



## Report

## When linking is stronger than thinking: Associative transfer of valence disrupts the emergence of cognitive balance after attitude change

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## ABSTRACT

The present research investigated the role of cognitive balance vs. associative transfer of valence in attitude change. Participants first formed positive or negative attitudes toward several source individuals. Subsequently, participants were shown source–target pairs along with information about the source–target relationship ('likes'/'dislikes'). Afterwards, participants' attitudes toward the sources were changed by means of information that was opposite to the initially induced attitude. In a control condition, initial source attitudes remained unqualified. Results in the control condition showed that initially formed attitudes and available relationship information produced target evaluations that were consistent with the notion of cognitive balance. However, when attitudes toward the sources changed, target evaluations directly matched attitudes toward individually associated sources, irrespective of the relation between source and target. These results suggest that associative transfer of valence can disrupt the emergence of cognitive balance after attitude change.

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## Introduction

Our social network consists of people we like and feel close to (e.g., our spouse, best friends, children, parents). Other people are not as close and we either like or dislike them, but they are nonetheless an important part of our network (e.g., acquaintances, neighbors, colleagues). In addition, there are individuals we hardly know, but we may still have a positive or negative attitude toward them. This could be the case when someone we like or dislike feels either positively or negatively about these individuals (e.g., Aronson & Cope, 1968; Gawronski, Walther, & Blank, 2005). For instance, imagine that your favorite colleague has some friends that you do not really know well, but because your colleague is very fond of them, you also have a favorable attitude toward them. The opposite is likely true for people your colleague feels negatively about.

Now imagine that you have an argument with your colleague and the situation gets so bad that your attitude toward your colleague becomes highly negative. Will your new attitude toward your colleague also change your attitudes toward your colleague's friends and enemies? Would you now start to dislike your colleague's friends, but like your colleague's foes? The question of

what happens to attitudes in social networks after change occurs in one part of the network is interesting not only from a real-world perspective; it also has a strong theoretical significance, as there are two potential factors that may influence attitudes in social networks after attitude change: (a) the simple transfer of valence through associative links in memory, and (b) the desire to hold attitudes that are in line with the principles of cognitive balance. These two mechanisms can lead to converging outcomes under some conditions but to opposite outcomes in others. The main goal of the present research was to test the different predictions implied by the two mechanisms to provide deeper insights into the dynamics of attitudes in social networks after attitude change.

## Cognitive balance

One major social psychological theory that directly addresses the structure of attitudes in social networks is Heider's (1958) theory of cognitive balance. According to balance theory, people strive for a pattern of interpersonal relations that can be described as balanced. In their simplest form, these balanced patterns include triads of relations between three individuals in which: (a) people like individuals who are liked by their friends, (b) people dislike individuals who are disliked by friends, (c) people dislike individuals who are liked by those whom they personally dislike, or (d) people like individuals who are disliked by those whom they personally dislike. According to Heider, a triad of interpersonal rela-

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tions is balanced if it includes either no or an even number of negative relations (i.e., people disliking each other) and imbalanced if it contains an odd number of negative relations.

Research guided by balance theory provided important insights into the structure of attitudes in social networks. Specifically, the desire to maintain balanced relations has been shown to influence attitudes toward unfamiliar individuals, even when there was no information about these individuals other than their relation to a positively or negatively evaluated familiar individual. In such cases, mere knowledge about this relation has been shown to create an attitude toward the unfamiliar individual, such that the resulting structure of attitudes formed a balanced triad (e.g., Aronson & Cope, 1968; Gawronski et al., 2005). In the present study, we were interested in whether these principles still hold when attitudes toward one person in the triad have changed. This is not as obvious as it may seem, as there is an alternative mechanism that may in fact disrupt the emergence of cognitive balance after attitude change.

#### Associative transfer of valence

The notion of associative transfer of valence is most prominently reflected in research on evaluative conditioning (EC) (for reviews, see De Houwer, Thomas, & Baeyens, 2001; Walther & Langer, 2008; Walther, Nagengast, & Trasselli, 2005). EC effects refer to changes in liking that are due to the pairing of stimuli (De Houwer, 2007). In a prototypical EC study, a neutral conditioned stimulus (CS) is repeatedly paired with a positive or negative unconditioned stimulus (US). The typical result is a shift in the valence of the formerly neutral CS, such that it acquires the valence of the US. A common explanation of EC effects is that repeated pairings of a CS with a given US create a mental link between the CS and the US in memory. As such, subsequent activation of the CS in memory may associatively spread to the US, which in turn activates the evaluation of the US. The result is an evaluative response to the CS that directly corresponds to the one toward the US.

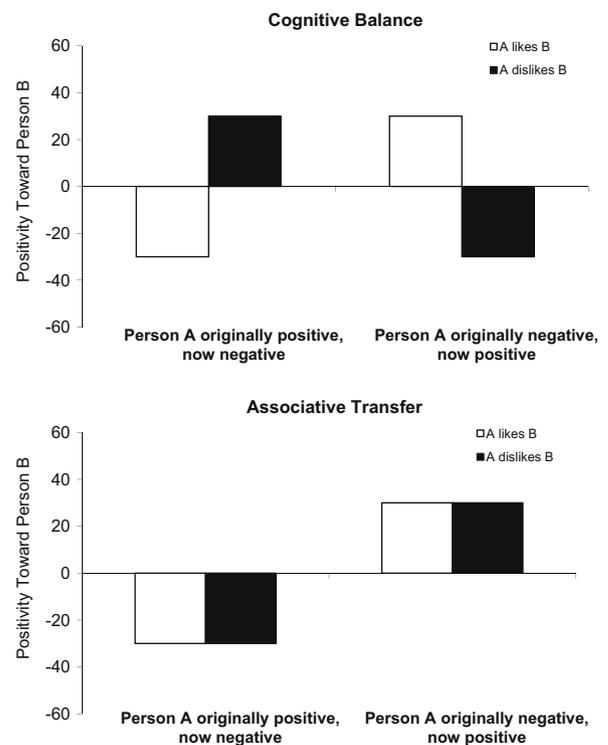
Empirical evidence for such associative transfers of valence comes from research on US-revaluation (e.g., Baeyens, Eelen, Van den Bergh, & Crombez, 1992; Walther, Gawronski, Blank, & Langer, 2009). US-revaluation means that subsequent changes in the valence of an originally positive or negative US lead to corresponding changes in the valence of pre-associated CSs (Rescorla, 1974). For example, Walther et al. (2009) employed an evaluative learning paradigm in which neutral faces (CS) were repeatedly paired with either positive or negative faces (US). Subsequently, the valence of the US faces was changed by presenting positive faces with negative information and negative faces with positive information. In a control condition, US faces were presented with neutral information. Results showed that revaluation of the US not only led to a reversal in the valence of the US faces; it also led to corresponding changes in the valence of the pre-associated CS faces. These findings suggest that the CS faces acquired their valence indirectly by virtue of their mental association to a given US. Moreover, these results provide further evidence that attitude changes can be due to associative transfers of valence resulting from established links between two stimuli in memory.

#### The present research

The notions of cognitive balance and associative transfer of valence seem particularly important in the context of attitude change in social networks, as the two mechanisms can lead to opposite outcomes under certain conditions. To illustrate these conditions, imagine that you like or dislike a person named Peter and that you have learned that Peter likes or dislikes another unfamiliar person named Mike. According to balance theory, you should like

Mike if: (a) you like Peter and Peter likes Mike, or (b) you dislike Peter and Peter dislikes Mike. However, balance theory predicts that you should dislike Mike if (c) you like Peter and Peter dislikes Mike, or (d) you dislike Peter and Peter likes Mike (e.g., Aronson & Cope, 1968; Gawronski et al., 2005). Importantly, the predicted attitudes toward Mike should also emerge if you just changed your attitude toward Peter from positive to negative or from negative to positive. What matters is your current attitude toward Peter. Thus, if the abovementioned case was implemented in a 2 (attitudes toward Peter: positive vs. negative)  $\times$  2 (Peter's attitude toward Mike: positive vs. negative) experimental design, attitudes toward Peter and knowledge about Peter's attitude toward Mike should produce a cross-over interaction, and this interaction pattern should be directly reversed if your attitudes toward Peter changed (see Fig. 1, upper panel).

These predictions stand in contrast to the ones derived from the notion of associative transfer. If your attitude toward Peter changes, the mental link between Peter and Mike that is created during the learning of their relation may lead to an associative transfer of the newly acquired attitude toward Peter, such that Mike acquires whatever valence is associated with Peter. In this case, Mike should acquire a positive valence if your attitude toward Peter changes from negative to positive, and a negative valence if your attitude toward Peter changes from positive to negative. Importantly, such associative transfers of valence may occur regardless of whether Peter likes or dislikes Mike, as they result from the simple associative link between Peter and Mike in memory. Thus, associative transfer of valence implies a simple main effect of attitudes toward Peter, such that Mike is liked when attitudes toward Peter change from negative to positive and disliked when they change from positive to negative (see Fig. 1, lower panel).



**Fig. 1.** Differential predictions of cognitive balance and associative transfer exemplified by attitudes toward an unfamiliar Person B as a function of changed attitudes toward a familiar Person A (originally positive, now negative vs. originally negative, now positive) and Person A's attitude toward Person B. Higher values indicate more positive evaluations.

To test the differential predictions implied by the two accounts, we combined an impression formation paradigm derived from research on cognitive balance (Gawronski et al., 2005) with the revaluation paradigm used by Walther et al. (2009). In this combined paradigm, participants first formed positive or negative attitudes toward a given set of “source” individuals. Subsequently, participants were shown pairs of “source” and “target” individuals with the additional information of whether the source likes or dislikes the target. In a third phase, participants’ original attitudes toward the sources were changed by means of information that was evaluatively opposite to the information presented in the first phase. In a control condition, initial attitudes were left unchanged. Finally, participants evaluated all sources and targets. Drawing on earlier evidence for the impact of cognitive balance on social attitudes (e.g., Aronson & Cope, 1968; Gawronski et al., 2005), it was expected that participants in the control condition (no revaluation of source valence) would form attitudes toward the target individuals that are in line with the principles of cognitive balance. Specifically, participants should show favorable attitudes toward targets that are liked by positive sources or disliked by negative sources. Further, they should show unfavorable attitudes toward targets that are liked by negative sources or disliked by positive sources. Of higher importance are the evaluations in the revaluation condition, which speak to the present question of how cognitive balance vs. associative transfer of valence influence social attitudes after attitude change. Whereas cognitive balance predicts a full reversal of the two-way interaction pattern predicted for the control condition (see Fig. 1, upper panel), associative transfer of valence predicts a simple main effect of source valence, such that target evaluations should directly correspond to the new attitudes toward the sources (see Fig. 1, lower panel).

## Method

### *Participants and design*

Forty students (26 females, 14 males) drawn from a volunteer pool took part in a study on impression formation. Participants received partial credit towards a course requirement. The experiment employed a 2 (original valence of source: positive vs. negative)  $\times$  2 (revaluation of source: opposite valence vs. control)  $\times$  2 (source–target relation: likes vs. dislikes) within-subjects design.

### *Procedure and materials*

Upon arrival, participants were greeted by an experimenter and seated in front of a computer screen. The experiment was guided entirely by a computer program. Instructions on the screen asked participants to imagine that they had just started a new job in a company, and hence were interested in getting acquainted with their new colleagues. Pictures of eight male source individuals were then presented. The materials were adopted from Gawronski et al. (2005) and comprised four liked and four disliked individuals. The pictures of the source individuals were accompanied by a number of either positive or negative statements about their behaviors (e.g., likes to help new colleagues to get adjusted; often insults the secretary). Three consistently positive or consistently negative statements were presented for each individual. Participants’ task was to form an impression of these individuals based on the statements. The individuals were presented via black-and-white portrait photographs on the left side of the screen, with the statements simultaneously appearing on the right. Picture-statement pairs were presented one-by-one, for 7000 ms each.

The inter-trial interval was 1000 ms. The picture-statement pairs were intermixed in a fixed randomized order.

After this task, participants were asked to imagine that they were now acquainted with some of their new colleagues but still unfamiliar with others. The instructions further stated that within the first week on their new job participants not only learned about the personalities of their new colleagues but also about their interpersonal relations. Participants were then presented with pairs of already familiar source individuals from the initial attitude formation task and yet unfamiliar, neutral target individuals. Source individuals of positive or negative valence were presented on the left side of the screen; neutral target individuals were presented on the right side of the screen. Additionally, one of the two relations “likes” or “dislikes” was presented in the center of the screen, indicating the sentiment of the source on the left about the target on the right, as implied by reading direction. Eight neutral individuals taken from Gawronski et al. (2005) were used as target stimuli. The pairing of source and target individuals was counterbalanced across experimental conditions. Source–target pairs were presented for 4000 ms with an inter-trial interval of 2000 ms. Order of source–target pairs was randomized for each participant. Participants’ task was to form impressions of the targets presented on the screen.

After the pairing phase, participants were asked to imagine that they had already been working in the company for several weeks. They were told that they would now receive additional information about their colleagues. The procedure was identical to the first phase of the experiment, except that the sources were now paired with information of either neutral or opposite valence. Specifically, positive sources were paired with either negative information (revaluation condition) or neutral information (control condition); negative sources were paired with either positive information (revaluation condition) or neutral information (control condition). Special care was taken to ensure that the presented information in the revaluation condition was opposite in valence, but not in direct contradiction to the information presented in the first phase of the study. A total of three statements was presented for each individual.

Finally, participants were asked to evaluate all individuals on a graphic rating scale, which consisted of a 20-cm horizontal line labeled “dislike” on the left and “like” on the right. Participants were asked to indicate how much they liked each individual by positioning the cursor on any point of the line and then pressing the left mouse key. To avoid response tendencies, the graphic scale consisted of no additional numbers or other numerical labels. The computer program recorded negative judgments on the left half of the line from  $-1$  to  $-100$ , and positive judgments on the right half from  $+1$  to  $+100$ . The midpoint of the line served as a neutral reference point (0), which was also used as the starting position of the cursor for each judgment.

## Results

### *Attitudes toward sources*

To confirm the effectiveness of our manipulation of source valence, evaluations of the source individuals were submitted to a 2 (original source valence: positive vs. negative)  $\times$  2 (revaluation: opposite valence vs. control)  $\times$  2 (source–target relation: likes vs. dislikes) ANOVA with repeated measurements on all factors. This analysis revealed a significant main effect of original source valence,  $F(1, 39) = 38.22$ ,  $p < .001$ ,  $\eta^2 = .49$ , a significant main effect of revaluation,  $F(1, 39) = 98.00$ ,  $p < .001$ ,  $\eta^2 = .72$ , a significant main effect of source–target relation,  $F(1, 39) = 6.17$ ,  $p < .01$ ,  $\eta^2 = .14$ , and, more important for the present investigation, a highly signif-

icant two-way interaction between original source valence and reevaluation,  $F(1, 39) = 111.64$ ,  $p < .001$ ,  $\eta^2 = .74$ . Consistent with the intended manipulation, originally positive sources were evaluated less positively after reevaluation compared to control conditions ( $M_s = -34.38$  vs.  $78.56$ , respectively),  $t(39) = 13.73$ ,  $p < .001$ ,  $d = 3.27$ . Conversely, originally negative sources were evaluated less negatively after reevaluation compared to control conditions ( $M_s = 6.66$  vs.  $-36.67$ , respectively),  $t(39) = 5.31$ ,  $p < .001$ ,  $d = 1.16$ . These results indicate that the employed reevaluation manipulation indeed affected the valence of the source individuals, which is a basic requirement for the proposed reevaluation effects on target valence.

#### Attitudes toward targets

The same ANOVA on attitudes toward targets revealed a significant main effect of original source valence,  $F(1, 39) = 27.65$ ,  $p < .001$ ,  $\eta^2 = .42$ , a significant two-way interaction of reevaluation and original source valence,  $F(1, 39) = 17.88$ ,  $p < .001$ ,  $\eta^2 = .31$ , a significant two-way interaction of original source valence and source–target relation,  $F(1, 39) = 25.16$ ,  $p < .01$ ,  $\eta^2 = .39$ , a significant two-way interaction between source–target relation and reevaluation  $F(1, 39) = 4.72$ ,  $p < .03$ ,  $\eta^2 = .11$ , and most importantly a highly significant three-way interaction between original source valence, reevaluation, and source–target relation,  $F(1, 39) = 38.14$ ,  $p < .001$ ,  $\eta^2 = .49$  (see Fig. 2). To specify this interaction in terms of the present predictions, we conducted separate 2 (original source valence)  $\times$  2 (source–target relation) ANOVAs for each of the two reevaluation conditions.

Under control conditions, analyses revealed the expected two-way interaction,  $F(1, 39) = 40.29$ ,  $p < .001$ ,  $\eta^2 = .51$ , which indicated a pattern consistent with the notion of cognitive balance (see Fig. 2, left panel). Specifically, participants showed more favorable attitudes toward targets who were liked by positive sources as compared to targets who were disliked by positive sources ( $M_s = 6.47$  vs.  $-36.03$ , respectively),  $t(39) = 3.87$ ,  $p < .001$ ,  $d = .93$ . Conversely, attitudes were less favorable toward targets who were liked by negative sources as compared to targets who were disliked by negative sources ( $M_s = -42.45$  vs.  $23.82$ , respectively),  $t(39) = 5.93$ ,  $p < .001$ ,  $d = 1.35$ . Further, participants showed more favorable attitudes toward targets who were liked by positive sources as compared to targets who were liked by negative sources ( $M_s = 6.47$  vs.  $-42.45$ , respectively),  $t(39) = -4.27$ ,  $p < .001$ ,

$d = 1.08$ . In contrast, attitudes were less favorable toward targets who were disliked by positive sources as compared to targets who were disliked by negative sources ( $M_s = -36.03$  vs.  $23.82$ , respectively),  $t(39) = -5.38$ ,  $p < .001$ ,  $d = 1.21$ . These results are consistent with the assumption that initial attitudes toward the sources created target attitudes that are in line with balance principles.

Central for the present question is whether the direction of this interaction pattern reverses after reevaluation of the sources, as implied by cognitive balance (see Fig. 1, upper panel), or whether the targets simply acquire the new valence of their pre-associated sources, as implied by the notion of associative transfer (see Fig. 1, lower panel). The first scenario would imply a significant two-way interaction in direct opposition to the one obtained under control conditions. By contrast, the second scenario would predict a simple main effect of original source valence, such that targets paired with formerly positive (now negative) sources are evaluated negatively and targets paired with formerly negative (now positive) sources are evaluated positively. The present findings clearly support the second but contradict the first scenario. Specifically, a 2 (original source valence)  $\times$  2 (source–target relation) ANOVA revealed only a significant main effect of source valence,  $F(1, 39) = 37.26$ ,  $p < .001$ ,  $\eta^2 = .49$ . Targets pre-associated with formerly positive (now negative) sources were evaluated more negatively than targets pre-associated with formerly positive (now negative) sources ( $M_s = -35.28$  vs.  $19.93$ , respectively) (see Fig. 2, right panel). The two-way interaction between original source valence and source–target relation was far from statistical significance ( $F < 1$ ).

#### Discussion

The main goal of the present research was to investigate the impact of cognitive balance vs. associative transfer of valence on the structure of social attitudes after attitude change. Specifically, do interpersonal attitudes still form a balanced triad after the attitude toward one member of the triad has changed, or can associative transfer of valence disrupt the emergence of balanced attitudes after attitude change? Expanding on the notion of associative transfer in the EC literature (e.g., Walther, 2002; Walther et al., 2009), the present results indicate that the emergence of balanced attitudes can indeed be disrupted by associative valence transfer. In the current study, participants did not follow the principles of

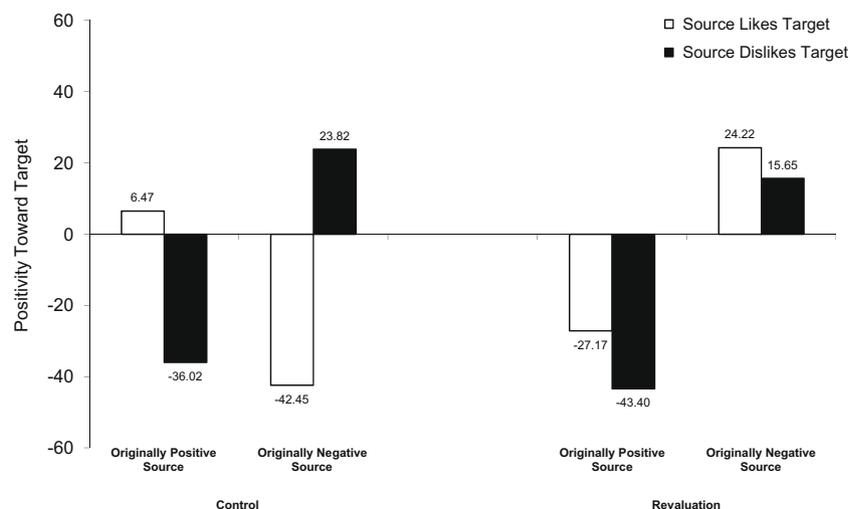


Fig. 2. Target evaluations as a function of original source valence (positive vs. negative), reevaluation of source (control vs. reevaluation), and source–target relation (source likes target vs. source dislikes target). Higher values indicate more positive evaluations.

cognitive balance when evaluating target individuals that were liked or disliked by a given source after their original attitude toward the source had changed. Instead, target evaluations directly corresponded to the new evaluations of pre-associated sources irrespective of the relation between source and target, suggesting that source evaluations had associatively transferred to the pre-associated targets.

The present results expand on earlier findings by Gawronski et al. (2005) who investigated the role of cognitive balance during encoding vs. the formation of evaluative judgments. Using a paradigm similar to the one employed in the present study, Gawronski et al. (2005) varied the order of information about source valence and source–target relations. In line with earlier research suggesting a stronger impact of cognitive balance during the encoding of information about interpersonal relations (e.g., Hummert, Crockett, & Kemper, 1990; Picek, Sherman, & Shiffrin, 1975), cognitive balance influenced target evaluations only when participants already held a positive or negative attitude toward the source when they learned about the source's relation to the target. If, however, participants formed a positive or negative attitude toward the source after they learned about the source's relation to the target, target evaluations were unaffected by cognitive balance.

The present study expands on these findings by combining the two order conditions in a single study to investigate the roles of cognitive balance and associative transfer in the context of attitude change. Specifically, our results indicate that subsequent changes in attitudes toward a given source do not reverse an originally established pattern of balanced attitudes. Instead, associative transfers of source evaluations disrupt the emergence of balanced attitudes, such that attitudes toward a source merely transfer to pre-associated targets. In line with Gawronski et al.'s (2005) claim, we argue that balance principles may affect attitudes primarily during the encoding of information about the relation between two individuals. Thus, if balanced triads have to be construed retroactively by means of reassessing the balance-relevant implications of the available information, the balance principle reaches its limits.

#### *Open questions and avenues for future research*

Drawing on the employed revaluation manipulation, we interpreted our findings as reflecting a disrupting effect of associative valence transfer after attitude change. However, one may object that no attitudes were assessed before participants received “counterattitudinal” information about the sources. Thus, it seems possible that no attitudes had been formed until the final stage of the experiment when all of the information was available and attitudes were measured. Following this line of reasoning, one may doubt if there was any attitude change in the first place. There are two arguments against this objection. The first one refers to Gawronski et al.'s (2005) results where attitudes were assessed at a stage that is functionally equivalent to the pre-revaluation stage in our study. This study produced the same balanced triads that were obtained in our control condition, supporting our interpretation in terms of attitude change. Second, if participants did not form any attitudes before attitudes were eventually measured, the situation in the revaluation condition would not be any more complex than in the control condition, and target attitudes should be formed according to the same principle. Hence, target attitudes in the revaluation condition should reflect a two-way interaction pattern just as in the control condition, albeit in the opposite direction. That is, targets should be evaluated more favorably when they are liked by a source whose overall valence at the end of the study is positive rather than negative. Conversely, targets should be evaluated less favorably when they are disliked by a source whose overall valence is positive rather than negative. However, this

was not the case and our manipulation checks clearly confirm the effectiveness of our revaluation manipulation. Thus, in light of these considerations, the present findings suggest that: (a) initially formed target attitudes followed the principles of cognitive balance and (b) associative transfer of valence disrupted the emergence of balanced triads after attitude change.

An open question is *why* balance principles were not applied after attitude change. After all, it does seem possible that, under certain conditions, people may reassess the balance-relevant implications of all available information before they make an evaluative judgment. For example, assuming that such reassessment requires considerable cognitive effort, one could argue that balanced triads might nevertheless emerge after attitude change if participants have both the motivation and the cognitive capacity to engage in effortful processing. This argument points to the interesting possibility of dissociations between associative representations and evaluative judgments, as they have been discussed in the literature on implicit and explicit measures (Fazio & Olson, 2003). For instance, in their Associative-Propositional Evaluation (APE) Model, Gawronski and Bodenhausen (2006) argued that implicit measures provide a proxy for the activation of associations in memory, whereas explicit measures reflect the outcome of propositional processes that assess the validity of activated information for explicit judgments. To the degree that the activated information is regarded as valid, explicit and implicit measures should lead to the same outcome. If, however, the activated information is rejected through propositional reasoning, explicit and implicit measures may lead to diverging outcomes (for a review, see Hofmann, Gschwendner, Nosek, & Schmitt, 2005). In line with Gawronski and Bodenhausen's (2006) claim that the default case in propositional reasoning is the acceptance of activated information, one could argue that associative transfer of valence influences the associative representation of the target after attitude change, and that the resulting associations are typically used as a basis for evaluative judgments. However, to the degree that people engage in a more elaborate validity assessment of the available information, balance-related inferences may suggest an alternative evaluation of the target. Given that such retroactive invalidations tend to leave associative evaluations unaffected (e.g., Gawronski & LeBel, 2008; Gregg, Seibt, & Banaji, 2006; Ranganath & Nosek, 2008), the likely result is a dissociation between explicit and implicit measures, such that explicit measures may show the proposed influence of cognitive balance on evaluative judgments, whereas implicit measures still reflect an associative transfer of valence (for similar considerations, see Gawronski, Strack, & Bodenhausen, 2009). Future research comparing the impact of cognitive balance and associative valence transfer on explicit and implicit measures under conditions of high vs. low elaboration may help to further clarify the dynamics of social attitudes after attitude change.

Another limitation might pertain to the experimental design employed in the present study. One could object that our design provided an unfair disadvantage for the balance hypothesis, because participants were presented with sterile, uncontextualized behavioral descriptions (“A likes B”), which might promote shallow, associative processing of the available information. In response to this criticism, it is important to note that balance effects have actually been obtained in our control condition as well as in previous studies by Gawronski et al. (2005) using a similar design. Thus, there seems to be nothing inherent in our material that *generally* undermines the emergence of cognitive balance. Nevertheless, we have to acknowledge that the present effects were observed under minimal processing conditions. Thus, it seems possible that these effects are moderated by processing-related variables, such as the degree of ego-involvement or the intensity of the information about source–target relations. In fact, such evidence would pose a challenge to our theoretical argument that

cognitive balance failed to occur, because balance influences information processing during encoding rather than the retroactive construal of evaluative judgments (Gawronski et al., 2005). Future studies should be specifically designed to address the question of possible moderating influences.

Another question concerns the potential influence of prior knowledge about the target on associative valence transfer. In the present study, the only knowledge participants had about the target was whether the source liked or disliked the target. Thus, it seems possible that the impact of associative valence transfer might be limited to conditions under which individuals have no (or limited) knowledge about the target. Even though we cannot rule out that prior knowledge may elicit additional processes that disrupt an associative transfer of valence, the more likely outcome is that the associative representation of the target will integrate multiple pieces of information, the associative link to the source being one of them. As such, prior knowledge about the target may not necessarily disrupt the associative transfer of valence. Still, additional knowledge may dilute its effect on evaluative responses, given that increasing amounts of evaluative information tend to reduce the relative weight that is given to a single piece of information. However, as this is true for any kind of evaluative information, we do not think that this objection qualifies the significance of the current findings for understanding the dynamics of interpersonal attitudes after attitude change. Moreover, given that the age of modern technologies to meet new people (e.g., on-line chats, facebook) is characterized by interpersonal relations that are often based on minimal information, associative transfer of valence may play a significant role in shaping real-life attitudes, even if the impact of associative valence transfer is diluted in contexts where more information is available.

Expanding on the notion of associative and propositional processes, the present results also have important theoretical implications. Specifically, our findings corroborate earlier claims that spreading activation and cognitive consistency should be treated as conceptually distinct principles of information processing. In line with this contention, Gawronski et al. (2009) argued that spreading activation may often lead to outcomes that are in line with the principles of cognitive consistency (e.g., Greenwald et al., 2002), even though the two are guided by different operating principles (see Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004). However, as the application of consistency principles can promote a rejection of momentarily activated information under certain conditions (e.g., Gawronski, Peters, Brochu, & Strack, 2008; Gawronski & Strack, 2004), spreading activation and cognitive consistency principles may sometimes lead to different outcomes. This notion is also reflected in the present results, in which simple processes of spreading activation (i.e., associative transfer of valence) disrupted the emergence of balanced attitudes. Future research comparing the impact of spreading activation and principles of cognitive consistency may help to further clarify commonalities and differences between the two principles.

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## References

- Aronson, E., & Cope, V. (1968). My enemy's enemy is my friend. *Journal of Personality and Social Psychology*, 8, 8–12.
- Baeyens, F., Eelen, P., Van den Bergh, O., & Crombez, G. (1992). The content of learning in human evaluative conditioning: Acquired valence is sensitive to US reevaluation. *Learning and Motivation*, 23, 200–224.
- De Houwer, J. (2007). A conceptual and theoretical analysis of evaluative conditioning. *The Spanish Journal of Psychology*, 10, 230–241.
- De Houwer, J., Thomas, S., & Baeyens, F. (2001). Associative learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin*, 127, 853–869.
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology*, 54, 297–327.
- Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, 132, 692–731.
- Gawronski, B., & LeBel, E. P. (2008). Understanding patterns of attitude change: When implicit measures show change, but explicit measures do not. *Journal of Experimental Social Psychology*, 44, 1355–1361.
- Gawronski, B., Peters, K. R., Brochu, P. M., & Strack, F. (2008). Understanding the relations between different forms of racial prejudice: A cognitive consistency perspective. *Personality and Social Psychology Bulletin*, 34, 648–665.
- Gawronski, B., & Strack, F. (2004). On the propositional nature of cognitive consistency: Dissonance changes explicit, but not implicit attitudes. *Journal of Experimental Social Psychology*, 40, 535–542.
- Gawronski, B., Strack, F., & Bodenhausen, G. V. (2009). Attitudes and cognitive consistency: The role of associative and propositional processes. In R. E. Petty, R. H. Fazio, & P. Briñol (Eds.), *Attitudes: Insights from the new implicit measures* (pp. 85–117). New York: Psychology Press.
- Gawronski, B., Walther, E., & Blank, H. (2005). Cognitive consistency and the formation of interpersonal attitudes: Cognitive balance affects the encoding of social information. *Journal of Experimental Social Psychology*, 41, 618–626.
- Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellott, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review*, 109, 3–25.
- Gregg, A. P., Seibt, B., & Banaji, M. R. (2006). Easier done than undone: Asymmetry in the malleability of implicit preferences. *Journal of Personality and Social Psychology*, 90, 1–20.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Hofmann, W., Gschwendner, T., Nosek, B. A., & Schmitt, M. (2005). What moderates explicit–implicit consistency? *European Review of Social Psychology*, 16, 335–390.
- Hummert, M. L., Crockett, W. H., & Kemper, S. (1990). Processing mechanisms underlying use of the balance schema. *Journal of Personality and Social Psychology*, 58, 5–21.
- Picek, J. S., Sherman, S. J., & Shiffrin, R. M. (1975). Cognitive organization and coding of social structures. *Journal of Personality and Social Psychology*, 31, 758–768.
- Ranganath, K. A., & Nosek, B. A. (2008). Implicit attitude generalization occurs immediately, explicit attitude generalization takes time. *Psychological Science*, 19, 249–254.
- Rescorla, R. A. (1974). Effect of inflation of the unconditioned stimulus value following conditioning. *Journal of Comparative and Physiological Psychology*, 86, 101–106.
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8, 220–247.
- Walther, E. (2002). Guilty by mere association: Evaluative conditioning and the spreading attitude effect. *Journal of Personality and Social Psychology*, 82, 919–934.
- Walther, E., Gawronski, B., Blank, H., & Langer, T. (2009). Changing likes and dislikes through the back door: The US-revaluation effect. *Cognition and Emotion*, 23, 889–917.
- Walther, E., & Langer, T. (2008). Attitude formation and change through association: An evaluative conditioning account. In R. Prislin & W. B. Crano (Eds.), *Attitudes and attitude change* (pp. 87–109). New York: Psychology Press.
- Walther, E., Nagengast, B., & Trasselli, C. (2005). Evaluative conditioning in social psychology: Facts and speculations. *Cognition and Emotion*, 19, 175–196.