



# Ambivalence, discomfort, and motivated information processing<sup>☆</sup>

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## Abstract

In two studies we examined the nature and consequence of ambivalent attitudes. In the first study, we assessed whether holding ambivalent attitudes was aversive, and tested whether this aversion was resolved through biased information processing. To do this we manipulated participants' attributions of the discomfort associated with an ambivalent message through a pill manipulation (tense vs. relaxed). Participants who attributed their discomfort to their ambivalence reported more negative emotions and generated more one-sided thoughts than participants who attributed their discomfort to the pill. In the second study, we examined the conditions necessary for ambivalence reduction. Results suggest that people spontaneously engage in biased information processing in order to resolve their ambivalence.

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Ambivalence reflects the co-existence of positive and negative evaluations of an attitude object. Considerable research has documented the properties of ambivalent attitudes, focusing particularly on the *strength* of ambivalent attitudes. Petty and Krosnick (1995) have conceptualized attitude strength using four dimensions. An attitude is said to be strong when it is: (a) resistant to persuasion, (b) predictive of behavior, (c) stable, and (d) affects information processing. Ambivalent attitudes are generally conceptualized as *weak* attitudes, as they are less predictive of behavior (Armitage & Conner, 2000; Conner, Sparks, Povey, James, & Sheperd, 2002), less stable (Armitage & Conner, 2000), and less resistant to persuasion (Armitage & Conner, 2000).

This body of results, however, is not without conflict. Bassili (1996) failed to replicate the finding that ambivalent attitudes are less stable and less resistant to persuasion.

Jonas, Diehl, and Brömer (1997) likewise found ambivalent attitudes to be more predictive of behavioral intention. However, of Krosnick and Petty's (1995) four characteristics of attitude strength, we believe that it is the assertion that strong attitudes impact information processing that most clearly challenges the view that ambivalent attitudes are weak.

Several studies have found ambivalent respondents to use more effort and deliberation in processing information (Brömer, 1998; Jonas et al., 1997; Maio, Bell, & Esses, 1996). Van Harreveld, Van der Pligt, De Vries, Wenneker, and Verhue (2004) found that ambivalent participants tend to select more attributes as being important to their evaluation of the attitude object and take longer to integrate their attributes into their evaluation. These findings tend to be explained in terms of the dual process models, such as heuristic-systematic processing model (Chaiken, Liberman, & Eagly, 1989). Systematic processing involves a comprehensive effort to analyze and understand information, while heuristic processing involves the use of simple decisions rules for judging information. Such rules might include

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agreement with consensus or agreement with expert opinion (Chaiken et al., 1989).

Of particular importance here is the idea that information processed under the heuristic mode tends to be associated with less stable attitudes and less tied to subsequent behavior than information processed under the systematic mode (Chaiken et al., 1989). Systematic processing, on the other hand, is also expected to produce *strong* attitudes. So, while ambivalent attitudes are themselves considered weak, ambivalence is also said to induce a more effortful processing of information that in turn leads to stronger attitudes.

This tension may in part be resolved by gaining a greater understanding of the relationship between ambivalence and information processing. There is general consensus that ambivalence reflects the extent to which there is conflict in an attitude (Hass, Katz, Rizzo, Bailey, & Moore, 1992; Maio et al., 1996). Beginning with dissonance theory, Festinger (1957) research suggests that psychological conflict is an aversive experience that is eliminated by resolving the inconsistency that caused it. Perhaps then the aversion of holding both positive and negative evaluations of an attitude object motivates ambivalent people to seek out and scrutinize any information that might enable them to resolve their conflict.

This idea can be unpacked into two sets of predictions. The first prediction is that holding ambivalent attitudes is an aversive experience. Though widely suggested (Maio et al., 1996; Newby-Clark, McGregor, & Zanna, 2002), this notion has yet to be tested directly. Hass et al. (1992) has found limited empirical support in the context of racial conflict. They found that ambivalent respondents reported more negative feelings than non-ambivalent respondents. This effect, however, occurred only when ambivalent respondents were made aware of their evaluative conflict. In other words, ambivalence alone was not sufficient for invoking negative feelings but occurred only when ambivalence was made salient. One explanation for the interaction between ambivalence and evaluative conflict salience is that ambivalence was measured using a measure of potential ambivalence.<sup>1</sup> This reasoning parallels Aronson and Carlsmith's (1963) finding that awareness of cognitive inconsistency heightens aversion. A measure of felt ambivalence, which taps the direct experience of evaluative conflict, may have yielded more straightforward results.

The second prediction is that ambivalence can be resolved through biased information processing. Festin-

ger (1957) has shown that one way to resolve psychological conflict is through the selective elaboration of favorable information. Therefore, ambivalence might be resolved by focusing on one side of the evaluative conflict. Previous research on ambivalence has neglected this issue. For example, while Jonas et al. (1997) found that ambivalent respondents generated more thoughts in a thought-listing task, they did not measure the valence of the thoughts generated, and could therefore not test for biased information processing.

In two studies, we examine the nature and consequence of holding ambivalent attitudes. In the first study, we directly assess whether ambivalence is indeed aversive, and test whether this aversion can be resolved through biased information processing. In the second study, we examine the conditions necessary for ambivalence reduction.

## Study 1

The goal of this study is to test the notion that ambivalence is indeed aversive. To do this, we manipulated participants' attributions of the discomfort associated with an ambivalent message through a pill manipulation—participants received a sugar pill that they were told would make them feel either tense or relaxed. If ambivalent attitudes are unpleasant, ambivalent participants given the tense pill should report less intense negative emotions toward the message as they attribute their discomfort to the pill, while ambivalent participants given the relaxed pill should report more intense negative emotions toward the attitude object as their discomfort is amplified by their expectation to feel relaxed.

We further examine whether ambivalent people attempt to resolve their ambivalence through biased information processing. To test this prediction, participants were asked to list their thoughts about the ambivalent object they were provided. We predicted that ambivalent participants would generate univalent thoughts that correspond with their initial evaluations, and that this selective elaboration would lead to a reduction in subsequent ambivalence.

## Method

### Participants

Participants were 60 psychology undergraduates from the University of Amsterdam (36 female and 14 male), who participated for course credit. The age of participants ranged from 19 to 24 years ( $M = 21.23$ ).

### Procedure

In the context of a separate study, half of the respondents took a sugar pill they were led to believe caused them to feel tense while the other half took a sugar pill

<sup>1</sup> *Potential* ambivalence assesses positive and negative evaluations of an attitude object using two unipolar scales. This method conceptualizes ambivalence as a structural property of attitudes. *Felt* ambivalence, on the other hand, is measured by asking participants to rate how conflicted they feel about an attitude object, and thus captures the direct experience or feelings of evaluative conflict.

they were led to believe caused them to feel relaxed. Following a filler task, participants read an article designed to induce ambivalence. The 500-word article was about the consequences of genetically modified (GM) food. In an effort to induce ambivalence, 11 positive consequences (e.g., increased food production, reduced pesticide use) and 11 negative consequences (e.g., unknown health risks, causes environmental problems) of GM food were imbedded in the article. The article was designed to look like it came from a Dutch newspaper in order to improve the authenticity of the information. Participants then indicated their attitude, ambivalence, and emotional reactions to GM food, completed a thought-listing task, and reported their subsequent ambivalence.

### Materials

**Attitudes toward GM food.** Global attitudes were measured using the semantic differential scales developed by Crites, Fabrigar, and Petty (1994). The four global pairings *positive/negative*, *good/bad*, *like/dislike*, and *desirable/undesirable* were measured on a nine-point scale.

**Ambivalence toward GM food.** Ambivalence was assessed using a three-item, nine-point scale (Priester & Petty, 1996). This scale was designed to capture the degree to which participants' reactions were conflicted, mixed, and indecisive toward the attitude object. Cronbach's  $\alpha$  was .83.

**Thought-listing.** Thought-listing is a primary tool for measuring the extent of information processing (Greenwald, 1968). Participants received a blank piece of paper and were instructed to write down any thoughts they had about the use of GM food. Thoughts were coded for valence and total number of arguments listed. Two judges scored each thought-listing and disagreements between judges were resolved through discussion.

**Negative feelings.** Participants responded to the question "How much do each of the following words describe your feelings toward genetically modified food?" We selected four negative emotions—tense, fearful, anxious, and angry—from the Positive and Negative Affect Schedule (PANAS) (Tellegen, Watson, & Clark, 1999). Cronbach's  $\alpha$  was .79.

### Results and discussion

The notion that ambivalent attitudes are discomforting, and that this discomfort can be resolved through biased information processing, was evaluated through participants' thought-listing and their reported negative emotions toward genetically modified food. We expected that participants who received the "tense" pill would: (1) report less intense negative emotions and (2) generate

less one-sided thoughts about the GM food as they attribute their discomfort to the pill. On the other hand, participants given the "relaxed" pill would: (1) report more intense negative emotions and (2) generate more one-sided thought-listings about GM food as their discomfort is amplified by their expectation to feel relaxed. An important feature of these predictions is that they only apply to participants who are initially ambivalent. We expect there to be a minimum threshold ambivalence must exceed before it becomes aversive, as has also been suggested in the dissonance literature (Wyer, 1974). Therefore, eight non-ambivalent participants—those with ambivalence ratings lower than two (on a nine-point scale)—were removed from all further analyses.

### Negative feelings toward GM food

We reasoned that if ambivalence is indeed aversive, participants in the tense condition should experience less intense negative emotion toward GM food as they attribute their discomfort to the effects of the pill, while participants given the relaxed pill should report higher levels of negative emotion toward GM food as their discomfort over the attitude object is amplified by their expectation to feel relaxed. As predicted, participants in the relaxed-pill condition ( $M = 3.53$ ) reported greater negative emotions toward GM food than participants in the tense condition ( $M = 2.87$ ),  $F = 4.24$ ,  $p = .04$  (see Fig. 1). This confirms the notion that ambivalence is unpleasant.

### Thoughts about GM Food

We next examined the relationship between initial ambivalence and the sidedness of thoughts participants generated. To calculate sidedness, we adapted the

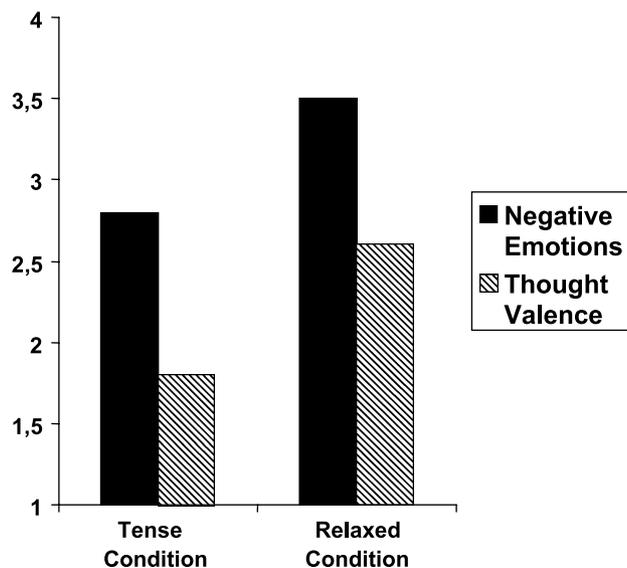


Fig. 1. Reported negativity of emotion (1 = low, 9 = high) and extent of univalent thought-listing by condition.

formula recommended by Thompson, Zanna, and Griffin (1995) whereby sidedness equals the average number of positive and negative thoughts subtracted from the absolute difference between positive and negative thoughts,  $|P - N| - (P + N)/2$ .<sup>2</sup> Higher values indicate more one-sided thoughts. The advantage of this formula is that it takes into account both the proportion of positive and negative thoughts and the number of thoughts generated, such that generating six positive and seven negative thoughts is scored as more two-sided than generating one positive and two negative thoughts.

Initial ambivalence positively correlated with thought-sidedness  $r = .31$ ,  $p = .01$ , which suggests that participants with more felt ambivalence generated more univalent thoughts. We next examined whether participants who attributed their discomfort to their ambivalence—the relaxed-pill condition—resolved their ambivalence through selective elaboration and whether their biased processing corresponds with their initial attitude. As predicted, participants in the relaxed condition produced more one-sided thoughts ( $M = 2.60$ ) than participants in the tense condition ( $M = 1.82$ ),  $F = 7.74$ ,  $p = .007$ .<sup>3</sup>

The thought-listing measure allows for the additional opportunity to examine the correspondence between participants' initial attitude and the valence of the thoughts they generated. We reasoned that the valence of participants' initial attitude should correspond with thought valence. For instance, participants who initially indicated more positive attitudes toward GM food should resolve the inconsistent information they received by focusing on positive thoughts. To test this prediction, we correlated participants' general attitude ratings with the valence of the thoughts they generated, such that for both measures higher scores represented positive valence. Initial attitude toward GM food was positively associated with thought valence  $r = .35$ ,  $p = .004$ . Taken together, the results from the thought-listing task suggest that participants who attributed their discomfort to their ambivalence engaged in more biased information processing and their biased processing corresponded with their initial attitude.

We next examined whether generating more univalent thoughts is indeed effective in resolving subsequent ambivalence. First, collapsing across condition, we predicted that listing more univalent thoughts is associated

with a greater reduction in subsequent ambivalence. To test this prediction, we assessed the correlation between thought-sidedness (using the Thompson formula) and the difference between initial and subsequent ambivalence ratings (higher scores indicate a greater reduction). As predicted, generating univalent thoughts was positively associated with greater reduction in subsequent ambivalence  $r = .29$ ,  $p = .02$ .

Finally, we assessed whether ambivalence reduction differed by condition. A repeated measures analysis of variance testing the influence of condition (tense vs. relaxed) on the difference between ratings of initial and subsequent ambivalence was marginally significant,  $F(1, 51) = 3.57$ ,  $p = .06$ . As expected, in the tense condition, participants' ratings of subsequent ambivalence ( $M = 4.77$ ) did not differ from ratings of initial ambivalence ( $M = 5.00$ ),  $F(1, 51) = 1.86$ ,  $p = ns$ . In the relaxed condition, where participants expressed more negative emotions and engaged in more selective elaboration, participants' ratings of subsequent ambivalence ( $M = 4.26$ ) were significantly lower than ratings of initial ambivalence ( $M = 5.02$ ),  $F(1, 51) = 11.39$ ,  $p = .002$ .

The present findings offer insight into the nature and consequence of holding ambivalent attitudes. This study provides direct support for the notion that the experience of ambivalence is aversive, and people generate one-sided thoughts that correspond with their initial attitude as a means of reducing their ambivalence. In the next study, we seek to replicate these findings and take a closer look at the conditions necessary for ambivalence resolution.

## Study 2

An important feature of the first study was that participants were encouraged, through the thought-listing task, to (re)-evaluate the attitude object. Do people require an explicit opportunity to reduce their ambivalence or does this occur naturally? This is an important question as it gives some indication of the extent of the discomfort associated with the experience of ambivalence. In the second study, we addressed this question by varying the opportunity participants had to reduce their ambivalence.

### Method

#### Participants

Participants were 103 psychology undergraduates from the University of Amsterdam (77 female and 26 male), who participated for course credit. The age of participants ranged from 18 to 25 years ( $M = 21.59$ ).

#### Procedure

The experiment was run on the computer. Participants were presented with a 500-word article about the consequences of genetically modified (GM) food (the

<sup>2</sup> One alternative explanation for this finding is that extreme negative attitudes toward GM food, rather than ambivalence, might be aversive and thus drive the observed effects. However, attitude did not correlate with thought-sidedness  $r = .19$ ,  $p = ns$ , and participants with a clear negative attitude toward GM food (a score of less than 3) did not generate more one-sided thoughts (2.44) than participants with a more positive attitude (2.10),  $F = 1.3$ ,  $p = ns$ .

<sup>3</sup> A constant of two was added to each score so that the most two-sided thought-listing we obtained (two positive and two negative thoughts) received a score of zero.

same article used in Study 1). After reading the article, participants completed a questionnaire that contained three sections. The first section asked participants to rate their attitude and ambivalence toward the issue of genetically modified food. In the second section, participants were randomly assigned to one of three conditions that varied in terms of the opportunity participants had to reduce their ambivalence. In the thought-listing condition (high opportunity), participants were asked to write their thoughts on the issue of genetically modified food. In the cognitive load condition (low opportunity), participants were asked to solve a number of difficult anagrams. In the waiting condition (moderate opportunity), participants were simply asked to wait for the next part of the experiment to begin. Each task lasted for 3 min. In the final section of the questionnaire, participants reported their subsequent ambivalence.

### Measures

*Attitudes toward GM food.* Global attitudes were measured using the semantic differential scales developed by Crites et al. (1994). The four global pairings, *positive/negative*, *good/bad*, *like/dislike*, and *desirable/undesirable*, were measured on a nine-point scale.

*Ambivalence.* Ambivalence toward GM food was assessed using the same three items used in Study 1. Cronbach's  $\alpha$  was .91.

*Thought-listing.* Participants received a blank piece of paper and were instructed to write down any thoughts they had about GM food. Thoughts were coded for valence and total number of arguments was listed. Two judges scored each thought-listing, and disagreements between judges were resolved through discussion.

### Results and discussion

The aim of this experiment was to vary the opportunity participants had to reduce their ambivalence in order to test whether ambivalence resolution requires an explicit opportunity to re-evaluate the attitude object. Our expectation was that participants would reduce their ambivalence without encouragement, but only when they had the cognitive capacity to do so (i.e., not in the cognitive load condition). A repeated measures analysis of variance testing the influence of ambivalence resolution opportunity (thought-listing, waiting, cognitive load) on the difference between ratings of initial and subsequent ambivalence (controlling for differences in initial ambivalence among the three groups) confirmed this prediction,  $F(2, 89) = 3.00, p = .05$ .<sup>4</sup>

<sup>4</sup> Consistent with Study 1, participants with ambivalent ratings lower than 2 (on a nine-point scale) were removed from the analyses. A total of 10 participants were removed from all further analyses.

In the thought-listing condition, participants' ratings of subsequent ambivalence ( $M = 5.00$ ) were significantly lower than their ratings of initial ambivalence ( $M = 5.63$ ),  $F(1, 33) = 14.10, p = .001$ . In the wait condition, participants ratings of subsequent ambivalence ( $M = 5.62$ ) were marginally lower than their ratings of initial ambivalence ( $M = 6.05$ ),  $F(1, 24) = 3.82, p = .06$ . In the cognitive load condition, participants ratings of subsequent ambivalence ( $M = 5.17$ ) did not differ from their ratings of initial ambivalence ( $M = 5.21$ ),  $F(1, 87) = .07, p = ns$ .

The thought-listing condition affords the opportunity to replicate the main findings from Study 1. First, we found that higher ambivalence ratings were associated with more univalent thought-listing  $r = .45, p = .007$ , and the valence of participants' thoughts corresponded with their initial attitude  $r = .35, p = .001$ . This replicates the findings that ambivalent people engaged in more biased information processing, and the sidedness of their biased processing matched the valence of their initial attitude. We additionally replicated the finding that biased processing was associated with ambivalence resolution, as generating more one-sided thoughts was positively associated with a greater reduction in subsequent ambivalence  $r = .32, p = .002$ .

In the second study, we addressed whether participants require an explicit opportunity to reduce their ambivalence or whether this process occurs naturally. Participants in the thought-listing condition (high opportunity) reported a significant decrease in subsequent ambivalence, while those who received the anagram task (low opportunity) reported no change in ambivalence. Interestingly, participants in the waiting condition (moderate opportunity) reported a reduction in ambivalence comparable to the thought-listing condition. These findings suggest that while a cognitive load task can interfere with people's ability to reduce their ambivalence, given the opportunity, people will resolve their ambivalence whether they are encouraged to or not.

### General discussion

These studies provide direct support for the notion that the experience of ambivalence is aversive, and that the increased processing associated with ambivalence serves to reduce this discomfort. This finding can be viewed in the context of a long history of research that demonstrates people's preference for evaluative consistency. Whether the focus of the conflict is between attitudes and behavior (Festinger, 1957), attitudes and beliefs (Rosenberg, 1968), or between discrepant attitudes (Tesser & Conlee, 1975), these studies point to a consistency-seeking motivation.

Building on this tradition, the present studies offer insight into the process of resolving evaluative conflict, an aspect of many consistency theories that has received lit-

the attention. Tesser and Conlee (1975), for example, found that the more time people spent thinking about an attitude object, the more polarized their thoughts became. Tesser and Conlee (1975) argued that this effect emerges from the tendency to focus on evaluatively consistent thoughts. The present study provides evidence for one strategy people use to resolve attitudinal conflict—the selective elaboration of information consistent with one's prior attitude. In Study 1, people who generated more univalent thoughts reported less subsequent ambivalence. Moreover, the valence of their biased processing corresponded with their prior attitudes. Study 2 addressed the ease with which ambivalence is resolved. The finding that people reduce their ambivalence without encouragement suggests that the experience of ambivalence is sufficiently unpleasant as to naturally direct people's attention toward the attitude object, rather than a host of other possible sources of attention (e.g., the unfamiliar surroundings, plans for later that evening, etc.).

Future research should continue to investigate the relationship between ambivalence and information processing. In the present studies people resolved their ambivalence through the selective elaboration of one-sided information. It would be interesting to also look at other strategies that could help to reduce ambivalence. One strategy might be to differentially weigh pro and con information. Another way people might resolve ambivalence is through the selective exposure of information. In a study by Erlich, Guttman, Schopenhach, and Mills (1957), for example, people who recently purchased a car avoided advertisements (and therefore positive information) about a car different from the one they purchased—and thus avoiding information potentially inconsistent with their decision. This may in fact be a preferable strategy to biased information processing, as it means that people can avoid the discomfort of ambivalence altogether, rather than experience discomfort and then have to subsequently resolve it. Of course, to engage in selective exposure requires that people can anticipate information as potentially ambivalence inducing. This point raises the interesting possibility that the strategies people use to resolve (or avoid) ambivalence might in part depend upon the presentation of the information itself. For example, in the article that participants received both positive and negative arguments were interspersed in such a way that they could not anticipate whether subsequent information would correspond or conflict with their general attitude. However, if we had grouped and clearly identified the arguments for and against GM food, people would have been able to selectively avoid the side of the issue that was inconsistent with their general attitude.

Future research might also examine the circumstances under which conflicting evaluations are made salient (felt ambivalence) or remain dormant (potential ambivalence). Our results suggest that for ambivalence to be experienced as an uncomfortable state, the discomfort

must be attributed to one's own conflicted attitude. This is in line with findings obtained by Cooper, Zanna, and Taves (1978) and Pittman (1975) who showed that, in the context of a dissonance study, both arousal and the right attribution are necessary conditions for attitude change to occur. Whether or not people are always aware of their conflicted evaluations may depend upon a variety of factors, including the accessibility of the beliefs, the centrality of the attitude object, or mode of information processing.

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