

# Formation, Representation, and Activation of Contextualized Attitudes

Bertram Gawronski

*University of Texas at Austin, USA*

Yang Ye

*University of Western Ontario, Canada*

Robert J. Rydell

*Indiana University, USA*

Jan De Houwer

*Ghent University, Belgium*

The pervasiveness of context effects on evaluative responses has led to conflicting views as to whether evaluations reflect stable attitudinal representations that are directly retrieved from memory or online constructions on the basis of momentarily accessible attributes. The current research expands on this debate by investigating the formation, representation, and activation of contextualized attitudes, with a particular focus on the role of incidental visual cues of the environmental context. Five experiments demonstrated that (1) incidental visual cues tend to be integrated into the representation of attitude-incongruent, but not attitude-congruent, information; (2) these cues are not directly associated with the valence of counterattitudinal experiences, but instead constrain the activation of available information about the attitude object; (3) the modulating function of these cues remains intact even when they become directly associated with an evaluative response; (4) contextualized representations of counterattitudinal information can be activated by contexts that are either perceptually or conceptually similar to the context in which the counterattitudinal experience took place. Implications for context effects and attitude change are discussed.

Keywords: attitude change; attitude construction; context effects; occasion setting; renewal effects; situated cognition

To the resentment of observers searching for cross-situational consistency in attitudes, people's likes and dislikes can be vexingly different across contexts (Smith & Semin, 2004). Evaluations of objects, individuals, and social groups may be favorable in one context but unfavorable in another. Such context effects have been shown not only for deliberate evaluative judgments, but also for spontaneous evaluative responses that are less susceptible to voluntary control (for reviews, see Blair, 2002; Gawronski & Sritharan, 2010). In attitude research, these findings have sparked theoretical debates about whether evaluations are the product of relatively stable attitudinal representations that are directly retrieved from memory (Fazio, 2007) or constructed online on the basis of momentarily accessible attributes (Schwarz, 2007).

The current research expands on the debate between dispositional and constructivist accounts of attitudes by investigating the integration of contextual information into the mental representation of attitude objects, with a particular focus on the role of incidental visual cues of the environmental context. The central assumption underlying this research is that basic principles of expectancy violation and attention determine whether incidental visual cues are integrated into the representation of evaluative information about an attitude object, thereby influencing the contextual conditions under which this information is activated during subsequent encounters with that object. In the current studies, we tested several novel predictions derived from this account and explored the role of

perceptual and conceptual context features in the activation of contextualized attitudes.

## **Online Constructions versus Stable Dispositions**

The available evidence for context effects on spontaneous and deliberate evaluations has led some researchers to reject the idea that evaluations are the product of stored attitudinal representations that are directly retrieved from memory (e.g., Schwarz, 2007). Instead, it is argued that evaluations are constructed on the spot on the basis of momentarily accessible concepts (see also Ferguson & Bargh, 2007; Lord & Lepper, 1999; Wilson & Hodges, 1992). Accessibility of mental concepts is further assumed to depend on incidental features of the context. For example, contextual cues may influence the momentary accessibility of positive or negative exemplars of a given category (e.g., the context of a basketball court may activate different exemplars of the category African American than the context of a graffiti wall), which may moderate evaluative responses to other members of the same category (e.g., Bodenhausen, Schwarz, Bless, & Wänke, 1995; Sia, Lord, Blessum, Ratcliff, & Lepper, 1997). Thus, evaluations should be consistent across different contexts to the extent that these contexts activate mental concepts of the same valence. If, however, the valence of activated concepts differs across contexts, the resulting evaluations should be inconsistent across contexts.

Such constructivist interpretations of context effects differ from dispositional accounts which conceptualize attitudes as enduring representations that are directly retrieved from memory (e.g., Fazio, 2007; Petty, Briñol,

& DeMarree, 2007). Although dispositional accounts may seem difficult to reconcile with the available evidence for context effects on spontaneous and deliberate evaluations, some researchers have argued that context effects do not reflect differences in the evaluation of a given object, but differences in the object that is being evaluated (Fazio, 2007). The central argument is that evaluative responses to a given object depend on how the object is categorized, with category evaluations being determined by stored attitudinal representations (e.g., Mitchell, Nosek, & Banaji, 2005; Olson & Fazio, 2003; but see Gawronski, Cunningham, LeBel, & Deutsch, 2010). For example, a young African American man may elicit a more favorable response when he is categorized in terms of his age (activating a positive category representation of young people) than when he is categorized in terms of his race (activating a negative category representation of African Americans). Thus, the same object may elicit different evaluative responses across different contexts to the extent that contextual cues lead to different categorizations of a given object.

#### **A Representational Account of Context Effects**

Although constructivist and dispositional accounts are quite different, it is extremely difficult to empirically distinguish between them, because either account can explain any possible context effect in a post-hoc fashion (Schwarz & Bohner, 2001). To tackle this issue, it would be necessary to go beyond *a posteriori* explanations of context effects and instead formulate *a priori* predictions about the conditions under which evaluative responses should be context-dependent or context-independent (cf. Gawronski & Bodenhausen, in press). In a first step to address this challenging task, Gawronski, Rydell, Vervliet, and De Houwer (2010) proposed a representational account that integrates central features of both theoretical approaches. On the one hand, this account includes a constructivist component, in that contextual cues are assumed to moderate evaluative responses by influencing the momentary accessibility of evaluative information. On the other hand, their account includes a dispositional component, in that contextual cues are assumed to operate on the basis of stored representations of evaluative information. Yet, deviating from the overarching focus of the two approaches on various kinds of context effects (for reviews, see Blair, 2002; Gawronski & Sritharan, 2010), Gawronski et al.'s representational account is specifically concerned with the effects of incidental visual cues of the environmental context.

A central aspect of their account concerns the conditions under which incidental visual cues are integrated into the mental representation of evaluative information about an object. To the extent that there is no prior knowledge about an attitude object, exposure to evaluative information about the object is assumed to produce a mental trace that links the object to that

information (Gawronski & Bodenhausen, 2006). If this link is sufficiently strong, future encounters with the object should activate the associated information, leading to an evaluative response that is in line with this information. Moreover, new information that is evaluatively congruent with the initially acquired information will simply be added to the existing representation, thereby increasing the likelihood of a corresponding evaluative response during future encounters with the attitude object. Thus, as long as available information about an attitude object is evaluatively congruent, evaluations of the object should be consistent across contexts and reflect the valence of the stored information (e.g., Rydell & Gawronski, 2009).

An important question is what happens when new information about an attitude object is evaluatively incongruent with initially acquired information. Drawing on basic principles of expectancy violation (Roose & Sherman, 2007), Gawronski et al. (2010) argued that exposure to counterattitudinal information enhances attention to the momentary context in order to identify factors that may resolve the inconsistency between the initial expectancy and the newly acquired information (cf. Festinger, 1957; Gawronski, 2012). As a result of this attentional tuning, incidental visual cues of the environmental context become integrated in a contextualized representation of the newly acquired counterattitudinal information (see also Rosas & Callejas-Aguilera, 2007). However, instead of erasing the initially formed representation from memory, the newly formed contextualized representation is simply added to the existing memory structures (Bouton, 1994). Hence, the mental representation of the attitude object can be said to acquire a "dual" nature, in that it comprises (1) a *context-free representation* that includes the object and the initially acquired attitudinal information, and (2) a *contextualized representation* that includes the object, the subsequently acquired counterattitudinal information, and the context in which this information was acquired. For example, if a person forms a favorable first impression of a new colleague at work and this impression is later challenged by negative behavior of that person at the gym, the initial positive information will be stored in a context-free representation that is not specifically tied to the work context, whereas the subsequent negative information will be stored in a contextualized representation that includes the gym context.

Gawronski et al.'s (2010) representational account resembles earlier theories assuming that counterattitudinal information does not erase previously acquired attitudinal information from memory, but instead produces two distinct attitudinal traces that influence evaluative responses under different conditions (e.g., Petty, Tormala, Briñol, & Jarvis, 2006; Wilson, Lindsey, & Schooler, 2000). According to these theories,

earlier acquired attitudinal information is often highly overlearned, such that it is activated automatically upon encounter of an attitude object. In contrast, more recently acquired counterattitudinal information is assumed to require more effort to be retrieved from memory, implying that it should influence evaluative responses only under conditions of controlled processing. Thus, whereas initial attitudinal information is assumed to determine spontaneous responses, effects of counterattitudinal information are assumed to be limited to deliberate responses. Gawronski et al.'s (2010) representational account differs from these theories by assuming that incidental visual cues of the environmental context, rather than conditions of automatic versus controlled processing, determine the activation of initial attitudinal and subsequent counterattitudinal information. This idea is reflected in the notion of contextualized attitude change, which is outlined in the following section.

### **Contextualized Attitude Change**

The hypothesized integration of contextual cues into the representation of counterattitudinal information has several important implications. First, it implies that effects of counterattitudinal information are often limited to the context in which this information was acquired. In other words, attitude change is contextualized such that evaluations of the attitude object reflect the valence of the counterattitudinal information only in the context in which this information had been acquired. Yet, evaluations tend to reflect the valence of the initial attitudinal information in any other context, be it the context in which the initial attitudinal information had been acquired or a novel context in which the target had not been encountered before (e.g., Rydell & Gawronski, 2009).

In research on animal learning, such context-dependent recurrence of an initially acquired response is typically referred to as *renewal effect* (Bouton, 2004). Depending on the contexts during (1) the acquisition of initial attitudinal information, (2) the acquisition of subsequent counterattitudinal information, and (3) the elicitation of an evaluative response, it is possible to distinguish between three different kinds of renewal effects in attitude formation and change (see Table 1). *ABA renewal* refers to cases in which an initial attitudinal response is acquired in Context A, a counterattitudinal response is acquired in a different Context B, and the initial attitudinal response recurs in the initial Context A (e.g., Bouton & Bolles, 1979; Bouton & Peck, 1989). *ABC renewal* refers to cases in which an initial attitudinal response is acquired in Context A, a counterattitudinal response is acquired in a different Context B, and the initial attitudinal response recurs in a novel Context C (e.g., Bouton & Bolles, 1979; Bouton & Brooks, 1993). Finally, *AAB renewal* refers to cases in which an initial attitudinal response is acquired in Context A, a

counterattitudinal response is acquired in the same Context A, and the initial attitudinal response recurs in a novel Context B (e.g., Bouton & Ricker, 1994; Tamai & Nakajima, 2000). Taken together, the three kinds of renewal effects imply that effects of counterattitudinal information are often limited to the context in which the counterattitudinal information had been acquired. Yet, whenever the target is encountered in a context that is different from the one in which the counterattitudinal information had been acquired, the initially acquired attitudinal information will determine evaluations of the target.

In addition to the fact that counterattitudinal information will influence evaluations only in the context in which it has been acquired, another important aspect of contextualized attitude change is that it implies systematic differences in evaluations across contexts (see Table 2). For example, if initial attitudinal information about an object is acquired in Context A and then challenged by counterattitudinal information in another Context B, comparing evaluations across Context A and Context B should reveal inconsistent responses across the two contexts. In this case, evaluations should reflect the valence of the initial attitudinal information in Context A, but the valence of the counterattitudinal information in Context B. Similarly, if initial attitudinal information about an object is acquired in Context A and then challenged by counterattitudinal information in another Context B, comparing evaluations in Context B to evaluations in a novel Context C should also reveal inconsistent responses. In this case, evaluations should reflect the valence of the initial attitudinal information in the novel Context C, but the valence of the counterattitudinal information in Context B. In contrast, if initial attitudinal information about an object is acquired in Context A and then challenged by counterattitudinal information in another Context B, comparing evaluations in Context A to evaluations in a novel Context C should reveal consistent responses across the two contexts. In this case, evaluations should reflect the valence of the initial attitudinal information in both Context A and Context C. Finally, if initial attitudinal information about an object is acquired in Context A and then challenged by counterattitudinal information in the same Context A, comparing evaluations in Context A to evaluations in a novel Context B should reveal inconsistent responses across the two contexts. In this case, evaluations should reflect the valence of the initial attitudinal information in Context B, but the valence of the counterattitudinal information in Context A.

These patterns are well-established in research on extinction and counterconditioning in animal learning (for a review, see Bouton, 2004) and relapse in the clinical treatment of affective disorders (for a review, see Vervliet, Craske, & Hermans, 2013). The first evidence

for similar patterns in the formation and change of social attitudes was obtained in a series of studies by Rydell and Gawronski (2009) who demonstrated the emergence of ABA renewal and ABC renewal in impression formation. Evidence for AAB renewal in impression formation was obtained by Gawronski et al. (2010), who also provided preliminary evidence for the proposed representational account. Consistent with the predictions derived from this account, their results showed that (1) the impact of initial attitudinal information on evaluations in novel contexts was reduced when attention to contextual cues during the encoding of initial attitudinal information was experimentally enhanced and (2) context effects were eliminated altogether when attention to contextual cues during the encoding of counterattitudinal information was experimentally reduced. These results are consistent with the hypothesized contribution of attentional processes to the integration of contextual cues into the representation of evaluative information.

### The Present Research

Although Gawronski et al.'s (2010) findings are consistent with the predictions of their representational account, there are still a number of important questions about how contextualized attitudes are formed, how they are represented in memory, and how they are activated upon future encounters with the attitude object. To address these questions, the current research aimed to provide deeper insights into (1) the conditions under which incidental visual cues of the environmental context are integrated into the representation of newly acquired evaluative information, (2) how these contextual cues are stored and represented in memory, and (3) which features of visual context cues determine the activation of contextualized representations. Toward this end, Experiments 1a and 1b investigated recollective memory for incidental context cues as a function of whether these cues were present during the encoding of attitude-congruent versus attitude-incongruent information. Expanding on the results of these studies, Experiment 2 tested whether contextual cues become directly associated with the valence of counterattitudinal information (*evaluative binding*) or instead are stored in a manner such that they constrain the activation of evaluative information in response to the attitude object (*occasion setting*). Experiment 3 investigated whether the modulating function of contextual cues remains intact when these cues become later associated with an evaluative response. Finally, Experiment 4 explored which features of incidental visual cues determine the activation of contextualized attitudes by testing effects of contexts that are either perceptually or conceptually

similar to the context in which counterattitudinal information had been acquired. Taken together, these studies provide deeper insights into the formation of contextualized attitudes, the nature of their mental representation, and their activation by different kinds of contextual cues.<sup>1</sup>

### Experiment 1a

The main goal of Experiment 1a was to test the hypothesis that incidental visual cues of the environmental context tend to be integrated into the mental representation of attitude-incongruent, but not attitude-congruent, information. To test this hypothesis, participants received either positive or negative information about an unknown target individual and were then exposed to information that was either congruent or incongruent with the valence of the initial information. Participants' task was to form an impression of the target on the basis of the presented information. To investigate the integration of incidental context cues into the representation of evaluative information, the information about the target individual was presented against different background colors. After the impression formation task, participants were asked to complete a surprise recognition test in which they were asked to indicate the background color against which the critical target information had been presented. Based on the assumption that incidental context cues are integrated into the mental representation of expectancy-violating counterattitudinal information, recognition memory for the colored backgrounds was expected to be more accurate when the critical target information was incongruent than when it was congruent with the valence of the initial information.

### Method

**Participants and design.** A total of 125 participants (93 women, 32 men) were recruited for a one-hour battery on "Perception of Consumer Products and Impression Formation" that included the current experiment and two additional experiments that were unrelated to this study. Participants were randomly assigned to the four conditions of a 2 (Valence of Initial Information: positive vs. negative)  $\times$  2 (Valence of Target Statement: congruent with initial information vs. incongruent with initial information) between-subjects design. Due to a computer malfunction, recognition data from three participants were not recorded. Thus, the final sample included 122 participants. All participants received research credit for an introductory psychology course.

**Impression formation task.** Participants were told that the main goal of the study was to investigate how people form first impressions of other individuals. They

<sup>1</sup> For all of the presented studies, we report all data exclusions (if any), all manipulations, and all measures. All sample sizes were determined on the basis of prior research using similar paradigms and availability

of subjects. All data collections were conducted without intermittent statistical analyses until we reached the predetermined sample sizes. All materials are available from the authors upon request.

were further informed that they would be presented with information about a person named Bob, and that their task was to form a first impression of Bob based on the presented information. Over the course of 30 trials, participants read brief descriptions of 30 behaviors that Bob had performed while a picture of Bob was presented simultaneously on the screen. The statements and the picture of the target person were adopted from Rydell and Gawronski (2009). The picture of Bob appeared slightly above and the statement slightly below the center of the screen. Picture-statement pairs were presented for 5000 ms with an inter-trial interval of 1000 ms. The first 20 statements were used to create an impression of Bob as being either likeable (e.g., *Bob bought groceries for an elderly lady next door who was ill.*) or dislikeable (e.g., *Bob continually yells at his girlfriend in public.*). The 21st statement was used as the critical target trial that was either congruent or incongruent with the valence of the initial information. The remaining 9 trials after the critical target statement served as filler items, including 9 statements that had the same valence as the initial 20 trials. To investigate participants' memory for incidental context cues, each statement was presented against 1 of 10 different background colors. The color displays fully covered the background of the computer screen and appeared only during the 5000 ms presentation of the picture-statement pairs. The computer screen turned black during the 1000 ms inter-trial interval. The background colors were randomized in a blocked manner, such that each color appeared once during the first block of 10 statements, once during the second block of 10 statements, and once during the third block of 10 statements. The critical target statement was presented against the same background color in each of the four experimental conditions. The statements of the initial 20 trials and the 9 filler trials at the end were randomly selected from lists of 29 positive and 29 negative statements. For the critical target item, we used the same positive statement (i.e., *Bob donates blood on a regular basis.*) and the same negative statement (i.e., *Bob robbed a convenience store.*) in the two expectancy conditions.

**Recognition task.** After participants completed the impression formation task, they were given a surprise recognition test in which they were asked to recall the background color against which a given statement had been presented during the impression formation task. On each trial of the recognition task, participants were presented with 10 squares displaying the 10 background colors at the top of the screen, and one of the statements of the impression formation task at the bottom of the screen. The background colors were numbered from 0 to 9 including a label that specified the color. Participants were asked to press the number key on the computer keyboard that corresponded to the background color against which the statement had been presented during the impression formation task. The recognition task

started with 3 statements that were randomly selected from the list of 29 irrelevant trials. The fourth trial of the recognition task was the critical test trial, including the statement that was either congruent or incongruent with the initial information. The recognition task proceeded with 3 statements that were randomly selected from the list of 29 irrelevant trials. The primary dependent measure was whether participants correctly recalled the background color of the critical target statement that was either congruent or incongruent with the valence of the initial information about the target individual.

## Results

Figure 1 displays the proportions of participants who correctly recalled the background color of the critical target statement within each of the four experimental conditions. The proportions of correct responses significantly differed as a function of Valence of Target Statement,  $\chi^2(1) = 12.36, p < .001$ , but not as a function of Valence of Initial Information,  $\chi^2(1) = 1.41, p = .24$ . In line with our prediction, recognition memory for the task-irrelevant background color was more accurate when the valence of the target statement was incongruent with the initial information than when it was congruent with the initial information. This effect was statistically significant regardless of whether the initial information was positive,  $\chi^2(1) = 7.65, p = .006$ , or negative,  $\chi^2(1) = 4.88, p = .03$ . The recognition advantage for incongruent target statements did not significantly differ as a function of whether the initial information was positive or negative,  $\chi^2(1) = 2.77, p = .10$ . Moreover, the valence of the initial information did not influence recognition memory for the task-irrelevant background-color regardless of whether of the target statement was congruent,  $\chi^2(1) = 0.26, p = .61$ , or incongruent,  $\chi^2(1) = 1.32, p = .25$ , with the initial information. Memory performance was significantly above the chance level of 10% when the target statement was incongruent,  $t(62) = 4.12, p < .001, d = .52$ , but not when it was congruent,  $t(58) = -0.42, p = .68, d = .05$ , with the initial information.

## Discussion

The main goal of Experiment 1a was to test the hypothesis that incidental visual cues of the environmental context tend to be integrated into the mental representation of attitude-incongruent, but not attitude-congruent, information. Based on this hypothesis, we expected recognition memory for incidental context cues to be more accurate when these cues were present during the encoding of attitude-incongruent than attitude-congruent information. Consistent with this prediction, Experiment 1a showed that recognition memory for the background color against which evaluative information had been presented was at chance level when this information was congruent with the valence of initially acquired information. However, recognition memory for the task-irrelevant background color improved significantly when the target

information was incongruent with the valence of initially acquired information. These results are consistent with the hypothesis that attitude-congruent experiences tend to be stored in context-free representations, whereas attitude-incongruent experiences are stored in contextualized representations.

### Experiment 1b

A potential concern about Experiment 1a is that the manipulation of expectancy-violation during encoding was confounded with expectancy-violation in the recognition task. Because the recognition task included several attitude-congruent filler items before the presentation of the critical target item, one could argue that expectancy-violation during the recognition task might have contributed to the obtained effects. To rule out this concern, we conducted a follow-up study in which the critical target statement was presented as the very first item in the recognition task. Based on the findings in Experiment 1a, we expected that recognition memory for the background color should be at chance level when the target information was congruent with the valence of the initial information. Yet, recognition memory should be significantly enhanced when the target information was incongruent with the valence of the initial information.

#### Method

**Participants and design.** A total of 94 participants (57 women, 37 men) were recruited for a one-hour battery on “Face Perception and Humor” that included the current experiment and one additional experiment that was unrelated to the current study. Because the additional experiment in this battery involved responses to racial humor, the current study was always conducted at the beginning of the session to avoid potential mood effects resulting from the humor manipulation. Participants were randomly assigned to the four conditions of a 2 (Valence of Initial Information: positive vs. negative)  $\times$  2 (Valence of Target Statement: congruent with initial information vs. incongruent with initial information) between-subjects design. Due to a computer malfunction, recognition data from two participants were not recorded, which left us with a final sample of 92 participants. All participants received research credit for an introductory psychology course.

**Materials and measures.** The impression formation task was identical to the one in Experiment 1a. Aside from presenting the critical target statement as the first item, the recognition task was also identical to the one in Experiment 1a.

#### Results

Figure 2 shows the proportions of participants who correctly recalled the background color of the critical target statement within each of the four experimental conditions. The number of correct responses significantly differed as a function of Valence of Target Statement,  $\chi^2(1) = 9.48, p = .002$ , but not as a function of

Valence of Initial Information,  $\chi^2(1) = 1.27, p = .26$ . Recognition memory for the task-irrelevant background color was again higher when the valence of the target statement was incongruent with the initial information than when it was congruent with the initial information. This effect was statistically significant when the initial information was positive,  $\chi^2(1) = 5.63, p = .02$ , and marginally significant when the initial information was negative,  $\chi^2(1) = 3.68, p = .06$ . The recognition advantage for incongruent target statements did not significantly differ as a function of whether the initial information was positive or negative,  $\chi^2(1) = 1.95, p = .16$ . Moreover, the valence of the initial information did not influence recognition memory for the task-irrelevant background-color regardless of whether of the target statement was congruent,  $\chi^2(1) = 0.27, p = .60$ , or incongruent,  $\chi^2(1) = 0.83, p = .36$ , with the valence of the initial information. Memory performance was again significantly above the chance level of 10% when the target statement was incongruent,  $t(42) = 3.65, p = .001, d = .56$ , but not when it was congruent,  $t(48) = 0.05, p = .96, d = .007$ , with the valence of the initial information.

#### Discussion

The results of Experiment 1b corroborate the hypothesis that incidental visual cues of the environmental context tend to be integrated into the mental representation of attitude-incongruent, but not attitude-congruent, information. To rule out potential concerns about a confound between the manipulation of expectancy-violation during encoding and expectancy-violation during retrieval in Experiment 1a, the current study presented the critical target statement as the very first item in the recognition task. Replicating the results of Experiment 1a, recognition memory for the task-irrelevant background color was at chance level when the target information was congruent with the valence of the initially acquired information. However, recognition memory for the background color significantly improved when the target information was incongruent with the valence of the initially acquired information. These results provide further support for the hypothesis that attitude-congruent experiences are stored in context-free representations, whereas attitude-incongruent experiences are stored in contextualized representations.

### Experiment 2

Although the findings of Experiments 1a and 1b suggest *that* incidental visual cues of the environmental context are integrated into the representation of attitude-incongruent information, they do not indicate *how* incidental context cues are represented in memory (see Bouton, 2010; Vervliet, Baeyens, Van den Bergh, & Hermans, 2013). On the one hand, it is possible that contextual cues are stored in a manner such that they constrain which information is activated by the target. On the other hand, contextual cues might become directly associated with the valence of the counterattitudinal

experience, such that they influence evaluative responses over and above the impact of the information that is available about the target. To illustrate the difference between the two cases, consider the earlier example in which a person formed a favorable first impression of a new colleague at work and this impression is later challenged by that person's negative behavior at the gym. In this case, subsequent encounters with the target at the gym may elicit a negative response because either (1) the gym context facilitates the activation of negative information about the target and inhibits the activation of positive information or (2) the gym directly elicits a negative response over and above the response that is based on the available information about the target.

The first interpretation is consistent with the notion of *occasion setting*, suggesting that contextual cues are represented as modulatory nodes that determine whether the initial attitudinal information or the subsequent counterattitudinal information is activated in response to the attitude object (Schmajuk & Holland, 1998). According to this account, contextualized representations constrain the spread of activation from the attitude object to the available evaluative information by virtue of inhibitory links (see Bouton, 2002). If the context during the encoding of counterattitudinal experiences is absent, activation of the attitude object is assumed to spread to the initial attitudinal information, which in turn inhibits the activation of the counterattitudinal information. In contrast, if the context during the encoding of counterattitudinal experiences is present, activation of the context node is assumed to inhibit the link between the attitude object and the initial attitudinal information, thereby gating the spread of activation from the attitude object to the counterattitudinal information, which further inhibits the activation of the initial attitudinal information.

The second interpretation is consistent with the notion of *evaluative binding*, suggesting that enhanced attention to contextual cues during the acquisition of counterattitudinal information may create a direct link between the representation of these cues and the counterattitudinal experience (see Rescorla & Wagner, 1972). From this perspective, context effects on evaluative responses may reflect additive effects of independent excitatory links between (1) the attitude object and the available information about that object and (2) the context during the acquisition of counterattitudinal information and the counterattitudinal experience. As a result, activation of the counterattitudinal experience should be stronger when the attitude object is encountered in the context in which this experience had been made than when it is encountered in any other context.

Previous research tried to differentiate occasion setting from evaluative binding by comparing evaluative responses to a given target individual to those elicited by

other unknown individuals within the same contexts. The general finding was that contextual cues moderated evaluative responses to the target individual, but not evaluative responses to other unknown individuals that were presented in the same contexts (Gawronski et al., 2010; Rydell & Gawronski, 2009). Although these findings are consistent with the notion of occasion setting, a major limitation is that the null effect of contextual cues in influencing evaluative responses to unknown individuals could be due to incidental features of the unknown individuals. Specifically, it is possible that incidental facial features of the unknown individuals elicited a positive or negative response (e.g., Gawronski & Quinn, 2013), which may dilute or override the simultaneous effects of contextual cues. Such incidental effects could undermine the possibility of detecting direct effects of the contextual cues, thereby leading to the incorrect conclusion that the obtained context effects are driven by occasion setting rather than evaluative binding.

Another limitation of previous experiments is that they involved a perfect contingency between context and valence. Because participants always received positive information in one context and negative information in another context, there was a systematic relation between context and valence. Thus, context effects could be due not only to occasion setting, but also to the formation of direct associations between context and valence (see De Houwer, Thomas, & Baeyens, 2001).

One way to rule out evaluative binding is to eliminate the contingency between context and valence, which should attenuate context effects resulting from additive excitatory links. To the extent that a given context is paired with an equal number of positive and negative experiences, excitatory links between context and valence should lead to a neutral (or ambivalent) response to the context. The same should be true for the attitude object, which should be associated with both positive and negative information. Thus, if there is no contingency between context and valence, additive effects of independent excitatory links should lead to neutral (or ambivalent) responses regardless of the context. In contrast, the notion of occasion setting implies that contextual cues constrain the evaluative information that is activated in response to the attitude object without being directly associated with the counterattitudinal experience. According to this account, contextual cues should moderate the evaluative response that is elicited by an attitude object even if there is no contingency between context and valence.

The main goal of Experiment 2 was to test these competing predictions by presenting evaluative information about two individuals rather than one. To avoid any contingency between context and valence, one of the two targets was described as positive in an initial Context A, whereas the other one was described as

negative in the same Context A. In a subsequent block, the initially positive target was presented with negative information in a second Context B, while the initially negative target was presented with positive information in the same Context B. Finally, evaluative responses toward the two targets were assessed in the initial Context A, the second Context B, and a novel Context C that was not part of the impression formation task.

To the extent that context effects stem from direct associations between context and valence (*evaluative binding*), the absence of context-valence contingencies in the current study should eliminate context effects on evaluative responses to the two targets. If, however, contextual cues are represented in a manner such that they constrain the activation of available information through inhibitory links (*occasion setting*), context effects on evaluative responses to the two targets should be unaffected by the absence of context-valence contingencies. According to the latter account, the two targets should elicit evaluative responses in line with the counterattitudinal information only when they are presented in the context in which the counterattitudinal information had been acquired. However, when the two targets are presented in contexts that are different from the one in which the counterattitudinal information had been acquired, the initially acquired attitudinal information should determine evaluations of the targets.

## Method

**Participants and design.** A total of 91 participants (57 women, 30 men, 4 missing) were recruited for a one-hour battery on “How Do We Form Impressions of People and Images?” that included the present experiment and two additional experiments that were unrelated to this study. Participants were randomly assigned to the four conditions of a 2 (Order of Background Color: yellow-blue vs. blue-yellow)  $\times$  2 (Target Valence in First Learning Block: Target1-positive/Target2-negative vs. Target1-negative/Target2-positive) between-subjects design. Due to an experimenter error, four participants failed to complete this experiment. This left us with a final sample of 87 participants. All participants received research credit for an introductory psychology course.

**Impression formation task.** Participants were told that this study investigated how people form first impressions of other individuals. They were further informed that they would be presented with information about two individuals, and that their task was to form a first impression of these individuals based on the presented information. In the first block of the impression formation task, participants were presented with statements about 25 positive behaviors that one of the two targets had performed and 25 negative behaviors that the other target had performed. For both targets, a picture of a male individual was presented simultaneously with the statements. The statements were adopted from Rydell and Gawronski (2009). The picture

of the targets appeared slightly above and the statement slightly below the center of the screen. Picture-statement pairs were presented for 5000 ms with an inter-trial interval of 1000 ms. The picture-statement pairs were presented against a colored background (e.g., yellow) that continually remained on the screen during the entire block. The order of the picture-statement pairs was randomized individually for each participant.

After participants had completed the first block of the impression formation, they were presented with more information about the two targets against a differently colored background (e.g., blue). However, different from the first learning block, the target that was initially described in a positive manner was now described with 25 negative behaviors and the target that was initially described in a negative manner was now described with 25 positive behaviors. The procedural parameters were identical to those in the first learning block. For half of the participants the background color during the first learning block was yellow and the background color of the second learning block was blue; for the remaining half the background color during the first learning block was blue and the background color of the second learning block was yellow. In addition, we counterbalanced which of the two targets was presented with positive versus negative behaviors in the first block and correspondingly with negative versus positive behaviors in the second block.

**Speeded evaluation task.** After participants completed the impression formation task, their responses to the two targets in different contexts were assessed with a speeded evaluation task. The measure was designed to combine central features of similar paradigms by Ranganath, Smith, and Nosek (2008) and Payne, Burkley, and Stokes (2008). The task included brief presentations of the two target individuals against the background color of the first learning block, the background color of the second learning block, and a new background color that was not presented during the impression formation task (i.e., white). Each trial started with a fixation cross which was displayed for 500 ms in the center of the screen. The fixation cross was followed by the presentation of one of the two targets against one of the three backgrounds for 100 ms, which was followed by blank screen for 100 ms. Participants were then prompted by a question mark in the center of the screen to indicate whether their immediate “gut” response to the presented stimulus was positive or negative. Participants were asked to press a right-hand key (*Numpad 5*) if their immediate gut response was positive and a left-hand key (*A*) if their immediate gut response was negative. Participants were told they have only one second to provide their response. If participants did not respond within 1000 ms after the onset of the target image, the message *Please try to respond faster!* was presented for 2000 ms on the screen. The speeded evaluation task



included 10 trials for each of the two targets against each of the three colored backgrounds, summing up to a total of 60 trials.

### Results

Responses on the speeded evaluation task were aggregated by calculating the mean proportion of *positive* responses for each of the six target-background combinations (i.e., Target1-yellow, Target1-blue, Target1-white; Target2-yellow, Target2-blue, Target2-white). The data were then collapsed across the counterbalanced method factors of Color Order and Target Valence to obtain two primary within-subjects factors. The first within-subjects factor captured the order of valence for the two target individuals (i.e., positive-negative, negative-positive); the second within-subjects factor captured the nature of the background with reference to the impression formation task (i.e., first context, second context, novel context). Due to slow responses that exceeded the response deadline of 1000 ms, two participants had missing values for at least one of the six target-background combinations. Data from these participants were excluded from the analyses to avoid sample-based confounds in the report of statistical effects.

Submitted to a 2 (Target Valence Order: positive-negative vs. negative-positive)  $\times$  3 (Context: first vs. second vs. novel) ANOVA for repeated measures, evaluation scores revealed a significant interaction of the two factors,  $F(2, 168) = 7.11, p = .001, \eta_p^2 = .078$  (see Figure 3). When the targets were presented against the background of the first learning block, participants showed more favorable responses to the target that was described as positive in the first block (and negative in the second block) than the target that was described as negative in the first block (and positive in the second block),  $t(84) = 2.01, p = .047, d = .22$ . In contrast, when the targets were presented against the background of the second learning block, participants tended to show more favorable responses to the target that was described as negative in the first block (and positive in the second block) than the target that was described as positive in the first block (and negative in the second block),  $t(84) = 1.88, p = .064, d = .20$ . Finally, when the targets were presented against a novel background that was not presented during the impression formation task, participants tended to show more favorable responses to the target that was described as positive in the first block (and negative in the second block) than the target that was described as negative in the first block (and positive in the second block),  $t(84) = 1.77, p = .081, d = .19$ .

### Discussion

The main goal of Experiment 2 was to test whether contextual cues during the acquisition of counterattitudinal information become directly associated with the valence of the counterattitudinal experience (*evaluative binding*) or whether they are

represented in a manner such that they constrain which information is activated in response to the attitude object (*occasion setting*). Consistent with the latter hypothesis, evaluative responses were moderated by the presence versus absence of a contextual cue despite the absence of any contingency between the contextual cue and valence. Specifically, we found that evaluative responses to two targets reflected the valence of counterattitudinal information about the targets only when the targets were encountered in the context in which the counterattitudinal information had been acquired. However, when the targets were encountered either in the context of the initial attitudinal experience or in a novel context, they tended to elicit evaluative responses in line with the initial information about the attitude object. Importantly, the relevant contexts were paired with an equal number of positive and negative statements to avoid any contingency between context and valence. As such, the current findings are consistent with the notion of occasion setting, assuming that contextual cues constrain the spread of activation from the attitude object to the available information by virtue of inhibitory links. However, the current findings are difficult to reconcile with the notion of evaluative binding, which attributes context effects to direct associations between context and valence. Thus, expanding on the results of Experiments 1a and 1b showing that incidental visual cues of the environmental context tend to be integrated into the representation of attitude-incongruent but not attitude-congruent experiences, Experiment 2 suggests that context cues do not become directly associated with the valence of attitude-incongruent experiences, but instead are stored in a manner such that they constrain which information is activated by the target.

### Experiment 3

Although the results of Experiment 2 indicate that the obtained context effects do not stem from direct associations between context and valence, an important question remains: do contextual cues retain this modulating function when they themselves become directly associated with an evaluative response? For example, if negative experiences were made with a positively evaluated person in the context of a gym, will visual cues related to the gym context continue to activate a negative response toward the target when the gym context becomes associated with a positive response? In addition to providing deeper insights into different ways by which contextual cues may influence evaluative responses (see Bouton, 2010), persistence in contextual modulation after “counterconditioning” provides further evidence that the modulating function of contextual cues does not depend on direct associative links between context and valence (see De Houwer, Crombez, & Baeyens, 2005). To the extent that the initial modulating function of contextual cues remains intact if they become directly associated with an evaluative

response of the opposite valence, evaluative binding can be ruled out as a mechanism underlying the obtained context effects. However, such a finding would corroborate the notion of occasion setting, implying that contextual cues constrain the spread of activation from the attitude object to the available information by virtue of inhibitory links.

In Experiment 3, we addressed this question by repeatedly pairing context cues with positive or negative stimuli after participants had completed an impression formation task similar to the one in Experiment 2. On the basis of previous research on evaluative conditioning (for a meta-analysis, see Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010), we expected that repeated pairings of context cues with positive and negative images influence evaluative responses to these cues in line with the valence of the images. More importantly, these newly formed associations between context and valence were expected to leave the modulating function of the contexts unaffected, such that the contexts should continue to moderate the evaluative response that is elicited by a given target.

#### Method

**Participants and design.** A total of 100 participants (77 women, 23 men) were recruited for a one-hour battery on “First Impressions, Language, and Memory” that included the current experiment and two additional experiments that were unrelated to this study. Participants were randomly assigned to the eight conditions of a 2 (Order of Background Color: yellow-blue vs. blue-yellow)  $\times$  2 (Target Valence in First Learning Block: Target1-positive/Target2-negative vs. Target1-negative/Target2-positive)  $\times$  2 (Context Conditioning: yellow-positive/blue-negative vs. yellow-negative/blue-positive) between-subjects design. All participants received research credit for an introductory psychology course.

**Impression formation task.** The impression formation task was identical to the one in Experiment 2.

**Context conditioning task.** The evaluative conditioning procedure involved repeated pairings of the two background colors of the impression formation task with positive and negative images. The task was described as a visual perception exercise (see Gawronski, Balas, & Creighton, 2014; Gawronski & Mitchell, 2014). Participants were instructed to pay close attention to the pictures and told that we will ask them a number of questions about the pictures after the task. One background color was repeatedly paired with positive images and the other was repeatedly paired with negative images. Each trial of the task involved the presentation of an image against one of the two backgrounds for 1000 ms. The inter-trial interval was 2000 ms. As unconditioned stimuli, we used two positive and two negative images from the International Affective Picture System (IAPS, Lang, Bradley, & Cuthbert, 2008)

showing a baby seal (Image 1440; mean valence = 8.19), bunnies (Image 1750; mean valence = 8.28), a single cockroach (Image 1270; mean valence = 3.68), and several cockroaches (Image 1271; mean valence = 3.19). Each background was paired 8 times with each of the 2 images of the same valence, for a total of 32 conditioning trials.

**Speeded evaluation task.** The speeded evaluation task was identical to the one employed in Experiment 2 with one exception. Instead of presenting the two target individuals against a novel background that was not presented during the impression formation task, we included trials on which only one of the two background colors were presented, without either of the target individuals. Each of the six stimuli (i.e., Target1-yellow; Target1-blue; Target2-yellow; Target2-blue; yellow-alone; blue-alone) was presented 10 times, for a total of 60 trials. All participants completed the speeded evaluation task twice: once after the impression formation task and once after the context conditioning task.

**Procedure.** Participants initially completed the two blocks of the impression formation task, which was followed by the speeded evaluation task. Participants were then asked to complete the visual perception exercise that included the context conditioning task, followed by a second administration of the speeded evaluation task.

#### Results

Responses on the speeded evaluation task were aggregated by calculating the mean proportion of *positive* responses for each of the six stimuli (i.e., Target1-yellow; Target1-blue; Target2-yellow; Target2-blue; yellow-alone; blue-alone) at each of the two measurement times (i.e., before conditioning vs. after conditioning). Due to slow responses that exceeded the response deadline of 1000 ms, four participants had missing values for at least one of the 12 measurements (i.e., 6 stimuli at 2 measurement times). As in Experiment 2, data from these participants were excluded from the following analyses to avoid sample-based confounds in the report of statistical effects.

**Manipulation check.** To confirm the effectiveness of our context conditioning manipulation, evaluative responses to the colors alone were submitted to a 2 (Context: first vs. second)  $\times$  2 (Time: before conditioning vs. after conditioning)  $\times$  2 (Context Conditioning: first-positive/second-negative vs. first-negative/second-positive) mixed-model ANOVA with the first two variables as within-subjects factors and the third variable as a between-subjects factor. This analysis revealed a significant two-way interaction of Context Conditioning and Context,  $F(1, 94) = 17.47, p < .001, \eta_p^2 = .157$ , which was qualified by a significant three-way interaction of Context Conditioning, Context, and Time,  $F(1, 94) = 20.50, p < .001, \eta_p^2 = .179$ . To decompose this

interaction, we conducted separate 2 (Context)  $\times$  2 (Context Conditioning) ANOVAs for each of the two measurement points. The ANOVA did not show any significant main or interaction effect on evaluations before conditioning (all  $F$ s  $<$  1.39, all  $p$ s  $>$  .24). In contrast, evaluations after conditioning revealed a significant two-way interaction of Context Conditioning and Context,  $F(1, 94) = 32.01, p < .001, \eta_p^2 = .254$ . When the first context was paired with positive images and the second context with negative images, participants showed more favorable responses to the first context than the second context ( $M$ s = .73 vs. .39),  $t(47) = 3.70, p = .001, d = .53$ . In contrast, when the first context was paired with negative images and the second context with positive images, participants showed more favorable responses to the second context than the first context ( $M$ s = .72 vs. .36),  $t(47) = 4.30, p < .001, d = .62$ . These results support the effectiveness of our context conditioning manipulation to influence evaluative responses to the background colors.

**Evaluations of target individuals.** To investigate whether the conditioning of background colors influenced the modulating function of the second background, evaluative responses to the two targets were submitted to a 2 (Target Valence Order: positive-negative vs. negative-positive)  $\times$  2 (Context: first vs. second)  $\times$  2 (Time: before context conditioning vs. after context conditioning)  $\times$  2 (Context Conditioning: first-positive/second-negative vs. first-negative/second-positive) mixed-model ANOVA with the first three variables as within-subjects factors and the fourth variable as a between-subjects factor. This analysis revealed a significant two-way interaction of Target Valence Order and Context,  $F(1, 94) = 15.34, p < .001, \eta_p^2 = .140$  (see Figure 4). When the targets were presented against the background of the first learning block, participants showed more favorable responses to the target that was described as positive in the first block (and negative in the second block) than the target that was described as negative in the first block (and positive in the second block),  $F(1, 94) = 6.58, p = .01, \eta_p^2 = .065$ . In contrast, when the targets were presented against the background of the second learning block, participants showed more favorable responses to the target that was described as negative in the first block (and positive in the second block) than the target that was described as positive in the first block (and negative in the second block),  $F(1, 94) = 8.66, p = .004, \eta_p^2 = .084$ . Importantly, this two-way interaction remained unqualified by higher-order interactions with Time (all  $F$ s  $<$  1, all  $p$ s  $>$  .50), indicating that evaluative conditioning of the contexts did not eliminate their effectiveness in moderating evaluative responses to the targets. The critical two-way interaction of Target Valence Order and Context was statistically significant before context conditioning,  $F(1, 94) = 9.11, p = .003, \eta_p^2 = .088$  (see Figure 4, left panel),

and after context conditioning,  $F(1, 94) = 12.26, p = .001, \eta_p^2 = .115$  (see Figure 4, right panel).

Interestingly, the analysis also showed a significant two-way interaction of Context Conditioning and Context,  $F(1, 94) = 18.01, p < .001, \eta_p^2 = .161$ , which was qualified by a significant three-way interaction of Context Conditioning, Context, and Time,  $F(1, 94) = 37.69, p < .001, \eta_p^2 = .286$  (see Figure 5). This three-way interaction indicates that evaluative responses to targets within the two contexts were further influenced by the conditioned valence of the contexts. Corresponding to the pattern obtained for the backgrounds alone, Context Conditioning and Context did not show any significant effects before context conditioning (all  $F$ s  $<$  1, all  $p$ s  $>$  .44) (see Figure 5, left panel). However, evaluations after context conditioning revealed a significant two-way interaction of Context Conditioning and Context,  $F(1, 94) = 39.60, p < .001, \eta_p^2 = .296$  (see Figure 5, right panel). When the first context was paired with positive images and the second context with negative images, participants showed more favorable responses to the two targets in the first context than in the second context,  $F(1, 47) = 16.01, p < .001, \eta_p^2 = .261$ . In contrast, when the first context was paired with negative images and the second context with positive images, participants showed more favorable responses to the two targets in the second context than in the first context,  $F(1, 47) = 23.01, p < .001, \eta_p^2 = .329$ .

## Discussion

The main goal of Experiment 3 was to test whether the modulating function of contextual cues remains intact when the contexts themselves acquire a particular valence. Consistent with this assumption, contextual cues continued to moderate the evaluative response that was elicited by a given target even when the contextual cues became subsequently associated with a particular valence by virtue of repeated pairings with positive or negative stimuli. In fact, our results showed that contextual cues that independently acquired a particular valence can have two distinct effects on evaluative responses (see also Urcelay, Witnauer, & Miller, 2012). First, they can influence the evaluative response that is elicited by an object within that context independent of their own valence (moderating effect). Second, they can elicit an evaluative response reflecting their own valence independent of the evaluative response that is elicited by the target within that context (direct effect). The current findings indicate that both processes can operate simultaneously, suggesting that contextual cues retain their modulatory function as occasion setters even when the contextual cues themselves become directly associated with a particular valence. Using the example from the introduction to this experiment, if negative experiences were made with a positively evaluated target in the context of a gym and the gym becomes subsequently associated with a positive response, visual

cues related to the gym context will have two distinct effects when the target is encountered at the gym: (1) they will constrain the activation of available information about the target, leading to a negative response toward the target within the gym context, and (2) they will directly elicit a positive response despite the negative response that is elicited by the target within the gym context.

#### Experiment 4

The experiments reported so far demonstrate that (1) incidental visual cues of the environmental context tend to be integrated into the representation of attitude-incongruent, but not attitude-congruent, experiences; (2) these cues are not directly associated with the valence of counterattitudinal experiences, but instead constrain the activation of available information about the attitude object; and (3) this modulatory function remains intact even when the contextual cues become directly associated with a particular evaluative response. Toward this end, our studies have focused on effects of relatively simple, one-dimensional visual cues, such as the background color of the computer screen. However, two important questions that our work has yet to address are: (1) do context effects resulting from these processes generalize to real-world contexts with higher levels of visual complexity, and if so, (2) which features of complex real-world contexts determine the activation of contextualized representations? For example, if counterattitudinal experiences have occurred with an attitude object in the context of a seminar room, does only the same seminar room activate the representation of the counterattitudinal experience or will other contexts that are similar to the seminar room have the same effect? If similar contexts can have the same effect, in which particular sense do they have to resemble the context in which the counterattitudinal experience was made? Would any seminar room have the same effect even if it is perceptually dissimilar to the one in which the counterattitudinal experience was made (e.g., a perceptually distinct seminar room in a different building)? Alternatively, would a room that is perceptually similar to the seminar room have the same effect even if it is not a seminar room (e.g., a dining hall that visually resembles the seminar room)?

Experiment 4 addressed these questions by investigating effects of real-world contexts that were either perceptually or conceptually similar to the context in which the counterattitudinal experience took place. Toward this end, participants were presented with evaluatively incongruent information about two target individuals against different real-world backgrounds. Evaluative responses to the two targets were then measured against (1) the background of the initial attitudinal information, (2) the background of the counterattitudinal information, (3) a background that was perceptually similar to, but conceptually distinct from,

the background against which the counterattitudinal information had been presented, (4) a background that was conceptually similar to, but perceptually distinct from, the background against which the counterattitudinal information had been presented, and (5) a background that was both perceptually and conceptually distinct from the background against which the counterattitudinal information had been presented. Based on our earlier findings, we predicted that evaluative responses to the targets reflect the valence of the initial attitudinal information when they are presented against the background of the initial attitudinal information (*ABA renewal*) and when they are presented against a background that is both perceptually and conceptually distinct from the background against which the counterattitudinal information had been presented (*ABC renewal*). In contrast, evaluative responses to the targets should reflect the valence of the counterattitudinal information when they are presented against the background of the counterattitudinal information. The central question was whether backgrounds that are either perceptually or conceptually similar to the background of the counterattitudinal information elicit evaluative responses in line with the valence of the counterattitudinal information.

#### Method

**Participants and design.** A total of 120 participants (90 women, 30 men) were recruited for a one-hour battery on “Forming Impressions of Faces, Groups, and People” that included the current experiment and two unrelated experiments. Participants were randomly assigned to the eight conditions of a 2 (Target Valence in First Learning Block: Target1-positive/Target2-negative vs. Target1-negative/Target2-positive)  $\times$  4 (Second Context: Picture 1 vs. Picture 2 vs. Picture 3 vs. Picture 4) between-subjects design. The second factor involved the counterbalanced use of four different real-world images during the presentation of counterattitudinal information, which provided the basis for our manipulation of perceptual and conceptual similarity. All participants received research credit for an introductory psychology course.

**Materials.** To investigate which context features determine the activation of contextualized attitudes, we used Adobe Photoshop® to create a set of eight images that displayed one of two target individuals against four different real-world backgrounds (see Figure 6). Two of the backgrounds showed trees; the other two backgrounds showed windmills. Images showing the same type of object (e.g., windmills) were used to operationalize the conceptual similarity of different contexts. In addition, the images were matched perceptually, such that each of the two windmill images was visually similar to one of the two tree images in terms of structure and color. This matching procedure served as the basis of our operationalization of perceptual

similarity. Thus, for each of the four backgrounds, the set included one background that was (1) perceptually similar but conceptually distinct, (2) conceptually similar but perceptually distinct, and (3) both perceptually and conceptually distinct. One of these images was used in the second block of the impression formation task; the evaluation measure included all four backgrounds to investigate the role of perceptual versus conceptual features of contexts. The selection of the four backgrounds for the impression formation task was counterbalanced across participants. In addition to the set of images that were matched for perceptual versus conceptual similarity, we created one image for the first block of the impression formation task that displayed the target against a real-world background that was both perceptually and conceptually distinct from the four images in the set (i.e., sunset).

**Impression formation task.** Participants were told that the main goal of the study was to investigate how people form first impressions of other individuals. They were further informed that they would be presented with information about two target individuals, and that their task was to form a first impression of the two individuals based on the presented information. Over the course of 50 randomly presented trials, participants read about 25 positive behaviors that one of the targets had performed and 25 negative behaviors that the other target had performed (see Rydell & Gawronski, 2009). The mapping of the two targets with either positive or negative statements was counterbalanced across participants. Each statement was presented together with a picture that showed the target person against the background of a sunset. The picture of the target appeared slightly above and the statement slightly below the center of the screen. Picture-statement pairs were presented for 5000 ms with an inter-trial interval of 1000 ms.

After participants had completed the first block of the impression formation task, they were presented with more information about the two target individuals, who were now presented against a different real-world background. The particular background was selected from the set of four images that were matched for perceptual and conceptual similarity (see Figure 6). The target that was presented with 25 positive behaviors in the first block was presented with 25 negative behaviors in the second block; the target that was presented with 25 negative behaviors in the first block was presented with 25 positive behaviors in the second block. The procedural parameters were identical to those in the first learning block.

**Speeded evaluation task.** The speeded evaluation task was similar to the one employed in Experiment 2. The stimuli in the current study were images of the two target individuals against (1) the background of first block of the impression formation task, (2) the background of the

second block of the impression formation task, (3) a background that was perceptually similar to, but conceptually distinct from, the background of the second block, (4) a background that was conceptually similar to, but perceptually distinct from, the background of the second block, and (5) a background that was both perceptually and conceptually distinct from the background of the second block. Each of the 10 target-context combinations was presented 15 times, summing up to a total of 150 trials. The procedural parameters of the speeded evaluation task were identical to the ones in Experiment 2.

## Results

Responses on the speeded evaluation task were aggregated by calculating the mean proportion of *positive* responses for each of the 10 target-background combinations. The data were then collapsed across the two counterbalanced method factors to obtain two primary within-subjects factors. The first within-subjects factor captured the order of valence for the two target individuals (i.e., positive-negative; negative-positive); the second within-subjects factor captured the nature of the background with reference to the impression formation task (i.e., first context; second context; perceptually similar to second context; conceptually similar to second context; distinct from second context).

Submitted to a 2 (Valence Order: positive-negative vs. negative-positive)  $\times$  5 (Context: first context vs. second context vs. perceptually similar to second context vs. conceptually similar to second context vs. distinct from second context) ANOVA for repeated measures, evaluation scores revealed a significant main effect of Valence Order,  $F(1, 119) = 7.22, p = .008, \eta_p^2 = .057$ , indicating that participants showed more favorable responses to the target that was presented with negative information in the first block (and positive information in the second block) than the target that was presented with positive information in the first block (and negative information in the second block). More importantly, this main effect was qualified by a significant two-way interaction of Valence Order and Context,  $F(4, 476) = 13.57, p < .001, \eta_p^2 = .102$  (see Figure 7). To decompose this interaction, we tested simple main effects of Valence Order within each of the five context conditions.

When the targets were presented against the background of the first learning block, participants showed more favorable responses to the target person that was presented with positive information in the first block (and negative information in the second block) than the target person that was presented with negative information in the first block (and positive information in the second block),  $t(119) = 2.33, p = .02, d = .21$ . In contrast, when the targets were presented against the background of the second learning block, participants showed more favorable responses to the target person that was presented with negative information in the first

block (and positive information in the second block) than the target person that was presented with positive information in the first block (and negative information in the second block),  $t(119) = -5.43, p < .001, d = .50$ . The same effect was obtained when (1) the two targets were presented against a background that was perceptually similar to, but conceptually distinct from, the background of the second learning block,  $t(119) = -2.40, p = .02, d = .22$ , and (2) the two targets were presented against a background that was conceptually similar to, but perceptually distinct from, the background of the second learning block,  $t(119) = -3.54, p = .001, d = .32$ . In either case, participants showed more favorable responses to the target person that was presented with negative information in the first block (and positive information in the second block) than the target person that was presented with positive information in the first block (and negative information in the second block). Finally, when the targets were presented against a background that was both perceptually and conceptually distinct from the background of the second learning block, participants showed more favorable responses to the target person that was presented with positive information in the first block (and negative information in the second block) than the target person that was presented with negative information in the first block (and positive information in the second block),  $t(119) = 2.34, p = .02, d = .21$ .

### Discussion

The main goal of Experiment 4 was to investigate (1) whether our findings generalize to visual real-world contexts with higher levels of complexity, and if so, (2) which features of complex real-world contexts—perceptual or conceptual—determine the activation of contextualized representations. In addition to replicating our basic findings for real-world contexts with higher levels of visual complexity, the results of Experiment 4 indicate that contextualized representations of counterattitudinal experiences can be activated by either (1) contexts that are perceptually similar to, but conceptually distinct from, the context in which the counterattitudinal experience had been made, or (2) contexts that are conceptually similar to, but perceptually distinct from, the context in which the counterattitudinal experience took place. Both kinds of contexts produced evaluative target responses that reflected the valence of the counterattitudinal experience with the target. In contrast, contexts that were both perceptually and

conceptually distinct from the context in which the counterattitudinal experience had been made produced a renewal effect, such that evaluative responses reflected the valence of the initial experience with the target (*ABC renewal*). The same was true for the context in which the initial attitudinal experience had been made, which elicited evaluative target responses that were in line with the initial attitudinal experience (*ABA renewal*). Taken together, these results indicate that contextualized representations can be activated by contexts that are either perceptually or conceptually similar to the context in which counterattitudinal information had been acquired.<sup>2</sup>

### General Discussion

Across five experiments, we investigated the formation, representation, and activation of contextualized attitudes. Drawing on basic principles of expectancy violation (Roese & Sherman, 2007), we argued that exposure to counterattitudinal information enhances attention toward the momentary context, thereby leading to an integration of incidental visual cues of the environmental context into the representation of the newly acquired counterattitudinal information. As a result of this process, the mental representation of the attitude object acquires a “dual” nature, in that it comprises (1) a *context-free representation* that includes the object and the initially acquired attitudinal information, and (2) a *contextualized representation* that includes the object, the subsequently acquired counterattitudinal information, and the context in which this information had been acquired. From this perspective, attitude change is often contextualized in the sense that evaluations of an object reflect the valence of counterattitudinal experiences only in the context in which these experiences had been made. However, evaluations tend to reflect the valence of initial attitudinal experiences in other contexts, be it the context in which the initial attitudinal experience had been made or novel contexts that are distinct from the one in which the counterattitudinal experience had been made.

Expanding on earlier evidence for these assumptions (e.g., Gawronski et al., 2010; Rydell & Gawronski, 2009), the current research addressed three important questions: (1) under which conditions are incidental context cues integrated into the representation of newly acquired evaluative information, (2) how are these cues stored and represented in memory, and (3) which features of visual context cues determine the activation

<sup>2</sup> For the sake of full disclosure, we would like to note that another study in our lab replicated the current findings for contexts that were perceptually similar to, but conceptually distinct from, the context in which counterattitudinal information had been acquired. However, contexts that were conceptually similar to, but perceptually distinct from, the context in which counterattitudinal information had been acquired produced evaluative responses that reflected a mixture of attitudinal and counterattitudinal information. Although the

discrepancy between the two studies could be due to sampling error or differences in the experimental procedures (i.e., different design, different measure), it is possible that the obtained effects depend on boundary conditions that still need to be identified. Nevertheless, the current findings clearly indicate that both perceptually and conceptually similar contexts have the potential to activate contextualized representations of counterattitudinal experiences.

of contextualized representations? Experiments 1a and 1b investigated recollective memory for incidental context cues as a function of whether these cues were present during the encoding of target information that was either congruent or incongruent with the valence of initially acquired information. Consistent with the assumption that contextual cues tend to be integrated into the representation of attitude-incongruent information, but not attitude-congruent information, recognition memory for incidental context cues was higher when the target information was incongruent than when it was congruent with the valence of the initial information. Expanding on these findings, Experiment 2 tested whether contextual cues during the acquisition of counterattitudinal information become directly associated with the valence of the counterattitudinal experience (*evaluative binding*) or instead are represented in a manner such that they constrain the activation of evaluative information in response to the attitude object (*occasion setting*). Consistent with the latter hypothesis, evaluative responses were moderated by the presence versus absence of a contextual cue even when this cue was paired with equal amounts of positive and negative information. Experiment 3 tested whether this modulating function remains intact when the contexts themselves become directly associated with an evaluative response. Our results showed that contextual cues continued to moderate the evaluative response that was elicited by an attitude object even when the context cues became independently associated with an evaluative response. In this case, contextual cues had two simultaneous effects on evaluative responses. First, they influenced the evaluative response that was elicited by an object within that context independent of their own valence (moderating effect). Second, they elicited evaluative responses that were congruent with their associated valence independent of the evaluative response that was elicited by the target within that context (direct effect). Finally, Experiment 4 investigated which features of visual context cues determine the activation of contextualized representations. The results of this study indicate that contextualized representations of counterattitudinal information can be activated by contexts that are either perceptually or conceptually similar to the context in which the counterattitudinal experience had been made. Either kind of context produced an evaluative response that reflected the valence of the counterattitudinal experience. In contrast, contexts that were both perceptually and conceptually distinct from the context in which the counterattitudinal experience had been made produced a renewal effect, reflecting the valence of the initial attitudinal information.

### **Implications for Context Effects**

The accumulating body of evidence for context effects on spontaneous and deliberate evaluations has sparked

theoretical debates about whether evaluations reflect online constructions on the basis of momentarily accessible attributes (e.g., Schwarz, 2007) or stable attitudinal representations that are directly retrieved from memory (e.g., Fazio, 2007). The current research expands on this debate by integrating central components of both accounts. On the one hand, the proposed account includes a constructivist component, in that contextual cues are assumed to moderate which experiences with an attitude object are activated in response to the object. The central assumption is that counterattitudinal experiences are activated only in the context in which these experiences were made (or other contexts that are visually similar to the one in which the counterattitudinal experiences were made), whereas initial attitudinal experiences are activated in any other context. On the other hand, the current account includes a dispositional component by assuming that contextual cues moderate evaluative responses on the basis of stored attitudinal representations. Specifically, the current account assumes that enhanced attention to incidental visual cues during the encoding of counterattitudinal information leads to an integration of these cues into the mental representation of the counterattitudinal information. Because the contextualization of counterattitudinal information leaves the initial attitudinal representation intact, attitudes can be said to have a dispositional component that is difficult to change and effective in influencing evaluations despite observable change in response to counterattitudinal information.

Although the current research provides important insights into the mental processes and representations underlying a particular type of contextual influence (i.e., context effects resulting from enhanced attention to incidental visual cues during the encoding of counterattitudinal information), it is important to acknowledge the role of other processes that may contribute to context effects over and above the ones investigated in the current work. For example, context stimuli may influence evaluations by providing different comparison standards (Mussweiler, 2003), and such context effects may occur for both spontaneous and deliberate evaluations (e.g., Gawronski, Deutsch, & Seidel, 2005; Scherer & Lambert, 2009). Moreover, incidental characteristics of contexts (e.g., background noise) may influence meta-cognitive inferences about the diagnosticity of momentarily activated information, thereby influencing the weighting and use of that information (Schwarz, 1998). There are also various influences involving features of the measurement context, such as question order and response formats (Schwarz, 1999). Such context effects differ from the ones investigated in the current research, in that the relevant contextual cues are not necessarily included in the mental representation of the attitude object. More importantly, whereas earlier research on context effects

focused exclusively on the processes involved in the generation of an evaluative response, the current work adopts a more comprehensive view that includes (1) the processes that determine the inclusion of contextual information into the mental representation of evaluative information, (2) the particular manner in which contextual information is integrated into the representation of evaluative information, and (3) the processes that determine the activation of conflicting information about an attitude object. As such, the current work offers novel insights into the formation, representation, and activation of contextualized attitudes, and the situated construction of evaluative responses on the basis of stored information.

The current findings suggest that incidental visual cues of the environmental context function in a manner similar to retrieval cues, in that they determine which components of the mental representation of an evaluatively heterogeneous attitude object are activated in response to that object (Gawronski & Cesario, 2013). However, our findings remain ambiguous as to whether these representational components involve information about concrete attitudinal experiences or abstract information about valence. For example, in line with the assumptions of exemplar-based models (e.g., Smith & Zárate, 1992), contextual cues may influence which concrete experiences with an attitude object are activated in response to that object. Alternatively, it is possible that evaluatively incongruent experiences are integrated into two abstract representations of the attitude object as being positive versus negative (e.g., Fazio, 2007). Finally, it is possible that mental representations of evaluative information include both concrete and abstract knowledge, with the type of representation differing for initial attitudinal and subsequent counterattitudinal information. For example, initial attitudinal experiences may be integrated in abstract representations of the attitude object as being either positive or negative, whereas the representation of subsequent counterattitudinal information may involve concrete experiences with the attitude object. Although debates between abstraction and exemplar-based theories are extremely difficult to resolve (Barsalou, 1990), we consider the question of whether contextualized representations involve abstract or concrete information an important and interesting topic for future research in this area.

### **Implications for Attitude Change**

The current findings also have important implications for understanding the effectiveness of manipulations that attempt to change attitudes. A common question in basic and applied research is whether experimentally induced changes in evaluations reflect enduring changes in the underlying attitudinal representation or temporary shifts that may dissipate over time (e.g., Gawronski & Bodenhausen, 2007, 2011; Petty & Cacioppo, 1986). To

address this question, participants are often brought back into the lab several days or weeks after the experimental manipulation. To the extent that the initially observed effect remains stable over time, it is assumed that the employed manipulation was effective in producing enduring long-term change in the underlying attitudinal representation (e.g., Devine, Forscher, Austin, & Cox, 2012; Förderer & Unkelbach, 2013; Haugtvedt & Petty, 1992; Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000; Olson & Fazio, 2006). However, the current work suggests that, although the observed changes may be stable within the same context over time, they may not generalize to other visually distinct contexts. Indeed, it is possible that changes observed in the lab do not generalize to other contexts outside of the lab even when the observed change in the lab is stable over time. Thus, to establish the effectiveness of manipulations to induce enduring changes that generalize across contexts, it is important to include not only delayed follow-up measurements, but also measurements in contexts that are different from the one in which the manipulation took place (e.g., Devine et al., 2012). At a broader level, this conclusion resonates with Mischel and Shoda's (1995) notion of IF-THEN conditionals reflecting idiosyncratic situation-behavior profiles, which implies that individuals may show behavioral consistency over time *within* a particular context, even if behavioral consistency *across* contexts is low.

An important task for future research on attitude change is to identify ways to increase the generalization of counterattitudinal information across distinct contexts. Although this question has received relatively little attention in social psychology, clinical research on contextual relapse suggests that counterattitudinal experiences in multiple different contexts can enhance the generalization of these experiences across novel contexts (e.g., Gunter, Denniston, & Miller, 1998; Vansteenwegen, Vervliet, Iberico, Baeyens, Van den Bergh, & Hermans, 2007; see also Gawronski et al., 2010). Future research investigating the impact of attitude change manipulations across visually distinct contexts would be helpful to gain a deeper understanding of their overall effectiveness.

### **Spontaneous versus Deliberate Evaluation**

By showing that initial attitudinal and subsequent counterattitudinal information can influence evaluative responses under different conditions, the current findings expand on earlier theories suggesting that counterattitudinal information does not erase previously acquired attitudinal information from memory (e.g., Petty et al., 2006; Wilson et al., 2000). A central assumption of these theories is that spontaneous responses tend to reflect the valence of initial attitudinal information whereas effects of counterattitudinal information are limited to deliberate responses. The present research demonstrates the significance of another



important factor by showing that incidental visual cues of the environmental context can influence whether initial attitudinal or subsequent counterattitudinal information is activated in response to an attitude object. Yet, an important question is whether the current findings generalize to more deliberate judgments that go beyond self-reports of spontaneous “gut” responses. Although the evaluation measures in the current research can be described as “explicit” in the sense that they involved intentional evaluations of the targets (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009), the inclusion of response deadlines makes them more similar to “implicit” measures, capturing spontaneous rather than deliberate responses (e.g., Ranganath et al., 2008). Thus, an important question is whether similar effects can be obtained under conditions that allow for more elaborate processing.

Based on the proposal that occasion setters may function in a manner similar to retrieval cues (Gawronski & Cesario, 2013), one could argue that contextual cues in the current studies influenced which information came to mind most rapidly upon encountering a target. With increasing delays, however, deliberate processing may involve the retrieval of other target-related information, including information that has been learned in other contexts (cf. Cunningham, Zelazo, Packer, & Van Bavel, 2007; Wojnowicz, Ferguson, Dale, & Spivey, 2009). In this case, perceivers would have to resolve the resulting inconsistency between conflicting pieces of evaluative information to avoid a state of attitudinal ambivalence (Van Harreveld, Van der Pligt, & De Liver, 2009).

Although speculative at this point, these assumptions have two important implications. First, they imply that contextualized representations can prevent attitudinal ambivalence for spontaneous evaluative responses by preventing the simultaneous activation of conflicting information during early processing stages. Nevertheless, ambivalence may arise during later processing stages to the extent that deliberate processing involves the retrieval of other target-related information, including information that has been learned in other contexts. Second, if other target-related information is retrieved for more deliberate judgments, an important question is how perceivers deal with the conflict between initial attitudinal and subsequent counterattitudinal information. One possibility is implied by research on ease-of-retrieval effects (Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991), suggesting that people may attribute higher validity to information that comes to mind easily and discount the validity of information that requires cognitive effort to be retrieved from memory (Tormala, Petty, & Briñol, 2002). In this case, deliberate evaluations may show the same patterns of context effects that we found for spontaneous evaluations, such that they reflect the valence of information that comes to mind most rapidly within a

given context (see also Gawronski et al., 2010; Rydell & Gawronski, 2009). Alternatively, it is possible that less accessible information is given equal weight in an integrated judgment that combines all available information regardless of how rapidly it comes to mind. In this case, the patterns of context effects obtained for spontaneous evaluations may not necessarily generalize to deliberate evaluations, which may instead reflect neutral or ambivalent responses regardless of the context. Although the correspondence between spontaneous and deliberate evaluations can be moderated by various other factors (for a review, see Hofmann, Gschwendner, Nosek, & Schmitt, 2005), future research may help to clarify the commonalities and differences between spontaneous and deliberate evaluations in their susceptibility to the kinds of context effects demonstrated in the current work.

### Conclusion

The main goal of the present research was to provide deeper insights into the formation, representation, and activation of contextualized attitudes. Drawing on Gawronski et al.’s (2010) representational account, we argued that initial attitudinal information is typically stored in context-free representations, whereas subsequent counterattitudinal information is stored in contextualized representations. Thus, counterattitudinal experiences tend to influence evaluative responses only in the context in which these experiences have been made, whereas initially acquired attitudinal information influences responses in any other context, be it the context in which the initial information was acquired or novel contexts that are distinct from one in which the counterattitudinal experience had been made. The present research expands on earlier evidence for these hypotheses by providing deeper insights into (1) the conditions under which incidental visual cues of the environmental context are integrated into the representation of newly acquired evaluative information, (2) how these contextual cues are stored and represented in memory, and (3) which features of visual context cues determine the activation of contextualized representations. By integrating components of both constructivist and representational accounts, the current work not only encourages a new way of thinking about context effects; it also stipulates a contextualized view on the effectiveness of attitude change that is consistent with the notion of idiosyncratic situation-behavior profiles.

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#### Author Note

Bertram Gawronski, Department of Psychology, University of Texas at Austin, USA; Yang Ye, Department of Psychology, University of Western Ontario, Canada; Robert J. Rydell, Department of Psychological and Brain Sciences, Indiana University, USA; Jan De Houwer, Department of Experimental-Clinical and Health Psychology, Ghent University, Belgium.

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Correspondence concerning this article should be sent to: Bertram Gawronski, Department of Psychology, University of Texas at Austin, 108 E Dean Keeton A8000, Austin, TX 78712-1043, USA, Email: [gawronski@utexas.edu](mailto:gawronski@utexas.edu)

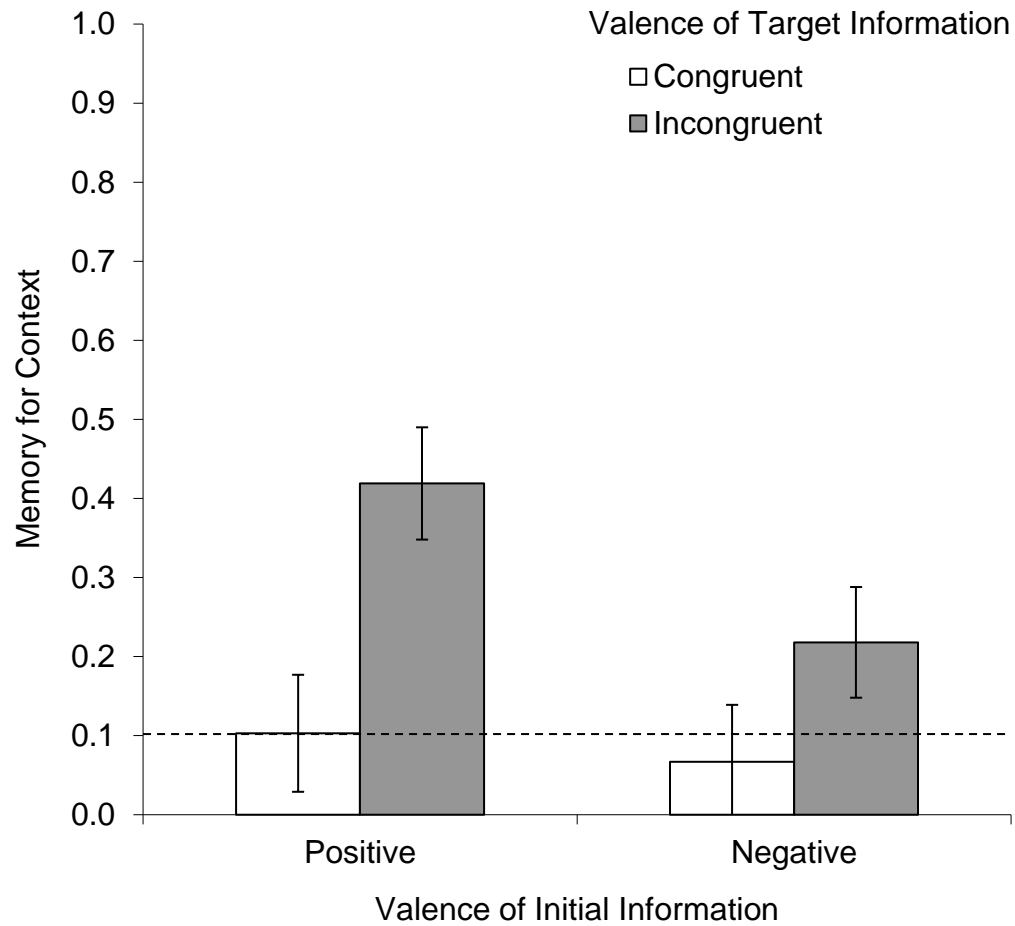
**Table 1.** Different kinds of renewal effects and their definitions. Table adapted from Gawronski and Cesario (2013). Reprinted with permission.

Effect	Description
ABA Renewal	Learning of a particular response in Context A Learning of a new response in Context B Renewal of the initially learned response in the initial Context A
ABC Renewal	Learning of a particular response in Context A Learning of a new response in Context B Renewal of the initially learned response in a novel Context C
AAB Renewal	Learning of a particular response in Context A Learning of a new response in the same Context A Renewal of the initially learned response in a novel Context B

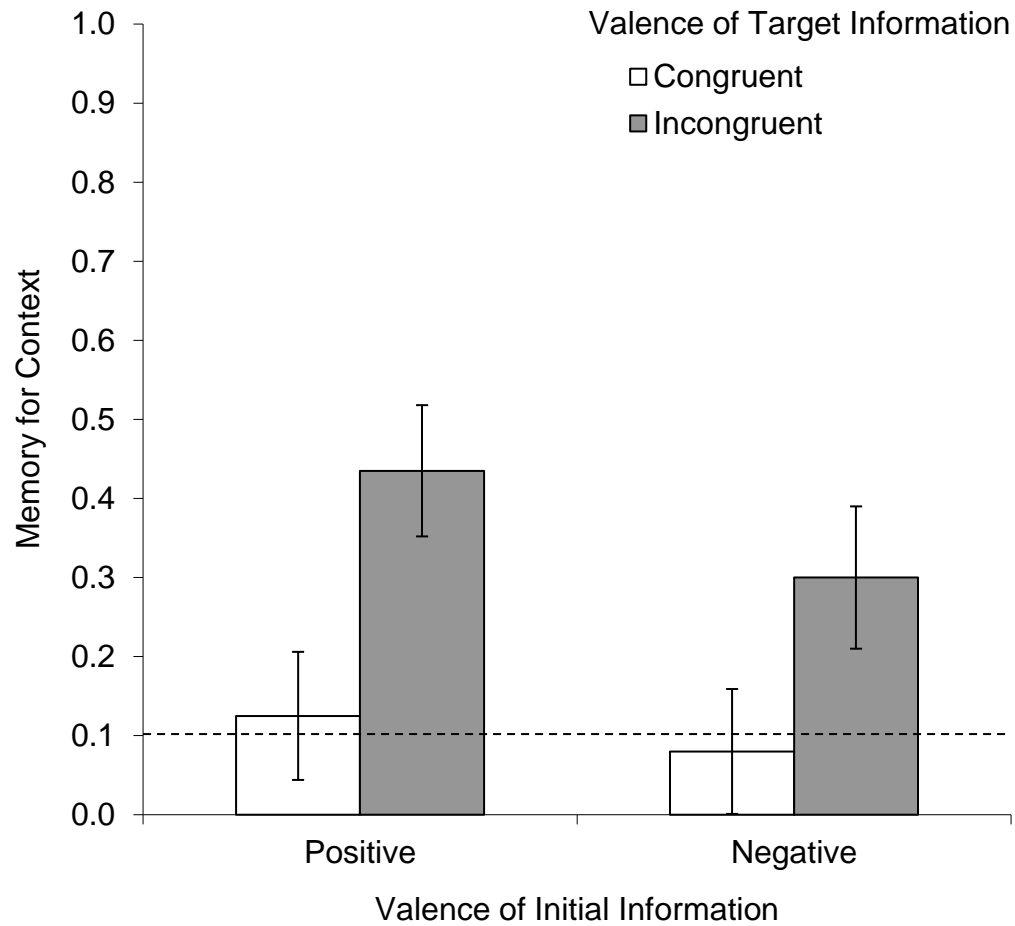
**Table 2.** Patterns of contexts during the acquisition of evaluative information and the measurement of evaluations, and their implications for empirical outcomes regarding the stability versus change of evaluation in studies on attitude change and the context-dependence versus context-independence of evaluations in studies on context effects. Table adapted from Gawronski and Cesario (2013). Reprinted with permission.

Contexts Patterns	Empirical Outcome
Attitude Change	
ABA	Stability
ABB	Change
ABC	Stability
AAA	Change
AAB	Stability
Context Effects	
ABA / ABB	Context-dependence
ABB / ABC	Context-dependence
ABA / ABC	Context-independence
AAA / AAB	Context-dependence

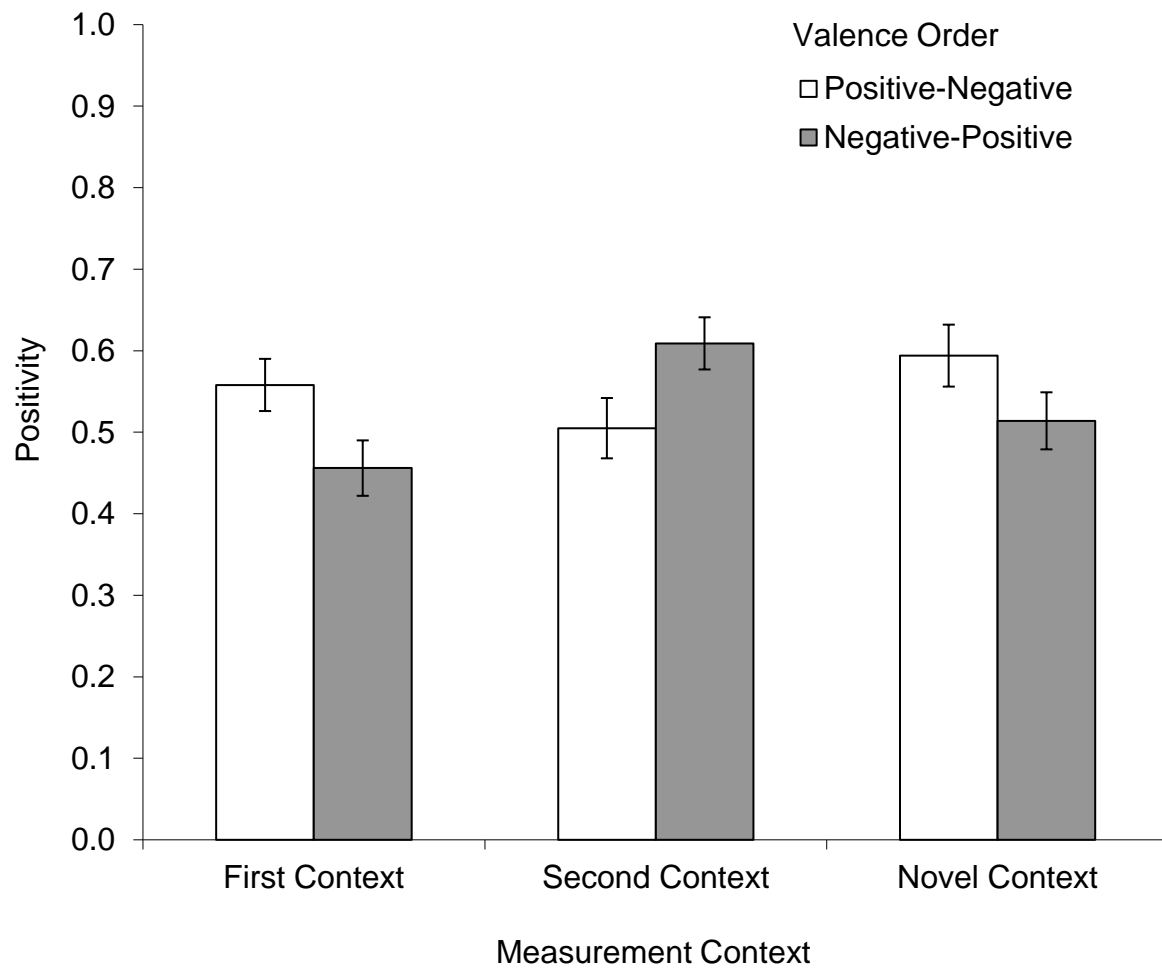
*Note.* The first letter in three-digit acronyms depicts the context during the acquisition of initial attitudinal information; the second letter depicts the context during the acquisition of subsequent counterattitudinal information; and the third letter depicts the context during the measurement of evaluations.



**Figure 1.** Proportion of participants with correct memory for the context (background color) of a target statement as a function of valence of initial information (positive vs. negative) and valence of target statement (congruent with initial information vs. incongruent with initial information), Experiment 1a. The dotted line depicts chance-level performance of 10% correct memory judgments. Error bars depict standard errors.

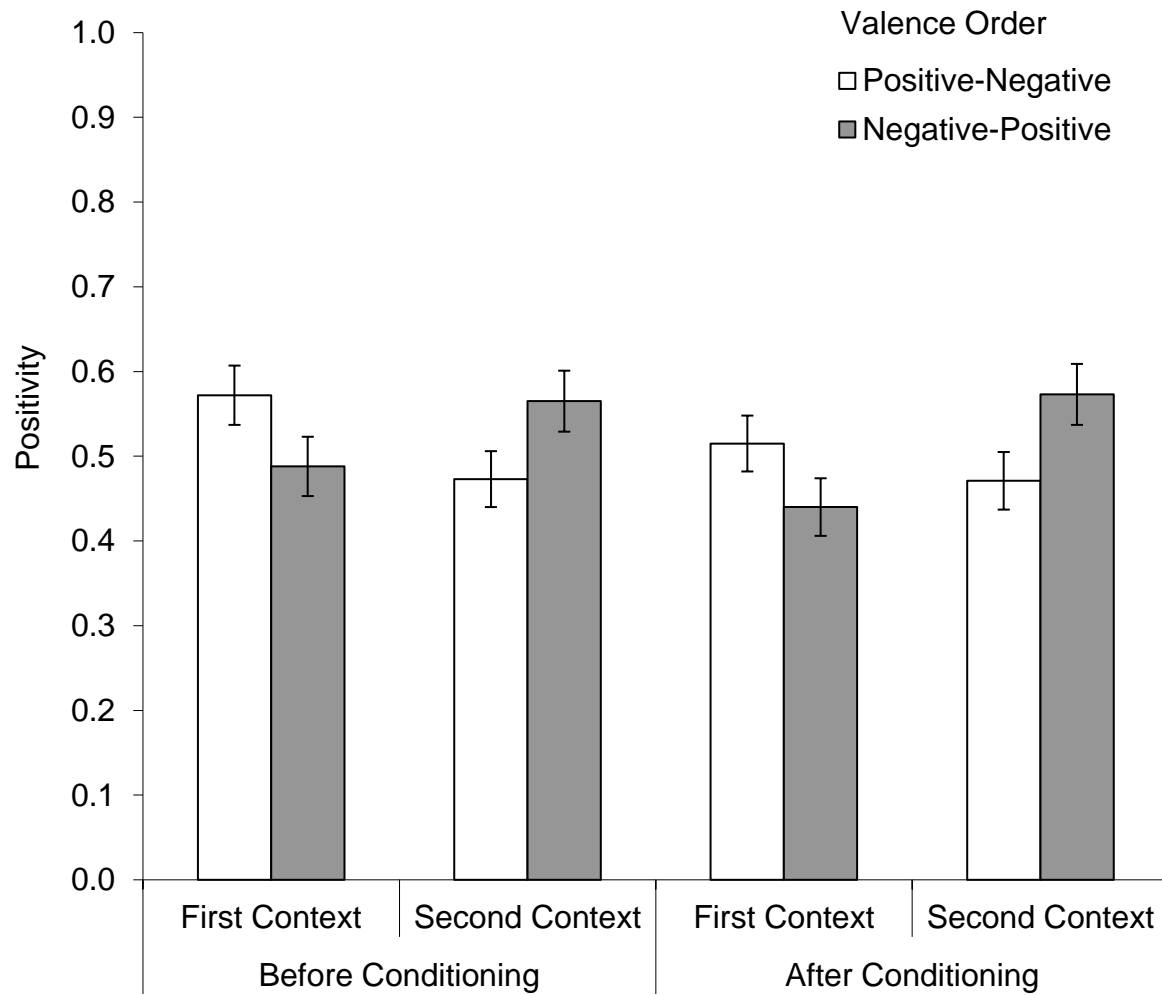


**Figure 2.** Proportion of participants with correct memory for the context (background color) of a target statement as a function of valence of initial information (positive vs. negative) and valence of target statement (congruent with initial information vs. incongruent with initial information), Experiment 1b. The dotted line depicts chance-level performance of 10% correct memory judgments. Error bars depict standard errors.

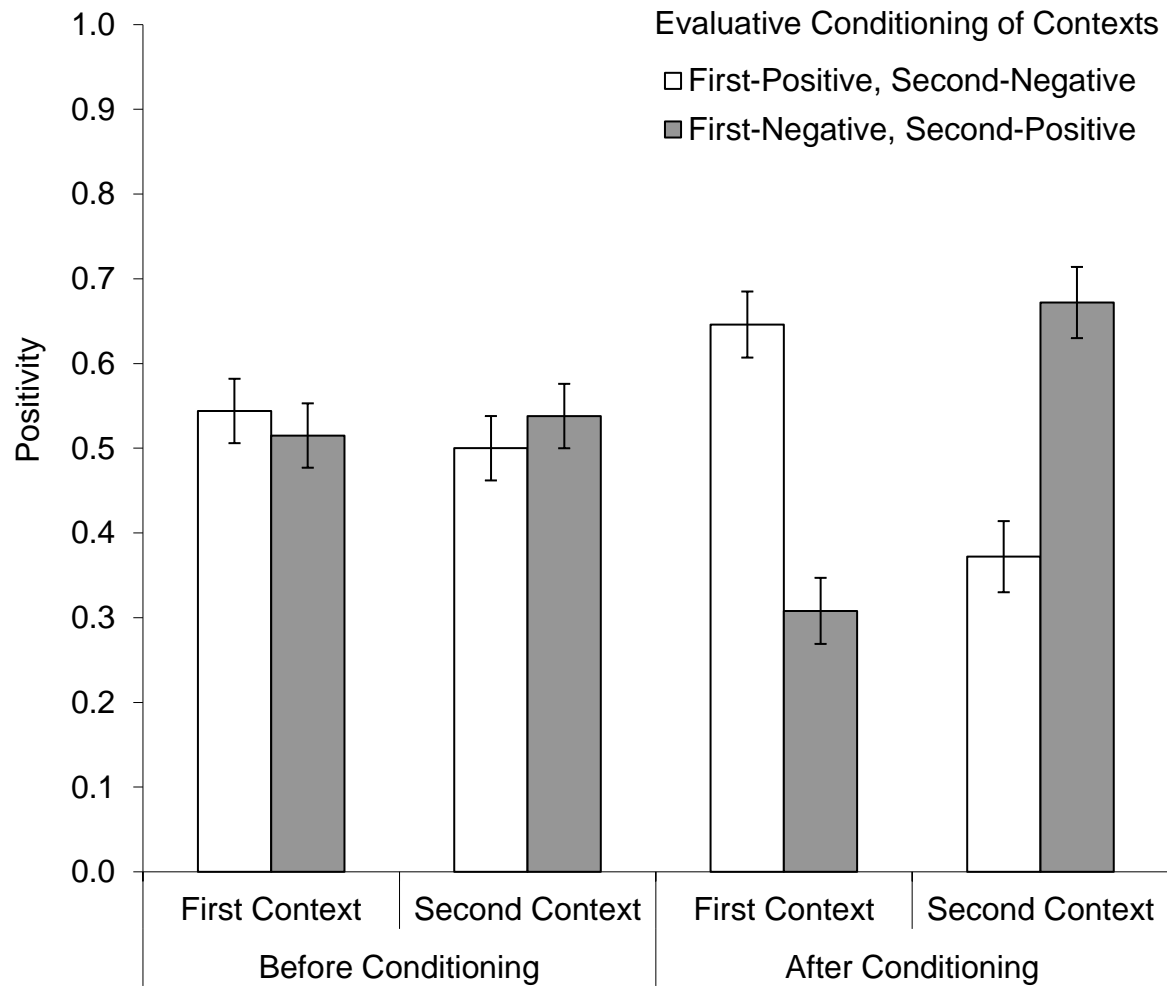


**Figure 3.** Evaluative responses toward target individuals as a function of order of valence in impression formation (positive-negative vs. negative-positive) and context during the measurement of evaluative responses (first context vs. second context vs. third context), Experiment 2. Error bars depict standard errors.

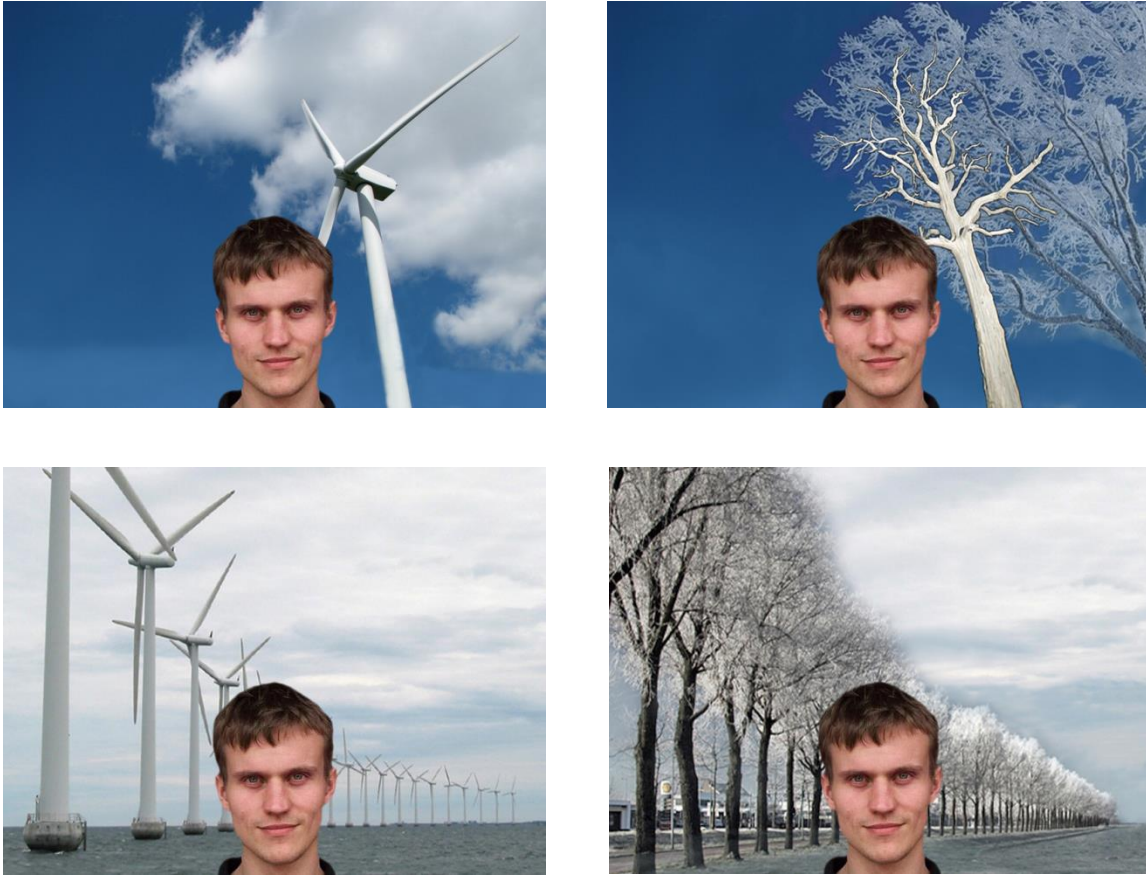




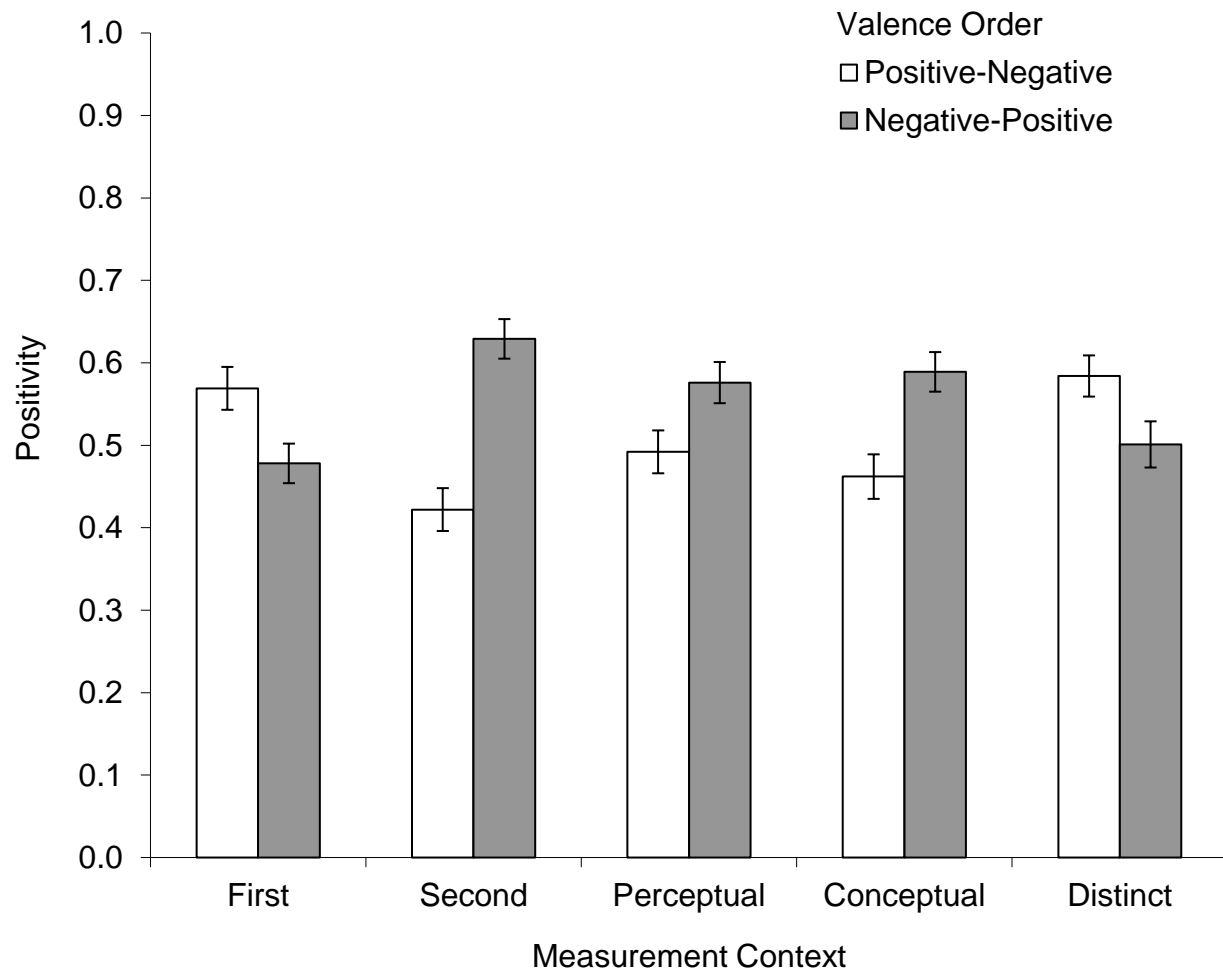
**Figure 4.** Evaluative responses toward target individuals as a function of order of valence in impression formation (positive-negative vs. negative-positive), context during the measurement of evaluative responses (first context vs. second context), and time of measurement (before context conditioning vs. after context conditioning), Experiment 3. Error bars depict standard errors.



**Figure 5.** Evaluative responses toward target individuals in different contexts as a function of context conditioning (first-positive, second-negative vs. first-negative, second-positive), context during the measurement of evaluative responses (first context vs. second context), and time of measurement (before context conditioning vs. after context conditioning), Experiment 3. Error bars depict standard errors.



**Figure 6.** Images used to manipulate perceptual versus conceptual similarity between contexts in Experiment 4. Images shown in the same row are perceptually similar but conceptually distinct; images in the same column are conceptually similar but perceptually distinct; images displayed diagonally are both perceptually and conceptually distinct.



**Figure 7.** Evaluative responses toward target individuals as a function of order of valence in impression formation (positive-negative vs. negative-positive) and context during the measurement of evaluative responses (first context vs. second context vs. perceptually similar to second context vs. conceptually similar to second context vs. distinct from second context), Experiment 4. Error bars depict standard errors.