effects regardless of the three control strategies, and EC effects on the implicit measure mediated EC effects on evaluative judgments independent of memory performance. Nevertheless, the failure to obtain a reduction in EC effects on spontaneous affective reactions—as opposed to a reduction in recollective memory—calls for the development of more effective procedures to manipulate the elicitation of affective reactions during encoding. Combined with instructions to rely on either feelings or knowledge (see Gawronski & LeBel, 2008), such manipulations would provide more compelling evidence for the hypothesized roles of recollective memory and spontaneous af-

3. An important caveat is that acquisition-related processes involving misattribution tend to show reduced EC effects for highly evocative USs (e.g., Jones et al., 2009), presumably because they undermine a misattribution of one's affective reaction during encoding. This boundary condition implies the possibility of a curvilinear (rather than linear) relation between affective strength of the US and affectively mediated EC effects.

fective reactions as independent mediators of EC effects on evaluative judgments (see Figure 1).

DISENTANGLING EFFECTS ON ACQUISITION AND EXPRESSION

Our analysis suggests that recollective memory and spontaneous affective reactions function as distinct proximal outcomes of CS-US pairings that can have independent effects on evaluative judgments as a distal outcome. Thus, influences on the use of the two kinds of information during the expression of evaluative judgments can lead to inaccurate conclusions about the mechanisms underlying EC when they are mistakenly attributed to acquisition-related processes.

An illustrative example of such interpretational ambiguities is the above-noted research on the controllability of EC. Recall that in Gawronski et al.'s (2014) studies participants were merely instructed to prevent the impact of CS-US pairings on their responses toward the CSs before they were presented with the pairings; in the follow-up study by Gawronski et al. (2015) participants were asked to use one of three specific strategies to prevent the impact of CS-US pairings on their responses toward the CSs: (1) suppression of emotional reactions to the US, (2) reappraisal of the valence of the US, and (3) facial blocking of emotional responses. Both studies found reduced EC effects on evaluative judgments as a result of the respective experimental manipulations; EC effects on an implicit measure were unaffected by the respective experimental manipulations. From a superficial point of view, the corresponding pattern of results may be interpreted as reflecting the same underlying mechanism (e.g., participants strategically controlled their responses on the self-report measure, but they were unable to control their responses on the implicit measure). Yet, a more thorough analysis using the current framework suggests that the underlying mechanisms are rather different in the two sets of studies.

In Gawronski et al.'s (2014) research on the effects of general control instructions, EC effects on evaluative judgments were independently predicted by recollective memory and EC effects on the implicit measure. Moreover, whereas the predictive relation of the implicit measure was unaffected by participants' motivation to prevent the impact of CS-US pairings, the predictive relation of memory performance decreased when participants were motivated to prevent the impact of CS-US pairings on their evaluative responses. In terms of the current framework, these results suggest that control motivation influenced the use of recollective memory for CS-US pairings for evaluative judgments about the CS, but it did not influence the use of spontaneous affective reactions to the CS.

In Gawronski et al.'s (2015) study on the effects of specific control strategies, EC effects on evaluative judgments were also predicted by recollective memory and EC effects on the implicit measure. Yet, different from the pattern obtained in Gawronski et al.'s (2014) research, the three control strategies influenced EC effects on evaluative judgments by impairing recollective memory for CS-US pairings rather than reducing the use of recollective memory for evaluative judgments. Both recollective memory and EC effects on the implicit measure predicted EC effects

on evaluative judgments regardless of the three control strategies. Together, these findings suggest that general control instructions in Gawronski et al.'s (2014) studies led to the obtained pattern of results via effects on expression-related processes (i.e., reduced reliance on recollective memory for CS-US pairings for evaluative judgments as a result of control instructions). In contrast, the corresponding pattern in Gawronski et al.'s (2015) study on specific control strategies seems to be due to effects on acquisition-related processes (i.e., impaired memory for CS-US pairings as a result of interference during encoding). Thus, although the basic pattern of EC effects was identical in the two sets of studies (i.e., reduction of EC effects on evaluative judgments, but no reduction in EC effects on implicit measure), a closer inspection using the current framework suggests that the mechanisms underlying the obtained pattern are fundamentally different.

From a general point of view, our analysis suggests that EC research would benefit from going beyond mere demonstrations of EC effects and their moderators by investigating causal chains of outcomes, in particular the roles of recollective memory and spontaneous affective reactions as proximal outcomes that mediate evaluative judgments as a distal outcome. Ideally, such mediation analyses would avoid the known limitations of regression-based approaches (e.g., Baron & Kenny, 1986) and instead use experimental designs to establish causal chains of proximal and distal outcomes (Spencer, Zanna, & Fong, 2005). The latter approach also opens the door for more sophisticated designs testing patterns of moderated mediation as well as mediated moderation (Muller et al., 2005), which may uncover distinct causal chains underlying a given pattern of EC effects. Investigations of this type would help to prevent confusion between effects on acquisition-related versus expression-related processes, and thereby provide a more nuanced understanding of the mechanisms underlying EC.

IS THERE MEANINGFUL OVERLAP TO THE ASSOCIATIVE-PROPOSITIONAL DUALITY?

To illustrate the mediating roles of recollective memory and spontaneous affective reactions in EC, our discussion deviated from the traditional focus on the learning mechanisms underlying the acquisition of conditioned evaluative responses. Instead, we mainly focused on the expression of conditioned evaluative responses, particularly the processes underlying evaluative judgments. In the final section, we expand our focus and discuss the implications of our analysis for mental process theories of EC. A central question in this discussion concerns potential implications of our analysis for the ongoing debate between associative and propositional theories of EC. To avoid conceptual conflations between different aspects of these theories, we deem it important to draw a sharp distinction between (1) the processes involved in formation of evaluative representations, (2) the nature of evaluative representations, and (3) the processes involved in the expression of evaluative representations (see Gawronski, Brannon, & Bodenhausen, 2017).

Again starting at the back end, we argue that the use of recollective memory and spontaneous affective reactions for evaluative judgments involves an essential role of propositional processes. Although it might be tempting to classify the reliance on recollective memory as a propositional process and reliance on spontaneous affective reactions as an associative process (e.g., Epstein, 1994), the two mediators of EC effects on evaluative judgments are simply two kinds of information within an overarching process of propositional inference (see Kruglanski, 1989; Strack & Deutsch, 2004). Based on their relative salience and subjective assessments of validity, either type of information may have a stronger impact on evaluative judgments (see Figure 1, arrows on the right side). Yet, the processes underlying use of the two kinds of information are inherently propositional in the sense that propositional inferences assess the subjective validity of either information for judgments and decisions (see Gawronski & Bodenhausen, 2011).[4]

Similarly, associative principles may be involved in the activation of both recollective memories and spontaneous affective reactions, in that the activation of either one may be driven by principles of feature matching and spreading activation (see Figure 1, arrows on the left side). From this perspective, there is no meaningful overlap between the two distinctions, in that the distinction between associative activation and propositional validation in the expression of evaluative representations is independent of (and entirely irrelevant for) the distinction between recollective memory and spontaneous affective reactions.

As for the nature of the underlying representations, we argue that the associative-propositional distinction has led to a false debate that directed the attention away from more important questions about the processes underlying the formation of evaluative representations. A central argument of propositional accounts is that any kind of information is stored in a manner that reflects the relation between stimuli, which may involve various types of relations beyond mere co-occurrence (De Houwer, 2009). The idea of associative networks is rejected on the basis of claims that they do not capture more complex relations between co-occurring stimuli (e.g., cause-effect relations). In our view, this argument is based on a straw man, in that it equates associative network models with simple bidirectional links between two concept nodes. After all, multi-layer connectionist models with hidden units involving excitatory and inhibitory links are perfectly able to represent complex relational information beyond the mere co-occurrence of stimuli (e.g., McClelland, McNaughton, & O'Reilly, 1995). As noted by Gawronski et al. (2017), mental representations of this kind could be described as *propositional*, because they capture relational information. Alternatively, they could be described as *associative*, because they are based on associative links between nodes. From this perspective, the preferred label becomes a matter of terminological taste rather than genuine theoretical disagreement.

4. Note that the use of affective reactions for evaluative judgments does not have to be deliberate in the sense that it requires cognitive elaboration. Nevertheless, it is still propositional in the sense that the affective reaction to the CS has to be represented in a propositional format (e.g., "I feel good about the CS") before it can be used as a basis for an evaluative judgment.

Because connectionist networks of this kind can be fitted to almost every possible outcome, a much more important question is how such networks would have to be designed to provide a balance between post-hoc explanations of known phenomena and the prediction of novel phenomena (Fiedler & Kutzner, 2015). Yet, even if a "perfect" balance between explanation and prediction can be achieved, this does not guarantee that the model is neurologically plausible in the sense that it fits to current knowledge about the workings of the brain. Applied to the proposed roles of recollective memory and spontaneous affective reactions, any such model would have to draw a distinction between brain areas involved in recollective memory (e.g., hippocampus) and brain areas involved in the generation of spontaneous affective reactions (e.g., amygdala), as well as the nature of their interconnections (see Amodio & Ratner, 2011). These issues go far beyond the associative-propositional distinction, which seems entirely irrelevant if associative network models are not degraded to bi-directional links between two concept nodes.

For traditional learning theorists, the much more interesting question concerns the mechanisms underlying the formation of evaluative representations. Whereas associative learning theories argue that EC effects are mediated by the automatic formation of associative links between two simultaneously activated concepts (e.g., Gawronski & Bodenhausen, 2006), propositional learning theories claim that EC effects are due to the non-automatic generation and truth assessment of propositions about the relation between events (e.g., De Houwer, 2009). Again, although it might be tempting to map the distinction between recollective memory and spontaneous affective reactions onto the distinction between propositional and associative learning, there is no meaningful overlap between the two dichotomies. It is certainly possible that spontaneous affective reactions to the CS stem from associative learning mechanisms, and recollective memories for CS-US pairings from propositional learning mechanisms. Yet, recollective memory for CS-US pairings could also be the result of associative learning, in that the simultaneous activation of their corresponding mental concepts may create an associative link between the two in memory (e.g., Walther, Gawronski, Blank, & Langer, 2009). Conversely, spontaneous affective reactions may be the result of propositional learning to the extent that the non-automatic generation and truth assessment of propositions about CS-US relations can influence spontaneous affective reactions to the CS (e.g., Gawronski, Walther, & Blank, 2005). From this perspective, the distinction between recollective memory and spontaneous affective reactions as two kinds of proximal outcomes does not map onto the distinction between propositional and associative learning, the latter of which seems irrelevant for the key arguments of the current analysis.

Nevertheless, our analysis does raise important questions about whether EC effects are the result of a single learning process (e.g., De Houwer, 2014; Mitchell, De Houwer, & Lovibond, 2009) or whether the distinct roles of recollective memory and spontaneous affective reactions require a multi-process learning theory to fully account for the available evidence (e.g., Jones et al., 2010; Sweldens, Van Osselaer, & Janiszewski, 2010). In our view, it seems possible that recollective memory and spontaneous affective reactions are shaped by distinct learning mechanisms,

which is consistent with the reviewed evidence that contextual moderators of one source do not necessarily influence the other (see also Amodio & Ratner, 2011). From this perspective, their distinct functional properties may even explain some striking inconsistencies in the EC literature (see De Houwer, 2007; Jones et al., 2010) and known effects of various procedural moderators (e.g., Hütter & Sweldens, 2013; Sweldens et al., 2010). Yet, in exploring these questions, it is important not to conflate processes underlying the expression of conditioned evaluative responses with the processes underlying their acquisition. In fact, a central implication of our analysis is that at least some phenomena in the EC literature may occur as a result of expression-related processes rather than acquisition-related processes (e.g., Gawronski et al., 2014), while others involve complex interactions of the two stages (e.g., Gawronski et al., 2015). Thus, much more research is needed to further explore the distinct roles of recollective memory and spontaneous affective reactions in EC as well as their underlying learning mechanisms.

SOME CAVEATS

Our analysis provides a conceptual framework that specifies the relation between proximal and distal outcomes of CS-US pairings during the expression of evaluative judgments about a CS (see Figure 1). By extending the focus from the processes involved in acquisition of evaluative responses to the processes involved in their expression, the proposed framework sheds new light on existing findings and raises important questions for future research. Nevertheless, it is important to note that our analysis is based on a few oversimplifying assumptions that leave room for alternative interpretations. Although we are not aware of a coherent alternative with the same integrative potential, future theoretical work may generate competing predictions that could provide deeper insights into the mechanisms underlying EC when they are tested against predictions of the current framework.

One such oversimplification is the assumption that evaluative responses captured by implicit measures are inherently affective. Although the presumed role of affective processes is consistent with a considerable body of evidence (e.g., Dohle et al., 2010; Gawronski & LeBel, 2008; Grumm et al., 2009; Jordan et al., 2007; Scarabis et al., 2006; Smith & De Houwer, 2015; Smith & Nosek, 2011), it would be ill-founded to claim that affective processes are the only determinant of evaluative responses on implicit measures. After all, several studies suggest that non-affective, conceptual representations contribute to evaluative responses on implicit measures over and above the proposed impact of affective reactions (e.g., Gawronski & Ye, 2014; Wittenbrink, Judd, & Park, 2001). Thus, different from the current conceptualization in terms of spontaneous affective reactions, it seems possible to develop alternative frameworks that emphasize the contribution of non-affective processes to evaluative responses on implicit measures.

At a more general level, this issue reflects the methodological problem that there are no process-pure measures, and that the outcomes of any psychological mea-

sure are influenced by multiple processes. This issue goes beyond the proposed interplay of recollective memory and spontaneous affective reactions (see Figure 1), in that the measures of either construct may be contaminated by other constructs. Thus, even in cases where the impact of the construct of interest seems uncontroversial, the ubiquity of construct-unrelated influences prohibits reverse inferences that any variation in measurement scores reflects variations in the construct of interest (see De Houwer et al., 2013; Gawronski & Bodenhausen, 2015b). As with the contribution of non-affective processes to evaluative responses on implicit measures, this limitation leaves room for alternative frameworks that imply different interpretations of the same data. Because the reverse inference problem is a logical issue, and therefore impossible to solve through methodological refinements, the only way to address such interpretational ambiguities is to derive competing predictions from alternative interpretations of the same data and submit these predictions to empirical tests (see De Houwer et al., 2013; Gawronski & Bodenhausen, 2015b).[5] Thus, although the current analysis provides a coherent, integrative framework for the interpretation of EC data, the interpretations suggested by this account should be evaluated with reference to potential alternatives and their respective success in generating novel predictions that can be empirically confirmed.

CONCLUSION

Deviating from the traditional understanding of EC as a phenomenon involving the *acquisition* of conditioned evaluative responses, our theoretical analysis explored the potential roles of recollective memory and spontaneous affective reactions in the *expression* of evaluative judgments about a CS. Drawing on research and theorizing on response processes underlying evaluative judgments (see Strack, 1992), we hypothesized that EC effects on evaluative judgments can be mediated by the use of (1) recollective memory for events involving the CS or (2) one's spontaneous affective reaction toward the CS (or both). Because the two proximal outcomes of CS-US pairings can have independent effects on evaluative judgments as a distal outcome, influences on expression-related processes can lead to inaccurate conclusions when they are attributed to acquisition-related processes. Moreover, because the processes underlying the acquisition of recollective memories may not necessarily be identical to those underlying the acquisition of spontaneous affective reactions, the distinction between the two kinds of proximal outcomes raises interesting questions about the learning mechanisms underlying EC. These questions go beyond the current debate between associative and propositional accounts, pro-

5. Although formal modeling (e.g., multinomial modeling) can address the lack of process-purity to some extent, it does not eliminate the reverse inference problem, because there is no guarantee that the obtained parameters provide process-pure reflections of the processes they are supposed to capture. The latter issue has to be addressed through empirical validation, which reintroduces the original problem of reverse inference in the interpretation of measurement scores.

viding a new theoretical perspective that may inspire future research on the mental underpinnings of EC. Together, these conclusions suggest that a broader theoretical approach that includes both acquisition-related and expression-related processes can lead to a deeper and more nuanced understanding of the mechanisms underlying EC effects compared to an exclusive focus on acquisition-related processes.

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