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Cognitive consistency and the formation of interpersonal attitudes: Cognitive balance affects the encoding of social information

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Abstract

Three studies investigated the role of cognitive balance in the formation of interpersonal attitudes. Experiment 1 found evidence for balanced triads when participants first formed an attitude about one person, and then learned about this person's sentiments about another individual. Interestingly, balanced triads were obtained for both explicitly and implicitly assessed attitudes. Experiment 2 indicated that the pattern of interpersonal relations does not result in balanced triads, when participants first learn about the relationship between two neutral individuals, and then receive evaluative information about one of the two individuals. In this case, observed sentiments and evaluative information affected attitudes in an additive rather than interactive manner. Experiment 3 replicated these findings by manipulating valence, observed sentiments, and order of information acquisition in a single study. Taken together, these results suggest that cognitive balance influences the encoding of social information, rather than the retroactive construal of evaluative judgments.

Introduction

If one were to analyze the structure of people's interpersonal relations, one would presumably find a very coherent pattern. This assumption is the major notion of Heider's (1958) theory of cognitive balance. Specifically, Heider argued that people tend to achieve patterns of interpersonal relations that can be described as balanced triads. People usually like individuals who are liked by their friends, but they dislike individuals who are disliked by their friends. Conversely, people tend to dislike individuals who are liked by people they personally dislike, but they like individuals who are disliked by people they personally dislike. According to Heider, a triad of interpersonal relations is balanced when it has either no or an even number of disliking relations, but it is imbalanced when it has an odd number of disliking relations.

The aim of the present research was to investigate the role of cognitive balance in the formation of interpersonal attitudes. Previous research has shown that when people have an attitude toward one person and learn about this person's sentiment about a yet unfamiliar individual, people usually form an attitude toward the unfamiliar individual such that the resulting triad is balanced rather than imbalanced (e.g., Aronson & Cope, 1968). Drawing on these findings, the main goal of the present research was to investigate the underlying processes of how cognitive balance affects the formation of interpersonal attitudes. Specifically, we were interested in whether cognitive balance affects the formation of interpersonal attitudes at the encoding of social information, or whether cognitive balance is a guiding principle for judgment-related processes such as the retroactive construal of evaluative judgments.

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Attitudes as discounting cues

Useful insights for this question can be drawn from research on the sleeper effect in persuasion. The sleeper effect describes the delayed increase of the impact of a persuasive message that is accompanied with a discounting cue, such as a non-credible source (for a meta-analysis, see Kumkale & Albarracín, 2004). For example, an article on the harmless consequences of smoking may be condemned as untrustworthy when it is published by a tobacco company. After a short delay, however, this article may nevertheless lead to more positive attitudes toward smoking even though its source was considered as non-credible.

An important boundary condition of the sleeper effect seems to be the order of message and source information (Kumkale & Albarracín, 2004). Research by Pratkanis, Greenwald, Leippe, and Baumgardner (1988), for example, has shown that the sleeper effect occurs only when recipients receive the discounting cue after the message. However, the sleeper effect usually disappears when the discounting cue is available before the message. This finding indicates that discounting cues influence the encoding of a persuasive message. If the discounting cue is available before the message, the source and the content of the message are encoded and stored together, thus preventing the emergence of a sleeper effect. If, however, the discounting cue is provided after the message, source and message are encoded and stored independently from one another, thus leading to a dissociation of the two.

Applied to the present question of cognitive balance effects in attitude formation, one could argue that a priori attitudes toward a given individual function like a discounting cue in the encoding of this individual's sentiments about another target. Specifically, perceivers may spontaneously interpret a positive (negative) sentiment exhibited by a positively evaluated source individual as positive (negative) information about the target, whereas a positive (negative) sentiment exhibited by a negatively evaluated source individual may be interpreted as negative (positive) information about the target. That is, the evaluative implication of source valence and observed sentiment would be calculated at encoding in accordance with the cognitive balance principle. For instance, a negative attitude toward the source individual combined with a negative sentiment exhibited by the source would result in a positive attitude toward the target, and thus in a balanced three-person triad.

Importantly, however, such encoding-based balance effects are possible only when perceivers have an a priori positive or negative attitude toward the source at the time they learn about his or her sentiments. If perceivers have a neutral (or no) attitude toward the source at the time they learn about his or her sentiments, encoding of these sentiments cannot differ as function of a priori attitudes. Hence, the source individual's sentiments may be interpreted as positive information about the target when the source likes the target, but as negative information when the source dislikes the target. Most importantly, if cognitive balance primarily affects the encoding of social information (e.g., Hummert, Crockett, & Kemper, 1990; Picek, Sherman, & Shiffrin, 1975), subsequently formed attitudes toward the source might be insufficient to affect the original interpretation of previously observed sentiments, and thus to qualify the already stored evaluation of the target (Srull & Wyer, 1980; Trope & Alfieri, 1997). In other words, newly formed attitudes toward an unfamiliar target may be determined by the *interaction* of a priori attitudes toward the source and his or her sentiments about the target when perceivers first form an attitude about the source and then learn about his or her sentiments about the target. However, newly formed attitudes may be affected by a simple *main effect* of observed sentiments, when perceivers first learn about the source individuals' sentiment about the target and form a positive or negative attitude toward the source individual afterwards.

Associative vs. propositional processes

A second goal of the present research was to investigate the influence of cognitive balance on explicitly and implicitly assessed attitudes (Fazio & Olson, 2003). Drawing on the distinction between associative and rule-based processes (Gawronski & Strack, 2004; Sloman, 1996; Smith & DeCoster, 2000; Strack & Deutsch, 2004), one could argue that implicit measures tap low-level activation processes in associative memory, whereas explicit measures assess higher-order inferential processes of symbolic or propositional reasoning. This distinction is also relevant for the present question. If cognitive balance influences attitudes at the encoding of social information, the available information should be stored in a manner that is already consistent with a balanced triad. In this case, a priori source attitudes, observed sentiments, and attitudes towards the targets should result in a balanced triad for both explicitly assessed propositional evaluations and implicitly assessed associative evaluations. If, however, cognitive balance is a guiding principle for the retroactive construal of evaluative judgments, the relevant information may be stored independently in associative memory, and thus in a manner that does not reflect a balanced triad. In this case, balanced triads may emerge only for explicitly assessed propositional evaluations, but not for implicitly assessed associative evaluations.

Experiment 1

The main goal of Experiment 1 was to test the influence of cognitive balance on the formation of interpersonal

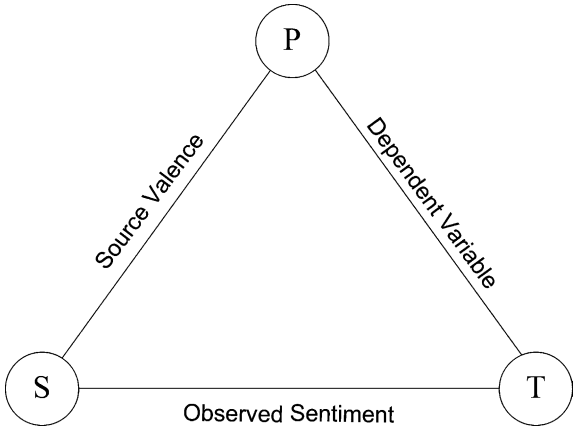

Fig. 1. Schematic representation of triads such as implied by the present experiments. P denotes the perspective of the participants, S denotes "source individuals" for which participants receive positive and negative information (source valence), and T denotes "target individuals" for which participants learn whether they are liked or disliked by a given source individual S (observed sentiment). Participants' attitudes toward target individuals T served as dependent variable.

attitudes. For this purpose, participants first formed positive or negative attitudes toward several "source individuals" and then learned about these individuals' sentiments regarding several "target individuals." Afterwards, participants' attitudes toward "target individuals" were assessed (see Fig. 1). If cognitive balance affects the encoding of social information, source valence and observed sentiments can be expected to have an interactive effect on participants' attitudes toward target individuals, and this interactive effect should emerge for both explicitly and implicitly assessed attitudes. If, however, cognitive balance affects the retroactive construal of evaluative judgments, balanced triads may emerge only for explicitly, but not for implicitly assessed attitudes.

Method

Participants and design

Sixty-two students (47 female) drawn from a volunteer pool participated in a study on impression formation. Participants were paid 6 € (approximately 6 US-$ at that time). Due to a computer error, data from one paNSrticipant were only partially recorded and were thus excluded from analyses. The experiment consisted of a 2 (source valence: positive vs. negative) × 2 (observed sentiment: likes vs. dislikes) × 2 (order of attitude assessment: explicit first vs. implicit first) factorial design, with the first two variables as within-subjects factors, and the last as a between-subjects factor.

Stimulus material

The stimulus material consisted of pictures of source and target individuals, which were presented with verbal information about these individuals. The pictures were selected by pretests, including a total of 30 black-and-white portrait photographs from Walther (2002). Forty-four psychology students (35 female) rated the individuals on the photographs for likeability on scales ranging from 1 (very low) to 9 (very high). The three pictures with the highest scores were selected for positive source individuals; the three pictures with the lowest scores were selected for negative source individuals. Additionally, four sets of three neutral target individuals were selected by their fulfillment of the following criteria: mean rating between 4.5 and 5.5; median rating between 4.5 and 5.5; and at least 75% of the ratings being within the range of 4 and 6.

Procedure

Instructions on a computer screen asked participants to imagine that they have just started a new job in a company, and hence are interested in getting acquainted with their new colleagues. Participants were then presented pictures of six male (source) individuals and a number of positive or negative statements about these individuals (e.g., likes to help new colleagues to incorporate; often insults the secretary). Participants' task was to form an impression of these individuals. Picture-statement pairs were randomly presented one-by-one for 7000 ms with an inter-trial interval of 1000 ms. Three statements were presented for each individual, with statements being either consistently positive or consistently negative. After this task, participants were asked to imagine that they were now acquainted with some of their new colleagues, but that they were still unfamiliar with others. However, within their first weeks they have learned a lot about sentiments between their colleagues. Participants were then presented pairs of already familiar source individuals and yet unfamiliar neutral targets. Familiar source individuals of positive or negative valence were presented on the left side of the screen. Unfamiliar target individuals were presented on the right side of the screen. Additionally, one of the two sentiments "likes" or "dislikes" was presented in the center of the screen, indicating the sentiment of the source individual on the left about the target individual on the right, as implied by reading direction. Pairs of individuals were randomly presented for 4000 ms with an inter-trial interval of 2000 ms. Participants' task was to form impressions of the individuals presented on the screen. The four picture sets for target individuals were counterbalanced across the four experimental conditions implied by source valence (positive vs. negative) and sentiment (likes vs. dislikes). Each of the three target individuals within a given set was paired with each of the three (positive or negative) source individuals, thus resulting in a total of nine pairings in each of the four conditions. The resulting 36 pairings were each presented three times, implying a total of 108 presentations. After this task, participants were administered an explicit and an implicit measure designed to assess

attitudes toward each of the presented source and target individuals.

Measures

The explicit attitude measure consisted of likeability ratings for each of the presented individuals, using scales ranging from 1 (very low) to 9 (very high). The implicit attitude measure consisted of an affective priming task (Fazio, Jackson, Dunton, & Williams, 1995). Participants were presented picture primes showing a source or target individual for 200 ms. Prime pictures were immediately followed by either a positive or negative word that had to be categorized as positive or negative as quickly as possible. Picture primes were identical to the ones used in the impression formation task; positive and negative words were adapted from Klauer and Musch (1999). The 18 pictures of the impression formation task were randomly presented five times each with a positive and a negative word, thus resulting in a total of 180 trials.

Results

Preliminary analyses

Explicitly assessed attitudes toward target individuals were merged as a function of the four experimental conditions implied by source valence (positive vs. negative) and observed sentiment (likes vs. dislikes). Attitude indices were revealed by calculating mean values. Attitude indices for positive and negative source individuals were aggregated accordingly. Indices for implicitly assessed attitudes were calculated by first eliminating error trials (3.7%), truncating response latencies higher than 800 ms, [1] and then subtracting the mean latency for positive words from the mean latency for negative words for each of the six picture prime categories (i.e., positive, negative, liked by positive, disliked by positive, liked by negative, and disliked by negative). Thus, higher scores indicate more positive attitudes. [2] Because order of attitude assessment did not reveal any reliable main or interaction effect, this variable was dropped from all of the following analyses.

Manipulation checks

Submitted to a one-way ANOVA, explicitly assessed attitudes toward source individuals revealed a highly significant effect of source valence, $F(1,60) = 717.48$, $p < .001$, $\eta^2 = .92$. Consistent with the intended manipulation, attitudes were more positive for positive source individuals than for negative source individuals (Ms = 7.51 vs. 1.84, respectively). Corroborating the effectiveness of the valence manipulation, the same effect emerged for implicitly assessed attitudes, $F(1,60) = 16.93$, $p < .001$, $\eta^2 = .22$ (Ms = 12.44 vs. −13.83, respectively).

Attitude formation

Submitted to a 2 (source valence) × 2 (observed sentiment) ANOVA, explicitly assessed attitudes toward target individuals showed a significant main effect of valence, indicating that likeability was higher for target individuals when they were presented with positive source individuals than when they were presented with negative source individuals, $F(1,60) = 20.36$, $p < .001$, $\eta^2 = .25$. Moreover, a significant main effect of observed sentiment indicated that likeability was higher for target individuals when they were liked than when they were disliked, $F(1,60) = 9.68$, $p = .003$, $\eta^2 = .14$. Most importantly, these main effects were qualified by a highly significant two-way interaction, $F(1,60) = 91.31$, $p < .001$, $\eta^2 = .60$ (see Fig. 2). Consistent with the present predictions, attitudes toward targets were more positive when they were liked than when they were disliked by positive source individuals. In contrast, attitudes toward targets were less positive when they were liked than when they were disliked by negative source individuals.

The same ANOVA on implicitly assessed attitudes revealed a highly significant two-way interaction, $F(1,60) = 13.12$, $p < .001$, $\eta^2 = .18$ (see Fig. 3). Replicating the pattern obtained for explicitly assessed attitudes, attitudes toward targets were more positive when they

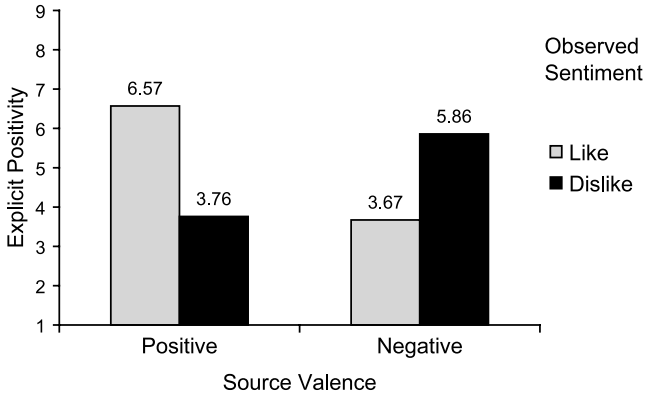

Fig. 2. Mean values of explicitly assessed attitudes toward target individuals as a function of the valence of source individuals (positive vs. negative) and observed sentiment about target individuals (like vs. dislike), Experiment 1.

[1] Following recommendations by Ratcliff (1993), all of the present analyses were conducted twice: once using a cutoff criterion of 800 ms without any additional transformation of the data, and once using an inverse-transformation without implementing an additional cutoff criterion. Analyses with both data sets revealed corresponding significant effects. Hence, all of the results reported for Experiment 1 are independent of a particular procedure of outlier treatment.

[2] Note that our indices of implicit positivity reflect the difference between positive and negative target words given a particular prime type. Hence, these scores should not be interpreted in an absolute manner (e.g., a value of zero reflecting a neutral attitude), because response latencies for positive target words may generally differ from response latencies for negative target words.

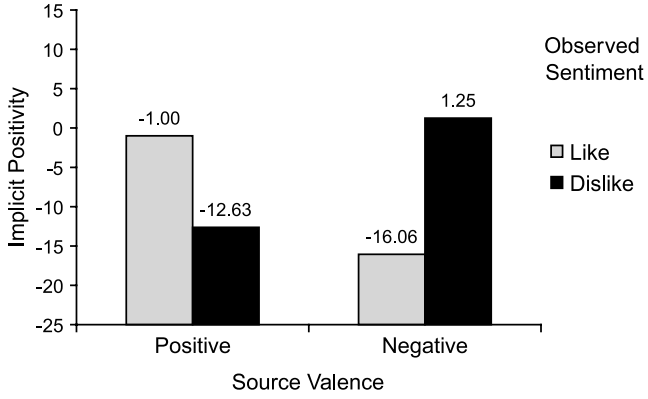

Fig. 3. Mean values of implicitly assessed attitudes toward target individuals as a function of the valence of source individuals (positive vs. negative) and observed sentiment about target individuals (like vs. dislike), Experiment 1.

were liked than when they were disliked by positive source individuals. In contrast, attitudes toward targets were less positive when they were liked than when they were disliked by negative source individuals.

Discussion

Results from Experiment 1 confirm the assumption that cognitive balance plays an important role for the formation of interpersonal attitudes. Consistent with the basic notion of balance theory (Heider, 1958), source valence and observed sentiments had an interactive effect on newly formed attitudes toward target individuals. Interestingly, this interactive effect emerged not only for explicitly, but also for implicitly assessed attitudes. This finding provides first evidence for the assumption that cognitive balance affects the encoding of social information, rather than the retroactive construal of evaluative judgments.

Experiment 2

The main goal of Experiment 2 was to further investigate the influence of cognitive balance on the encoding of social information. Specifically, we tested whether source valence and observed sentiments result in a balanced triad even when perceivers learn about the valence of the source *after* they learn about the source individual's sentiments. If cognitive balance influences the retroactive construal of evaluative judgments, attitudes toward targets should still be determined by the *interaction* of source valence and observed sentiments. If, however, source valence influences the encoding of observed sentiment relations, the present order should lead to a simple *main effect* of observed sentiments, such that participants show more positive attitudes toward targets who were liked as compared to targets who were disliked regardless of the valence of the liking or disliking source.

Method

Participants and design

Sixty-two students (41 female) drawn from a volunteer pool took part in a study on impression formation. Subjects were paid 6 € (approximately 6 US-$ at that time). The study consisted of a 2 (source valence) × 2 (observed sentiment) × 2 (order of attitude assessment) factorial design, with the first two variables being within-subjects factors, and the last being a between-subjects factor.

Procedure

The procedure of Experiment 2 was largely identical to Experiment 1, the only exception being that the information about the source individuals' sentiments was now presented before rather than after the information about source valence. Moreover, to prevent an influence of a priori attitudes on the encoding of observed sentiments, pictures of a priori positive and negative source individuals were replaced by two sets of three a priori neutral individuals. The new picture sets for neutral source individuals were counterbalanced across the two source valence conditions. Data aggregation was conducted according to the procedures described for Experiment 1. [3]

Results

Manipulation checks

Submitted to a one-way ANOVA, explicit likeability ratings for source individuals revealed a highly significant effect of source valence, $F(1,61) = 564.88$, $p < .001$, $\eta^2 = .90$, indicating that source individuals presented with positive statements were rated more positively than source individuals presented with negative statements (Ms = 7.58 vs. 1.94, respectively). Corroborating the effectiveness of this manipulation, the same effect was obtained for implicitly assessed attitudes, $F(1,61) = 10.05$, $p = .002$, $\eta^2 = .14$ (Ms = 1.62 vs. −18.94, respectively).

Attitude formation

Submitted to a 2 (source valence) × 2 (observed sentiment) ANOVA, explicit attitude ratings revealed a highly significant main effect of observed sentiment, indicating that attitudes toward target individuals were more positive when these individuals were liked than when they were disliked, $F(1,61) = 53.32$, $p < .001$,

[3] As with Experiment 1, all of the following analyses were conducted twice: once using a cutoff criterion of 800 ms without any additional transformation of the data, and once using an inverse-transformation without implementing an additional cutoff criterion. Replicating the finding of Experiment 1, analyses with both data sets revealed corresponding significant effects. Hence, all of the results reported for Experiment 2 are independent of a particular procedure of outlier treatment.

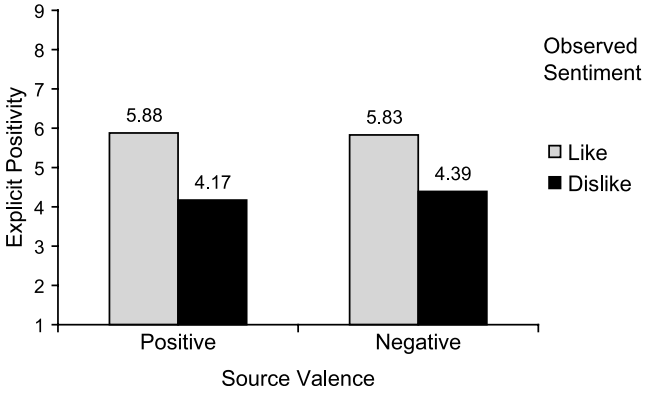

Fig. 4. Mean values of explicitly assessed attitudes toward target individuals as a function of the valence of source individuals (positive vs. negative) and observed sentiment about target individuals (like vs. dislike), Experiment 2.

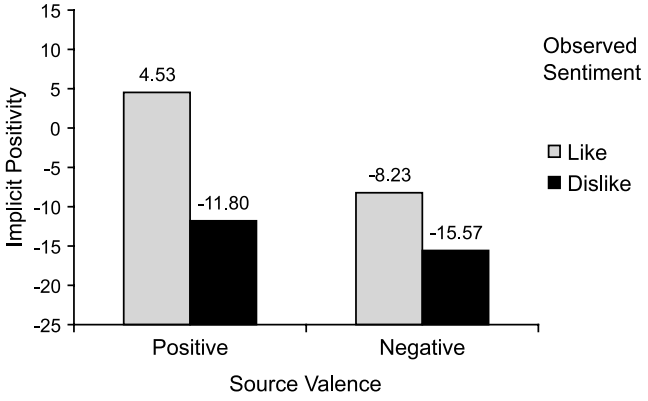

Fig. 5. Mean values of implicitly assessed attitudes toward target individuals as a function of the valence of source individuals (positive vs. negative) and observed sentiment about target individuals (like vs. dislike), Experiment 2.

$\eta^2 = .47$ (see Fig. 4). No other main or interaction effect reached statistical significance.

The same ANOVA on implicitly assessed attitudes also revealed a significant main effect of observed sentiment, $F(1,61) = 8.18$, $p = .006$, $\eta^2 = .12$, indicating that attitudes toward target individuals were more positive when they were liked than when they were disliked (see Fig. 5). Interestingly, there was also a significant main effect of source valence, $F(1,61) = 4.59$, $p = .04$, $\eta^2 = .07$, indicating that attitudes were more favorable when target individuals were previously presented with source individuals who were later described as positive, than when they were previously presented with source individuals who were later described as negative.

Discussion

Results from Experiment 2 provide further support for the assumption that cognitive balance affects the encoding of social information, rather than the retroactive construal of evaluative judgments. Consistent with this assumption, source valence did not qualify the influence of observed sentiments when participants first learned about the source individuals' sentiments and then formed a positive or negative attitude toward the source. As with Experiment 1, this effect emerged for both explicitly and implicitly assessed attitudes.

Interestingly, implicitly assessed attitudes toward targets additionally showed a main effect of source valence, such that attitudes toward targets were more positive when they were previously presented with source individuals who were later learned to be positive, than when they were previously presented with source individuals who were later learned to be negative. This effect is conceptually similar to the *spreading attitude effect* obtained by Walther (2002). Specifically, Walther demonstrated that evaluative conditioning of neutral individuals affects not only evaluations of these individuals, but also evaluations of other people who were implicitly associated with these individuals in a prior task (see also Hebl & Mannix, 2003). Most interestingly, Walther's spreading attitude effect occurred outside of perceivers' awareness and remained robust even when the pre-association between the two individuals was neutralized by an extinction procedure. Applied to the present finding, it seems that the repeated contingency between a source and a target individual resulted in an association between the two, such that the subsequently learned valence of the source associatively "spread" to the target.

Experiment 3

Even though Experiments 1 and 2 were largely identical, one could object that the two studies differed not only with respect to the order of source valence and observed sentiment information, but also with respect to the pictures used for positive and negative source individuals. Whereas in Experiment 1 we selected pictures of a priori positive and negative valence, Experiment 2 used pictures of a priori neutral individuals. Hence, to offer a more stringent test of our interpretation in terms of order effects, Experiment 3 manipulated the presentation order of source valence and observed sentiment information in a single study, generally using neutral pictures for the source individuals.

Method

Participants and design

A total of 103 students (87 female) took part in a study on impression formation. Sixty-six psychology students received credit for experiment participation requirements. Thirty-seven participants were paid 5 € (approximately 5 US-$ at that time). Data from six non-native speakers who indicated that they had problems in understanding the semantic meaning of some words in the affective priming task were excluded from analyses.

The study consisted of a 2 (source valence) × 2 (observed sentiment) × 2 (order of information) × 2 (order of attitude assessment) factorial design, with the first two variables being within-subjects factors, and the other two being between-subjects factors.

Procedure

With some exceptions, the procedure of Experiment 3 was identical to Experiment 2. In contrast to Experiment 2, observed sentiment information was presented either before or after source valence information. Picture sets for source and target individuals were reduced from three to two individuals. Moreover, we selected four (rather than two) sets of neutral pictures for source individuals, thus resulting in a total of eight picture sets of two neutral individuals. Neutral picture sets were distributed equally across the experimental conditions by a Latin square design. Each of the 16 resulting pairings was presented four times, thus revealing a total of 64 presentations. Data aggregation was conducted according to the procedures described for Experiments 1 and 2.

Results

Manipulation checks

Submitted to a 2 (source valence) × 2 (order of information) mixed-model ANOVA, explicitly assessed attitudes toward source individuals revealed a theoretically uninteresting main effect of order, $F(1,95) = 5.57$, $p = .02$, $\eta^2 = .06$, indicating that source individuals were rated more positively when sentiment information was presented first than when valence information was presented first (Ms = 4.81 vs. 4.47, respectively). More importantly, there was a highly significant main effect of valence, $F(1,95) = 285.80$, $p < .001$, $\eta^2 = .75$, indicating that source individuals were rated more positively when they were presented with positive statements than when they were presented with negative statements (Ms = 6.55 vs. 2.73, respectively). Corroborating the effectiveness of valence manipulations, the same ANOVA on implicitly assessed attitudes revealed the same main effect of valence, $F(1,95) = 20.04$, $p < .001$, $\eta^2 = .17$ (Ms = 6.96 vs. −9.75, respectively).

Attitude formation

A 2 (source valence) × 2 (observed sentiment) × 2 (order of information) mixed-model ANOVA on explicitly assessed attitudes toward target individuals revealed a significant main effect of source valence, $F(1, 95) = 8.18$, $p = .005$, $\eta^2 = .08$, a significant main effect of observed sentiment, $F(1,95) = 24.07$, $p < .001$, $\eta^2 = .20$, and a significant two-way interaction of source valence and observed sentiment, $F(1,95) = 19.28$, $p < .001$, $\eta^2 = .17$. Most importantly, these effects were qualified by the expected three-way interaction, $F(1,95) = 17.98$, $p < .001$, $\eta^2 = .16$ (see Table 1). To specify this interaction, separate 2 (source valence) × 2 (observed sentiment) ANOVAs for the two information order conditions were conducted.

Table 1
Mean values of explicitly and implicitly assessed attitudes toward target individuals as a function of valence information about source individuals (positive vs. negative), observed sentiment about target individuals (like vs. dislike), and order of valence and sentiment information (valence first vs. sentiment first), Experiment 3

Observed sentiment	Valence information first		Sentiment information first	
	Positive source	Negative source	Positive source	Negative source
Explicit attitudes				
Like	7.00	5.04	6.06	5.88
Dislike	4.79	5.76	4.94	4.81
Implicit attitudes				
Like	10.74	−11.01	9.63	1.76
Dislike	2.98	7.59	−0.15	−6.36

Note. Higher values indicate more positive attitudes.

For conditions in which participants received valence information first, results replicate the pattern obtained in Experiment 1. Specifically, attitudes toward targets were more positive when they were liked than when they were disliked by positive source individuals. In contrast, attitudes toward targets were less positive when they were liked than when they were disliked by negative source individuals. These effects were reflected by a highly significant two-way interaction between source valence and observed sentiment, $F(1,47) = 20.99$, $p < .001$, $\eta^2 = .31$.

For conditions in which participants received sentiment information first, results replicate the pattern obtained in Experiment 2. That is, attitudes toward targets were more positive when they were liked than when they were disliked. As with Experiment 2, this effect was reflected by highly significant main effect of observed sentiment, $F(1,48) = 17.94$, $p < .001$, $\eta^2 = .27$.

With respect to implicitly assessed attitudes, a 2 (source valence) × 2 (observed sentiment) × 2 (order of information) mixed-model ANOVA revealed a significant two-way interaction between source valence and order, $F(1,95) = 5.36$, $p = .02$, $\eta^2 = .05$, and, more importantly, a significant three-way interaction between source valence, observed sentiment, and order, $F(1,95) = 4.19$, $p = .04$, $\eta^2 = .04$ (see Table 1). To specify this interaction, separate 2 (source valence) × 2 (observed sentiment) ANOVAs for the two information order conditions were conducted.

When participants received valence information first, results replicate the pattern obtained in Experiment 1. Specifically, attitudes toward targets were more positive when they were liked than when they were disliked by positive source individuals. In contrast, attitudes toward targets were less positive when they were liked than when they were disliked by negative source individuals.

As with Experiment 1, these effects were reflected by a significant two-way interaction between source valence and observed sentiment, $F(1,47) = 6.26$, $p = .02$, $\eta^2 = .12$.

When participants received sentiment information first, analyses revealed the pattern of means obtained in Experiment 2. Even though the corresponding main effects were only marginal, attitudes toward targets tended to be more positive when they were liked than when they were disliked, $F(1,48) = 2.47$, $p = .12$, $\eta^2 = .05$, and attitudes tended to be more positive when targets were initially presented with source individuals that were later learned to be positive than when they were initially presented with source individuals that were later learned to be negative, $F(1,48) = 2.73$, $p = .11$, $\eta^2 = .05$.

Discussion

Results from Experiment 3 indicate that the obtained difference between Experiment 1 and 2 is actually due to the particular order of information presentation. In the present study, cognitive balance affected the formation of interpersonal attitudes only when participants first formed an attitude toward a given source individual and then learned about this individuals' sentiments about another target. However, when participants first learned about the source individual's sentiment about the target and then formed a positive or negative attitude toward the source, attitudes were unaffected by cognitive balance. In this case, participants showed more positive attitudes to targets when they were liked than when they were disliked, irrespective of whether the liking or disliking source was positive or negative. Also consistent with the results of Experiments 1 and 2, all of these effects emerged for both explicitly and implicitly assessed attitudes.

General discussion

The main goal of the present research was to investigate the underlying process of how cognitive balance affects the formation of interpersonal attitudes. Consistent with previous research on cognitive balance and social memory (Hummert et al., 1990; Picek et al., 1975), the present findings suggest that cognitive balance influences the encoding of social information rather than the retroactive construal of evaluative judgments. Specifically, it seems that attitudes toward a source individual function like a discounting cue for the encoding of this individual's sentiments about another target. This conclusion is based on two findings: (a) source valence qualified the influence of observed sentiments only when participants first formed an attitude toward the source and then learned about his or her sentiments, but not when participants first learned about the source's sentiments and then formed an attitude toward source, and (b) when participants first formed an attitude toward the source and then learned about his or her sentiments, cognitive balance affected not only explicitly, but also implicitly assessed attitudes.

The obtained influence of cognitive balance on implicitly assessed attitudes may appear to be in contrast with recent findings by Gawronski and Strack (2004), indicating that cognitive dissonance changes only explicitly, but not implicitly assessed attitudes. Specifically, Gawronski and Strack argued that both the causes of dissonance experiences and process of dissonance reduction require a propositional representation of the relevant elements, thus leading to dissonance-related attitude changes only for explicitly assessed propositional evaluations, but not for implicitly assessed associative evaluations. Given that both cognitive dissonance and cognitive balance reflect a desire for cognitive consistency (Zajonc, 1960), one could argue that cognitive balance should also affect only explicitly, but not implicitly assessed attitudes. Even though we cannot rule out that these differences are due to the different kind of implicit measure employed by Gawronski and Strack, [4] we believe that a fundamental difference between the two lines of research is that dissonance-related attitude changes usually imply a *retroactive* discounting of an old attitude, whereas the obtained influence of cognitive balance on implicitly assessed attitudes reflects a *proactive* discounting of observed sentiments (Experiment 1). Most importantly, if the particular order of information acquisition implies a retroactive discounting of observed sentiments (Experiment 2), implicitly assessed attitudes are also unaffected by cognitive balance (for a discussion, see Gawronski, Strack, & Bodenhausen, in press).

An open question is, however, why consistency concerns did not influence explicitly assessed attitudes under conditions of retroactive discounting—as was the case in Gawronski and Strack's (2004) research on cognitive dissonance. A possible explanation may be the independent encoding of source valence and observed sentiments under conditions of retroactive discounting. Specifically, source valence and observed sentiments may be stored independently in memory when source valence is encoded after observed sentiments. In this case, observed sentiments may be discounted only (a) if both kinds of information are retrieved from memory, and (b) if the two kinds of information can be related to one another. If both conditions are met, cognitive balance may indeed show a retroactive influence on explicitly assessed attitudes. Most importantly, such a retroactive influence may lead to the same dissociation Gawronski and Strack (2004) obtained for cognitive dissonance, such that cognitive balance affects only explicitly assessed propositional evaluations, but not implicitly assessed associative evalu-

[4] Whereas the present studies used an affective priming task (Fazio et al., 1995), Gawronski and Strack (2004) employed an Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998).

ations. Future research may help to clarify if (and under which conditions) cognitive balance has a retroactive influence on explicitly assessed attitudes.

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