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Ambivalence and information integration in attitudinal judgment

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In three studies we investigated the role of bottom-up information processing in attitudinal judgment. Overall, the results confirm our expectations and show that people are faster in judging attributes underlying their attitude towards the object than in generating or 'computing' their overall attitudinal response. As predicted, respondents who selected more attributes as important to their attitude needed more time to integrate these attributes in order to come to an overall attitudinal response. Moreover, ambivalence was also related to decreased response times of the overall attitudinal response. We argue that the main reason for this is that non-ambivalent attitudes are generally based on evaluatively congruent attributes, while ambivalent attitude-holders need to integrate evaluatively incongruent attributes into an overall judgment. Implications for research on attitude structure and ambivalence are briefly discussed.

A simple question like: 'Would you like a slice of blueberry pie?' may evoke a simple answer such as 'Great!'. Other people may want to think twice before accepting the offer. The process through which people arrive at such an overall evaluative judgment may thus vary considerably. Some provide an immediate answer. Others might engage in more elaborate thinking and consider a number of aspects specific to blueberry pie, such as its taste, number of calories etc., before reaching a decision. We focus on these processes and address the issue of how people come to overall evaluative judgments.

A number of theories emphasize the role of deliberate, controlled information processing, and generally assume that evaluative judgements are based on judgments of more specific attributes. These judgments are expected to be integrated into an overall attitudinal response. Examples are expectancy-value (EV) models such as those of Fishbein and Ajzen (Ajzen, 1991; Fishbein and Ajzen, 1975), and Anderson's information integration theory (Anderson, 1971). Although these theories have been

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reasonably successful in predicting intentions and/or behaviour regarding the attitude-object, considerable doubts have been raised about whether people recompute their overall evaluative judgment each subsequent time they are asked to express their attitude. For example, Fazio (1993, 1995) argued that attitudes are stored in memory and can be automatically activated, without the need for any deliberate processing whatsoever. Bargh and colleagues suggest that virtually all attitudes can be activated automatically (e.g. Bargh, Chaiken, Govender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996; Chaiken & Bargh, 1993). In their view, integrating attributes or even deliberate processing is (most often) not necessary.

As a consequence, attitude research in the 1990s reflected considerable interest in automatic and non-deliberate processes in attitudinal judgment. Obviously, the notion that people engage in almost computer-like calculations when engaging in attitudinal judgment is overly optimistic about human cognitive capabilities, and probably incorrect (see Fischhoff, Goitein, & Shapira, 1982; van der Pligt, de Vries, Manstead, & van Harreveld, 2000). Under many circumstances, (e.g. time pressure), people are more likely to retrieve a direct holistic evaluative judgment. Similarly, low involvement and limited knowledge are also likely to lead to more holistic evaluative judgments as opposed to the construction of an attitude on the basis of specific attributes of the attitude object. We would expect this type of top-down processing to be more prominent when dealing with less involving, less important, or even trivial attitudinal issues. We believe, however, that deliberate conscious processing of attributes underlying overall attitudes is not as uncommon as is often assumed. When dealing with more important issues, people are more likely to derive their overall attitudinal judgment from specific attributes, i.e. they rely on *bottom-up* processing.

The research described above raises an important question. If people do 'recompute' their overall attitudinal judgment by integrating attributes, one can question whether these attributes are stored in long-term memory and remain chronically accessible in the context of the attitude-object due to their subjective importance. Some have argued that overall evaluations are based on the information that coincidentally happens to be accessible at that specific moment. (Roskos-Ewoldsen & Fazio, 1997; Strack & Martin, 1987; Tesser, 1978; Tourangeau, 1984, 1987; Tourangeau & Rasinski, 1988; Tourangeau, Rasinski & D'Andrade, 1991; Wilson & Hodges, 1992; Zaller & Feldman, 1992). Tourangeau and Rasinski (1988) argued that attribute importance and accessibility are not necessarily related and concluded – referring to Tversky and Kahneman's (1981) availability heuristic – that information retrieval from memory is unreliable and subject to various distortions. Wilson, Hodges, and LaFleur (1995) also argued that although people can base their attitudes on accessible information, this process is hardly reliable.

On the other hand, research van Harreveld, van der Pligt, de Vries, and Andreas (2000) indicates that the attributes people consider important *are* likely to be chronically accessible in memory, and are thus relatively stable over time. The present studies aim to extend previous work by the authors (van der Pligt *et al.*, 2000; van Harreveld *et al.*, 2000) showing that people often need more time for an overall attitudinal judgment than for the more specific attribute judgments. We would like to take this work one step further by relating this phenomenon to attitudinal ambivalence.

If people actually do engage in bottom-up processing to derive their overall attitude, we expect that information integration will be more time-consuming for ambivalent participants than for participants integrating univalent cognitions, given

the time needed for judging the various attributes (see also van der Pligt *et al*., 2000, pp. 179–181). This because the ambivalent respondents need to integrate positive and negative cognitions regarding the attitude-object. Indirect support for this view can be found in research on impression formation and stereotyping, showing that integrating inconsistent information is associated with increased processing time (Rojahn & Pettigrew, 1992; Vonk & van Knippenberg, 1995).

Bargh *et al*. (1992) and Bassili (1996) found increased response times for ambivalent respondents using a dichotomous attitudinal response. They explained this effect in terms of attitude strength and not in terms of the process of information integration. Both accessibility and ambivalence are assumed to be dimensions of attitude strength. It needs to be added, however, that a dichotomous response might be less appropriate for ambivalent respondents. Even if their ambivalent attitude is readily available, there is no response category that reflects it. In other words, increased response times (RTs) for ambivalent attitude holders are due either to having weak attitudes or to less appropriate response options. Our findings over the three studies indicate that a third interpretation might be more applicable; ambivalent respondents need more time because they have to integrate evaluatively incongruent attributes.

In the present studies we first tested the prediction of van Harreveld *et al*. (2000) that attribute-based judgments are associated with shorter RTs than the overall attitudinal response. Second, we tested whether this difference is more pronounced for ambivalent attitude holders. For the latter group we expected a larger difference between the time needed to integrate attributes into an overall attitude and the time needed to judge these underlying attributes, due to the need to integrate (evaluatively) incongruent attributes. We thought that this moderating effect of ambivalence would provide corroborative evidence for the view that the longer RTs for overall attitudinal than for attribute responses implies information-integration processes preceding the formation and expression of overall attitudes. If this difference is more pronounced for ambivalent participants, this would support our point that people *do* engage in bottom-up processing.

Our hypotheses were tested in several domains. In the first two studies we focused on relatively new and recently formed attitudes (attitudes to genetically modified food and English as a language of instruction), whereas in the third study we used a more established attitude (attitude towards smoking cigarettes).

STUDY 1

In Study 1 we focused on attitudes towards genetically modified food. We expected participants to be slower when indicating their overall attitude than when judging the various attributes underlying their attitude. We expected this difference to be more pronounced for ambivalent participants.

Participants

A group of 85 students of the University of Amsterdam participated in this study in return for course credit; 44 of these were female and 41 were male. Age of participants ranged from 18 to 39 years ($M = 21.98$, $SD = 3.66$).

Procedure and variables

On arrival, participants were seated behind a computer and were guided through the questionnaire by a computer program. First, participants were presented with four

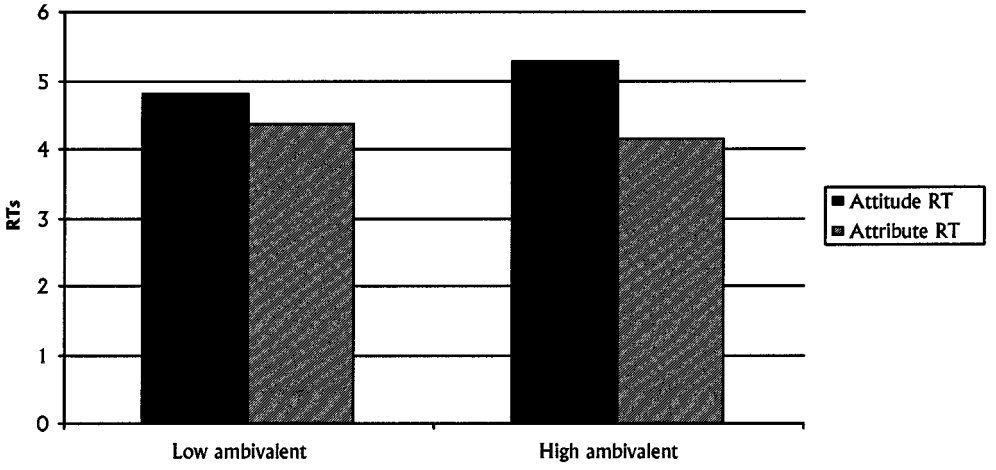

Figure 1. Response times in seconds to attitudinal and attribute judgments for groups of high and low ambivalence, Study 1.

semantic differential scales to assess their attitude (Cronbach's $\alpha = .97$). The four pairs of items were: *bad–good*, *negative–positive*, *for–against* and *favourable–unfavourable*. This measure ranged from 1 to 9 and constituted the direct measure of attitude. The order in which the semantic differentials were presented was randomized and response latencies were assessed for each of these responses.

Next, participants were presented with a total of 14 attributes related to the attitudinal issue. The set (listed in the Appendix) constituted a modally salient set based on a pilot study, and included an equal number of positive and negative attributes of genetically modified food. The perceived likelihood of these attributes was assessed on scales ranging from '*definitely not*' to '*definitely*'.[1] For all measures we used scales ranging from 1 to 9. Response times on these measures were recorded. Again the sequence in which the attributes were presented was randomized.[2]

[1]*We also assessed the evaluative component of each attribute but chose not to report these in the present paper, because we feel that the evaluative component does not reflect the attribute in its most basic form. For example, when a probability judgment with respect to smoking is 'smoking has detrimental effects to one's health', the corresponding evaluative judgment would be: 'I consider good health' (positive/negative). We believe that this is more of an abstract value than an attribute and that the evaluation is useful to weigh the probability judgment but not as a component per se.*

[2]*The reader will notice that the way in which we measure response times of the attributes and the overall attitudinal response is different from the method recommended by Fazio (1990). This is because the process we attempt to describe in these studies is more elaborate than merely the associative strength between target and evaluation. We would like to argue that categorizing objects dichotomously as 'good' or 'bad' does not always do justice to the way in which people perceive objects. In his chapter on how to use response latencies, Fazio (1990) argues that when using a 9-point scale, a respondent 'may make an implicit judgment readily and might have been able to respond relatively quickly if only a dichotomous choice had been available, the subject may spend time debating whether scale positions 6, 7 or 8 best represents his or her judgment'. This argument might be intuitively appealing; however, one could just as easily turn it around. If someone is highly ambivalent, a neutral score (i.e. 5) can be easily generated, but what if one is forced to choose between good and bad, even though both options are equally unappealing? In other words; in our view the positive correlations obtained between ambivalence and attitude response times (Bargh et al., 1992; Bassili, 1996) are the result of forcing ambivalent respondents to choose between two 'evils'. We would like to argue that often judgments are likely to be more fine-tuned in terms of how positive or how negative does one feel towards an object. By using the current measure, we attempt to do more justice to this notion than when forcing respondents to simply choose between good and bad, neither of which might represent their true thoughts or feelings.*

Nevertheless, even in this more elaborate task, a strong association between target and evaluation should also lead to faster response times. In previous work (van Harreveld et al., 2000), we have shown that response time patterns for these judgmental tasks are very similar to those of tasks following Fazio's recommendations. Moreover, in five studies we have

Ambivalence was measured using the so-called 'Griffin measure', as described by Thompson, Zanna, and Griffin (1995). This measure is based on Kaplan's measure (1972) which separately assesses the positive and negative attitudinal components. First, participants are asked to think about the positive aspects regarding the attitude-object, ignoring all negative aspects, and rate these positive aspects on a scale from 1 (*not at all positive*) to 9 (*very positive*). Subsequently, participants are asked to do the opposite and rate the negative aspects neglecting all positive aspects. These two scores are then combined into an overall ambivalence score in accordance with the following formula $|P + N|/2 - |P - N|$, in which P is the score on the 'positive' scale and N is the score on the 'negative' scale. Using this formula, the minimum ambivalence score is −4.5 (9 + 0/2 − 9) and the maximum score is 9 (9 + 9/2 − 0). For a comparison of this formula versus others, such as the one proposed by Kaplan (1972), see Thompson *et al*. (1995).

Results

First we computed the mean response latency on the overall attitude measure (assessed with four items) and the attribute measures (14 items). We log-transformed all response latencies but report untransformed response latencies in order to provide more insight into the results. Results showed that RTs for the overall attitudinal response were longer (5.03 seconds) than the RTs for the attribute judgments (4.25 seconds, $t(84) = 3.48$, $p = .001$). We would like to add that the attribute statements were considerably *longer* than the attitude items, and hence required more reading time. Not surprisingly, correcting for length of item (number of words) increased the size of the effect.

Next, we examined the extent to which ambivalence was related to attribute and attitude RTs. The scores on the ambivalence measure ranged from −3 to 9 with a mean of 2.35 ($SD = 3.45$). The correlation between ambivalence and RTs to the overall attitudinal response was significant ($r = .20$, $p = .035$, one-tailed), indicating that ambivalent participants tend to take more time to compute their overall attitude.

It could be that for ambivalent-attitude holders, the attributes underlying their attitude are more easily retrieved, and this increased accessibility of *attributes* should also facillitate *attitude* RTs if participants indeed rely on the integration of attributes. There is a negative (albeit non-significant) correlation between ambivalence and attribute RTs ($r = -.09$). To control for this 'head start' that ambivalent respondents have when integrating the various attribute judgments into their overall evaluative response, we examined the relation between ambivalence and attitude RTs controlling for attribute RTs. The partial correlation between attitude RTs and ambivalence controlling for attribute RTs was significant ($r = .24$, $p = .027$).

Before we can conclude that ambivalent attitude holders require more time to 'compute' their overall attitudinal response, we need to address a number of alternative explanations. First, ambivalent respondents tend to have less extreme, more moderate, attitudes. Second, attribute judgments tend to be more extreme than attitudes ($M = 2.13$, $SD = 0.70$ versus $M = 1.81$, $SD = 2.22$, $t(84) = 2.97$, $p = .004$). Extremity was operationalized as the mean difference from the mid-point of the scale. We examined the extent to which the moderating effect of ambivalence could be

included both out current measure and a dichtomous measure following Fazio's recommendations. Correlations between these measures were stable around .50 (.52, .47, .41, .44 and .57), providing considerable evidence for the assumption that our measure does tap on a very closely related construct (van Harreveld & van der Pligt, 2003).

Table 1. Ambivalence and extremity ratings regressed on the difference between log-transformed attitude RT and log-transformed attribute RT, Study 1

	Variable	Standardized β	*t*
Step 1	Ambivalence	.257	2.43*
Step 2	Attitude extremity	−.238	−1.86
	Belief extremity	−.164	−1.30

*$p < .05$

attributed to attitude extremity or attribute extremity. To do this, we conducted hierarichal multiple regresssions with ambivalence, attitude extremity and attribute extremity as independent variables and the difference between the log-transformed *attitude* response times and log-transformed *attribute* response times as the dependent variable. The results, depicted in Table 1, reveal a significant standardized β for ambivalence in Step 1. When we enter belief extremity and attitude extremity combined, we see a significant R^2 increase (F (2, 81) = 6.502, p = .002), but individually none of these variables reached statistical significance.

STUDY 2

In Study 2, participants were presented with the prospective introduction of English as a language of instruction at the University of Amsterdam. Participants were told that this would probably take place within 2 years and hence would have an effect on them personally.

Participants

A group of 56 students of the University of Amsterdam participated in this study in return for course credit; 37 of these were female, and 19 were male. The age of participants ranged from 17 to 43 years (M = 20.98, SD = 4.60).

Procedure and variables

On arrival, participants were seated behind a computer and were guided through the questionnaire by a computer program. First, participants were presented with four semantic differential scales to assess their overall attitude (Cronbach's α = .92). The four scales were: *bad–good*, *pleasant–unpleasant*, *for–against* and *favourable–unfavourable*. This constituted the direct measure of attitude. Response latencies on this measure were recorded, and we randomized the order in which the semantic differentials were presented. Next, participants were presented with a total of 18 attributes related to this issue. The set, listed in the Appendix, constituted a modally salient set based on a pilot study, and included both positive and negative attributes of the prospective introduction of English as a language of instruction at the University of Amsterdam. The likelihood of these attributes was assessed on scales ranging from '*definitely not*' to '*definitely*'.

For all measures we used 101-point scales ranging from 0 to 100. Participants were required to indicate the position that represented their opinion on a line drawn

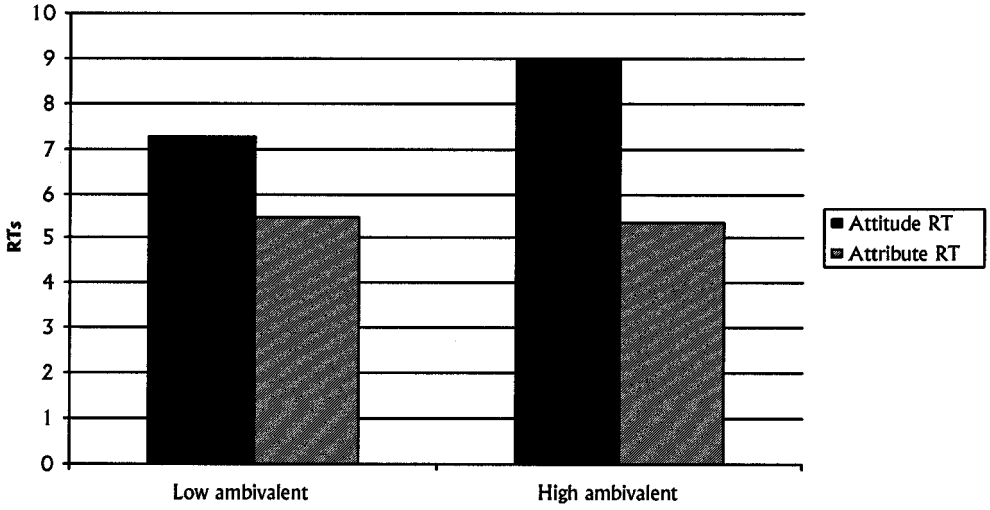

Figure 2. Response times in seconds to attitudinal and attribute judgments for groups of high and low ambivalence, Study 2.

between two labelled extremes. Response times on this measure were recorded. Again the sequence in which the attributes were presented was randomized.

In this study we also aimed to examine the effect of the number of attributes underlying the attitude. Therefore we included a measure of attribute importance (e.g. van der Pligt *et al.*, 2000). Attribute importance was assessed by means of a selection task. Participants were required to select the attributes they personally considered the most important out of the larger set of 18 attributes. We expect that if people *do* engage in bottom-up processing, they will need more time to come to an overall attitudinal judgment if the latter is based on a larger number of attributes.

To assess attitudinal ambivalance, we entered the number of selected attributes with a positive valence and the number of selected attributes with a negative valence in a formula adapted from Thompson *et al.* (1995): $|N_p + N_n|/2 - |N_p - N_n|$, in which N_p is the number of selected positive attributes and N_n is the number of selected negative attributes. Since there were nine positive and nine negative attributes in the present set, the ambivalence score could range from −4.5 (9 + 0/2 − 9) to 9 (9 + 9/2 − 0).

Results

We computed the mean response latency to the attitude measure (based on four items) and the attribute judgments. For each individual, the latter score was based on the attributes that he or she selected as important. In accordance with previous work we assumed the attitude to be based on a limited set of subjectively important attributes, hence the decision to compute mean RTs over this set of attributes instead of all attributes. All effects described in this section on mean RTs for the selected, important, attributes were also found for mean RTs of *all* attributes.

We log-transformed all response latencies, but report the more insightful untransformed response latencies. Participants were considerably faster on the

Table 2. Ambivalence, extremity ratings and number of attributes regressed on the difference between log-transformed attitude RT and log-transformed attribute RT, Study 2

	Variable	Standardized β	*t*
Step 1	Ambivalence	.349	2.74*
Step 2	Attitude extremity	.080	0.53
	Belief extremity	−.056	−0.38
	Number of beliefs	.175	1.06

*$p < .05$

selected-attribute-related items than on the overall attitudinal judgments. Means were 8.12 and 5.41, respectively ($t(55) = 13.04$, $p = .001$). These means were higher than those obtained in the previous study, which was due to the different response scales. In the present study, participants were required to indicate their preference by clicking with their mouse on a line between two extremes. In the previous study they had to press a key on the numerical pad ranging from 1 to 9. Again, attribute items were considerably *longer* than the attitude statements, but responses on attribute statements were still significantly faster. When corrected for length, differences were even more pronounced.

To examine whether ambivalence was related to the difference in RTs for the overall attitudinal judgment and the attribute-based judgments, we correlated ambivalence with attitude and attribute RTs. The scores on the ambivalence measure ranged from −3.5 to 6.0 with a mean of 0.64 ($SD = 2.19$).

The mean response latencies of the (selected) attribute judgments showed a non-significant correlation with ambivalence ($r = .13$). The overall attitude RT showed a significant correlation with ambivalence ($r = .39$, $p = .003$). When controlling for attribute RTs this relation remained significant ($r = .39$, $p = .003$).

One of the reasons that we included the attribute selection task was that it provides us with a further test of the presumed bottom-up process of attitudinal judgment. If people *do* integrate attributes, it seems plausible to assume that those respondents integrating many attributes need more time to do so than those integrating fewer attributes. To test this assumption, we correlated the number of selected attributes with the (log-transformed) response time to the overall attitude measure. This analysis showed a modest, but significant, positive correlation ($r = .23$, $p < .038$, one-tailed), indicating that respondents selecting more attributes as being important also needed more time to compute their overall attitudinal response.

Ambivalence was positively correlated with the number of selected attributes. ($r = .61$, $p = .000$), i.e. ambivalent participants tended to select more attributes as being important. Again we examined the extent to which the moderating effect of ambivalence could be attributed to attitude extremity or attribute extremity and also to the number of selected attributes. We conducted multiple regresssions with ambivalence, attitude extremity, attribute extremity and number of selected attributes as independent variables and the difference between log-transformed *attitude* response times and log-transformed *attribute* response times as the dependent variable. As Table 2 shows, we found a significant standardized β for ambivalence in Step 1, whereas adding belief extremity, attitude extremity and number of selected attributes did not lead to a

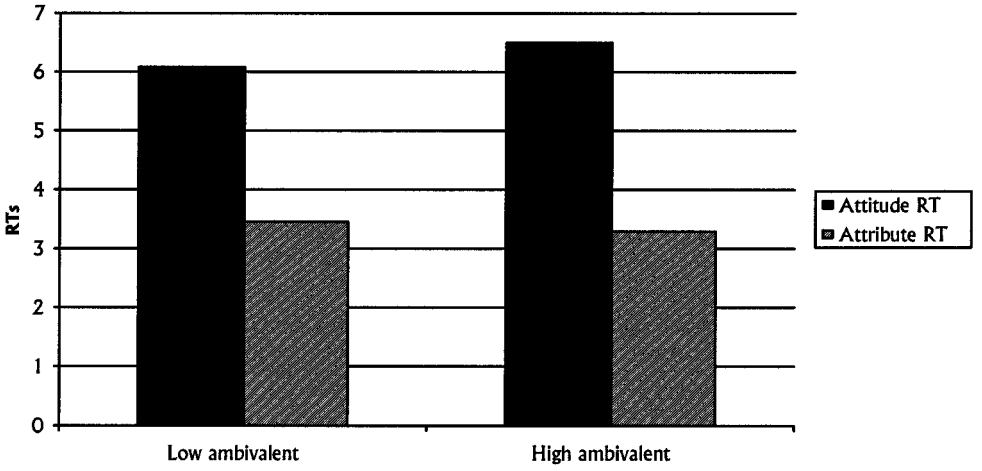

Figure 3. Response times in seconds to attitudinal and attribute judgments for groups of high and low ambivalence, Study 3.

significant R^2 increase. Individually the standardized βs of these variables also failed to reach significance.

STUDY 3

The data from Studies 1 and 2 provided support for our hypothesis regarding the moderating role of ambivalence with respect to information-integration processes preceding the overall attitudinal response. The attitudinal issues used in Studies 1 and 2 were relatively *new*; in Study 3 we tried to replicate these results in an attitude domain towards which people were likely to hold firm and well established attitudes: smoking cigarettes. As in the first two studies, we expected ambivalent participants to experience more difficulty in integrating the attributes, resulting in increased response latencies for their attitude judgments.

We extended the previous two studies by including a second measure of overall attitude at the end of the experiment, enabling us to assess the relative *stability* of the moderating effect of ambivalence. One could argue that participants' response to the attributes in the first two studies were faster than to the overall attitude, because the overall attitudinal response *primed* the various attributes. A second measure of the overall attitude helps to control for this because the reponse to this second measure has been primed by the first measure. Jonas, Diehl, and Brömer (1997) have argued that ambivalent-attitude holders show an increased tendency to engage in systematic information processing because they feel *less certain* about their attitude. An alternative explanation for the findings in the previous two studies might therefore be that ambivalent respondents go through a more elaborate bottom-up process of attitudinal judgment to reduce this uncertainty. In order to enable us to examine this potential alternative explanation we included a measure of attitude certainty.

Participants

A group of 83 students of the University of Amsterdam participated in this study in return for course credit; 64 of these were female and 19 were male. Participants

completed a computerized questionnaire on attitudes towards smoking cigarettes. The age of participants ranged from 18 to 32 years with a mean of 21.02 (*SD* = 2.57).

Procedure and variables

On arrival, participants were seated behind a computer and were guided through the questionnaire. First, participants were presented with four semantic differential scales to asses their attitude towards smoking (Cronbach's α = .84). The four items were the same as those used in the previous studies: *bad–good*, *pleasant–unpleasant*, *for–against* and *favourable–unfavourable*. As in the previous studies, response latencies on this measure were recorded.

In order to assess *attribute* RTs, participants were presented with a set of 15 attributes. These constituted a modally salient set and included seven positive and eight negative attributes of smoking cigarettes. These attributes were based on van Harreveld *et al*. (2000) and van der Pligt and de Vries (1998). The 15 attributes are listed in the Appendix. Again, the likelihood of these attributes was assessed on scales ranging from '*definitely not*' to '*definitely*'. For all measures we used 101-point scales ranging from 0 to 100. We randomized the sequence in which the attributes were presented to assess their perceived likelihood. We also randomized the order of the semantic differential items used as a direct attitude measure.

With respect to the selection of important attributes, participants were instructed to select as many attributes (in terms of their importance to their attitude) as they felt necessary.

An addition to the previous two studies was that at the end of the experimental session participants were again presented with the four items assessing their overall attitude. RTs were measured, enabling us to assess the relative *stability* of the moderating effect of ambivalence. As argued in the introduction of this study, we included a measure of attitude certainty. We asked respondents 'to what extent do you feel certain about your attitude towards smoking?' on a scale ranging from 'very uncertain' (1) to 'very certain' (100).

Results

As before, participants were considerably faster on the selected attribute-related items than on the overall attitudinal response. Means were 3.38 and 6.27, respectively ($t(81) = 21.42$, $p = .000$. This difference confirms those obtained in the previous studies. Again attribute statements were much longer than attitude statements, so correction for length increased the obtained differences.

Next, we examined the role of ambivalence. Not surprisingly, smokers were significantly more ambivalent ($M = 3.03$, $SD = 2.62$) than non-smokers ($M = 0.55$, $SD = 3.81$, $t(2,80) = 3.49$, $p = .001$). When correlating ambivalence with attitude and attribute RTs, we found no significant correlation on either of the two measures. Controlling for the latencies to the attribute measures we did find a significant correlation between ambivalence and attitude RTs ($r = .26$, $p = .017$).

As in the previous study we correlated the number of selected attributes with mean RTs to the overall attitude measure. The results showed a modest trend ($r = .17$, $p = .063$, one-tailed). Ambivalence and number of selected attributes were positively correlated ($r = .35$, $p = .001$)

As mentioned before, smoking status was related to ambivalence in the sense that smokers were more ambivalent about their behaviour than non-smokers. However,

Table 3. Ambivalence, extremity ratings, number of attributes and certainty regressed on the difference between log-transformed attitude RT and log-transformed attribute RT, Time 1, Study 3

	Variable	Standardized β	*t*
Step 1	Ambivalence	.293	2.76*
Step 2	Attitude extremity	−.199	−1.38
	Belief extremity	.082	0.68
	Number of beliefs	.056	0.49
	Certainty	.168	1.41

*$p < .05$

Table 4. Ambivalence, extremity ratings, number of attributes and certainty regressed on the difference between log-transformed attitude RT and log-transformed attribute RT, Time 2, Study 3

	Variable	Standardized β	*t*
Step 1	Ambivalence	.321	3.05*
Step 2	Attitude extremity	−.139	−0.91
	Belief extremity	.040	0.32
	Number of beliefs	−.025	−0.214
	Certainty	.075	0.63

*$p < .05$

there was no difference between smokers and non-smokers for attitude or attribute RTs.[3]

In the present study we assessed overall attitude twice. Respondents were significantly faster the second time their attitude was measured ($M = 4.98$, $t(82) = 8.92$, $p = .000$), but still slower than on their judgment of attributes ($t(82) = 13.49$, $p = .000$). When we examined the moderating effect of ambivalence on attitude and attribute RTs using the RTs on the second attitude measure, we found a similar pattern as before ($r = .29$, $p = .009$), i.e. when controlling for attribute RTs, increased ambivalence is related to higher attitude response times. This effect for the second attitude measure is not likely to be due to people being confronted with new attributes upon which they base their attitudes, because the two holistic attitude measures showed a correlation of .93 ($p = .000$).

To examine the extent to which extremity of the attitude, extremity of the attributes, the number of selected attributes or our measure of *attitude certainty* might provide an alternative explanation for these effects, we conducted two multiple regressions; one for the Time 1 attitude measure and one for the Time 2 attitude measure. In both cases ambivalence, attitude extremity, attribute extremity, number of selected attributes and certainty were the independent variables and the difference between log-transformed *attitude* response times and log-transformed *attribute* response times was the dependent variable. As Table 3 shows, at Time 1 we found a significant standardized β for ambivalence in Step 1, whereas adding belief extremity,

[3]*All effects described in this section on mean RTs for the set of selected, important, attributes were generally also found for mean RTs of all attributes.*

attitude extremity, number of selected attributes and certainty did not lead to a significant increase in R^2. Individually the standardized βs for these variables failed to reach significance level. In Table 4 we see that this is also the case for attitudes assessed at Time 2. Again there is no significant increase in R^2 when adding the other variables at Step 2.

Discussion

Previous research by van Harreveld *et al*. (2000) indicated that people take more time to indicate their overall attitudinal response than for judging more specific attributes underlying their attitude. We argued that people need more time to come to an overall attitudinal judgment because they have to go through a process of integrating attributes. Results of our studies support and extend these findings by showing that generating an overall attitudinal response is especially time-consuming for repondents who have to integrate evaluatively *incongruent* attributes. We have examined a number of possible alternative explanations and, generally, our results support our assumption that this effect is not caused by the fact that ambivalent respondents have moderate attitudes or more extreme attributes.

Also, in the two studies in which there were no restrictions on the number of attributes participants could select, results also showed that the *number* of selected attributes and response time to the overall attitudinal response are positively correlated. This also supports the assumed integration of attribute judgments into an overall attitude. The correlation between number of attributes and RTs was, however, not sufficient to explain the obtained effects of ambivalence.

As expected, the repeated expression of attitude in Study 3 resulted in increased accessibility of the overall evaluative response (see also Fazio, Chen, McDonel, & Sherman, 1982). However, over and above this increased accessibility, we still found that attitude RTs for the overall attitudinal response were slower than for the attribute judgments, and that ambivalence was related to attitude RTs.

Bargh *et al*. (1992) and Bassili (1996) explained increased attitude RTs for ambivalent respondents in terms of attitude strength. Our findings over the three studies indicate that a third interpretation might be more applicable: ambivalent respondents need more time because they have to integrate evaluatively incongruent attributes.

Maio, Bell, and Esses (1996) and Jonas *et al*. (1997) have shown that ambivalent respondents are more likely to engage in systematic processing because they hold their attitude with less certainty (Jonas *et al*., 1997) or are motivated to reduce their ambivalence (Maio *et al*., 1996). This might provide an alternative explanation of the current results. However, we found that the relation between attitude RTs and attitudinal incongruency cannot be attributed to *certainty* regarding one's attitude. Moreover, if respondents holding incongruent attitudes are more likely to show systematic processing, this should also be reflected in increased RTs for *attribute* measures. Results of all three studies show that this was not the case. Overall, these findings support our prediction that attitude holders need more time to integrate (evaluatively incongruent) attributes into an overall attitudinal response, and confirm the assumption that attitude holders go through a bottom-up process in which attributes are integrated into an overall attitude.

One could question why there was no main effect of attitude incongruency on the attribute RTs. One reason for this could be related to the attitude domains in our studies. For instance, smoking is an issue towards which people are likely to hold firm

attitudes, and one could question whether there is any difference between people holding ambivalent versus non-ambivalent attitudes in the extent to which they have thought about the various attributes of smoking. This could explain why we do not find a main effect on the RTs of attributes; for smokers the link between attitude and attributes is not more frequently activated than for non-smokers. In Study 1 we probably do not find a main effect on the response times to the attributes, because neither group was very familiar with attributes related to the attitudinal issue (genetically modified food).

Over the three studies, we see that the difference in attitude RTs and attribute RTs was largest in Study 3. We speculate that this is related to the personal relevance of the issues in the various studies, leading to different levels of involvement. Smoking is likely to be considered a more important issue than English as a language of instruction and genetically modified food, because it directly concerns one's health (smokers) or causes annoyance (non-smokers). We expect more important issues to result in bottom-up processing, while top-down attitudinal responses are more likely for less important issues. However, this is mere speculation and these assumptions could not be tested in the present series of studies. In subsequent research it would be interesting to present participants with various attitudinal domains and directly assess the subjective importance attached to these issues. When doing so, one could determine whether people are more likely to engage in bottom-up processing concerning matters they consider personally relevant or important.

The extent to which the set of attributes, and hence ambivalence, is subject to change is a different matter. Although participants seem to rely on a relatively stable set of important attributes, the question remains whether participants holding evaluatively incongruent attributes are motivated to reduce this ambivalence. Recently Newby-Clark, McGregor, and Zanna (2002) have shown when ambivalence is particularly considered as uncomfortable. One explanation of why ambivalence is uncomfortable is related to work on dissonance. McGregor, Newby-Clark, and Zanna (1999) have argued that these two forms of internal inconsistency are related and hence suggest that people will be motivated to reduce attitudinal ambivalence. If so, it remains to be seen what strategies people use to reduce ambivalence. Maio *et al.* (1996) and Jonas *et al.* (1997) have shown that people holding ambivalent attitudes are more inclined to show systematic processing. It would be interesting to examine other potential ways in which people (try to) reduce this unpleasant motivational state.

On a more general level, we would like to relate our findings to the work on *automatic* evaluative processes as described by Fazio (e.g. Fazio *et al.*, 1982) and Bargh (e.g. Bargh *et al.*, 1992). This research assumes that people do not need to go through a process of recomputing an overall judgment every time they are confronted with the attitude-object. People are expected to have an evaluative judgment stored in memory, which can be readily retrieved upon encountering the attitude-object. Our findings regarding bottom-up versus top-down processes are not so much in conflict with these findings, but complement this line of research. We certainly do not want to argue that people never go through a top-down process, i.e. retrieve an overall evaluative judgment from memory. In fact, under most circumstances, people probably *will* follow this route. However, when people are explicitly asked what they think about a particular object, or when they consider their attitude or decision to be particularly important, they *will* think about the reasons underlying their attitude before actually expressing it.

Future research should address the question of *when* either of these two processes occur. For instance, a first encounter with a particular attitude-object is likely to result in assessing various attributes and integrating these into an overall attitudinal response. When one is confronted with this attitude-object once again, it seems unlikely that he/she will go through that bottom-up process time and again. Instead he/she will try to retrieve a simplified overall judgment such as *good* or *bad*.

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Appendix

Sets of attributes

Genetically Modified Food (Study 1)

1. Disrupts the ecological balance
2. Increases world food production
3. Leads to less healthy food
4. Reduces the need to use pesticides
5. Makes me worry
6. Leads to risks for health and the environment
7. Makes me enthusiastic
8. Helps to develop better medicine
9. Is immoral
10. Brings hope for the future
11. Has positive consequences for developing countries
12. Increases food allergies
13. Annoys me
14. Gives me a sense of pride in scientific accomplishments

English as a language of instruction at the University of Amsterdam (Study 2)

1. Facilitates collaboration with other universities
2. Is unfair for students whose English is poor
3. Helps to standardize technical terms
4. Hinders communication with Dutch institutions
5. Improves the reputation of the university
6. Has detrimental consequences for the teaching quality
7. Makes it easier for students to study abroad
8. Reduces students' understanding of the study contents
9. Makes the university more accessible for foreign students
10. Widens the gap between secondary school and the university
11. Leads to a closer relation of lectures to the literature
12. Has a negative impact on 'Dutch' language and culture
13. Leads to better understanding of the English language
14. Leads to less interest in "Dutch" topics
15. Helps to prepare for an international career
16. Increases the difficulty of an academic career
17. Fosters collaboration in research between different countries
18. Leads to an English-speaking elite

Smoking cigarettes (Study 3)

1. Reduces fitness
2. Gives you a good feeling
3. Increases coughing
4. Helps you to relax
5. Is expensive
6. Causes discomfort to others
7. Is bad for one's health

8. Is smelly
9. Prevents one from getting too heavy
10. Is addictive
11. Prevents you from getting bored
12. Increases the likelihood of lung cancer and heart diseases
13. Increases the ability to concentrate
14. Fosters social interaction
15. Helps to conceal one's uneasiness