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Unpacking atitudes towards genetically modified food

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Abstract

The present study investigates the structure of attitudes towards genetically modified (GM) food. A total of 431 respondents completed a questionnaire measuring their overall attitude, cognition and affect towards GM food. A model with distinct positive and negative, affective and cognitive components and a separate factor for perceived risk and worry best accounted for the data. Negative - but not positive - components directly affected behavioural intentions. Implications of these findings for our understanding of attitudes towards GM food and their impact on behaviour are discussed.

Keywords: Cognition; Affect; Attitude-structure; Attitudes; Genetically modified food; Involvement; Ambivalence; Valence

Over the past years, it has become evident that reactions of the public to GM food vary widely (e.g. Gaskell, Bauer, Durant & Allum, 1999; Magnusson & Koivisto Hursti, 2002; Moses, 1999; Staff, 2000). Both potential positive attributes (e.g. less pesticides) and negative attributes (e.g. unnatural) have been identified (e.g. Bredahl, 1999; Cook, Kerr, & Moore, 2002; Siegrist, 2000). In the current study we aim to supplement these studies by investigating attitudes towards GM food at a structural level. We aim to show that attitudes towards GM-food are characterized by four distinct components: positive and negative cognition and positive and negative affect (feelings) and that these components have different relations with the overall attitude/evaluation and with behavioural intentions.

Traditionally one assumed that attitudes towards a certain object are either positive or negative: you either like sprouts or you hate them. Over the years evidence has accumulated that someone can have both positive *and* negative evaluations regarding the same attitude object, and, more importantly, that these evaluations can be relatively independent from one another (for a recent review see Conner & Sparks, 2002). The domain of health behaviour and food choice is one in which such attitudes may be especially prevalent (Berndsen & Van der Pligt, 2004; Conner and Sparks, 2002). For instance, someone may find a piece of cake both unhealthy and attractive at the same time. In the domain of GM-food one may find genetically modified products both useful *and* scary. In line with this reasoning, Frewer, Howard, and Shepherd (1997) found that the various applications of genetic engineering could be classified along two axes: one related to benefits (useful), and the other related to negative concerns, including risks, ethical concerns and consequences for the environment. Although they found that attitudes towards applications of genetic engineering were generally either positive *or* negative, some food-related applications were thought to have both benefits and negative concerns. We want to take this reasoning one step further and show that attitudes towards GM food can best be described in terms of separate positive and negative components, using confirmatory factor analyses (CFA). In other words, we propose that positive and negative components of attitudes can be relatively independent from each other and are not necessarily related to each other in a hydraulic fashion. This reasoning is backed up by growing evidence that positive and negative information in general is processed separately and through potentially different systems in the brain (Cacioppo, Gardner & Berntson, 1997).

In addition, we think a distinction should be made between affective and cognitive factors. Attitudes are not solely based on cognitive considerations, such as beliefs about risks and benefits of a certain issue. Affective

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information, i.e. the feelings or emotions associated with the attitude object, can be equally important in determining peoples' attitudes towards an issue (Eagly & Chaiken, 1993; Giner-Sorolla, 1999; Zanna & Rempel, 1988). For instance, Abelson, Kinders, Peters, and Fiske (1982) found that affective reactions of respondents towards presidential candidates were more predictive of their overall attitudes than were their beliefs. Because of its hedonic function, food is likely to be a domain where affective reactions are especially relevant. However, in the domain of attitudes towards GM food, the focus has predominantly been on cognitive considerations that determine evaluations of GM food (e.g. Bredahl, 1999; Cook et al., 2002; Frewer, Howard, & Shepherd, 1995; Siegrist, 2000). A few studies have included questions pertaining to feelings evoked by GM food (e.g. Magnusson & Koivisto Hursti, 2002), but in these studies affect was not examined as a separate component of attitudes. Of course, cognitive beliefs and feelings are generally correlated: Perceived benefits of a product are usually accompanied by positive feelings and vice versa. Nevertheless, affect and cognition can be separate components of attitudes, and they can both influence the overall attitude towards an issue in relatively independent ways and through potentially different processes (Breckler & Wiggins, 1989; Eagly & Chaiken, 1993). Therefore, in the present study we aim to show that a distinction in affective and cognitive components improves our understanding of the structure of attitudes towards GM food.

In the present article we propose a 4-factor model of the attitude towards GM food, with valence (positive and negative) and affective versus cognitive aspects as distinct, but correlated components. To test the tenability of this model we use confirmatory factor analyses (CFA; Kline, 2005). An advantage of CFA is that it allows for evaluation of the fit of the hypothesized model to that of alternative models. We will compare the relative fit of the proposed 4-factor model to that of models that describe the attitude in terms of only one or two components. One obvious alternative to our proposed model is a 1-factor model where all positive and negative, affective and cognitive aspects are part of one single attitudinal component. A second alternative model treats positive and negative aspects as distinct components. We expect this model to be more in accordance with the data than the 1-factor model, but still not able to adequately describe the data. Along the same lines, a 2-factor model where only affect and cognition are separate components is not expected to fit the data well. The 4-factor model we propose has separate components for positive affect, negative affect, positive cognition and negative cognition. We expect this model to provide an adequate fit of the data in this study.

One important implication of the proposed structure of attitudes towards GM food is that positive and negative components may have different effects, for instance on behaviour. One possibility is that both positive and negative components influence the overall attitude, but that especially the negative components are directly related to behavioural intentions. A person who thinks GM food is useful may have a more positive attitude than someone who thinks it is less useful, but this may not directly lead to differences in the willingness to buy the food. On the other hand someone who thinks GM food is risky will be less willing to buy or eat GM food than someone who thinks it is less risky. Whereas the evaluation of GM food may depend on both positive and negative components, behaviour is likely to be stronger related to negative considerations than to positive considerations. This reasoning is supported by studies that show that negative information is more attention grabbing than positive information and is more influential in person perception and impression formation than positive information (Cacioppo et al., 1997; Kanouse & Hanson, 1987). A second reason why negative components of attitude may be directly related to behaviour is that intentions are psychologically less distant from behavioural action than attitudes. This reasoning is derived from construal level theory (Eyal, Liberman, Trope & Walther, 2004). Eyal and co-workers showed that negative considerations are more influential than positive considerations when a decision regards the near future in contrast to when the decision regards the distant future. Although their research focused on *temporal* distance from future events, they explain that these effects can also apply to *psychological* distance from an event. Since overall attitude judgments are psychologically more distant from behavioural action than behavioural intentions (see also Ajzen, 1985; Fazio, 1986; Eagly & Chaiken, 1993), it can be expected that negative considerations are more important than positive ones, especially for behavioural intentions. In the present study we aim to show these asymmetrical effects of positive and negative components on overall attitude and behavioural intentions. We hypothesize that negative components (both affective and cognitive) are directly related to behavioural intentions, whereas this is less the case for positive components.

Our focus in the present study is on the structure underlying attitudes towards GM food. The use of confirmatory factor analysis provides us with information about the structure of attitudes towards GM food as inferred from the responses to the various attributes of GM-food. Apart from this 'objective' information about the structure of respondents' attitudes we are also interested in 'subjective' or 'meta-attitudinal' information about their attitudes. Specifically, we included measures of subjective ambivalence and involvement, both of which are indicators of attitude strength. Attitude strength refers to the degree to which an attitude is stable over time and impacts on behaviour (Krosnick & Petty, 1995). For instance, someone whose attitude does not change after a persuasive message or over an extended period of time is said to have a strong attitude. In the case of GM food we expect that ambivalence and involvement are positively correlated. Respondents who find GM food an

important issue are likely to think more and more thoroughly about the issue (Pomerantz, Chaiken & Tordesillas, 1995). Since the debate about GM food is relatively polarized with clear opponents and supporters, positive *and* negative information both are present in the media. People who are more involved are more likely to be confronted with this two-sided information, because they will pay more attention to it. Therefore we expect higher levels of experienced ambivalence than for those with lower levels of involvement. Thus, measures of attitude strength provide us with additional information on what kind of attitudes people hold towards GM food.

In sum, we assess the structure of attitudes towards GM-food and in doing so we distinguish between positive and negative components as well as cognitive versus affective components of attitudes. We assess the relative fit of models that do or do not distinguish between these components. In addition, we investigate the relation between different attitude components and behavioural intentions and explore relations between different attitude strength indicators.

Method

Participants

431 introductory psychology students participated in this study in partial fulfilment of a course requirement, 34% of these were male. Mean age was 21.60 years (SD = 2.78).

Procedure

The questionnaire was part of a larger testing session. Participants were told that the questionnaire dealt with their ideas about and feelings towards GM food. The first part of the questionnaire consisted of an overall attitude measure, followed by the measurement of the different affective and cognitive aspects. Finally, involvement, subjective ambivalence and behavioural intentions were measured.

Dependent variables

Overall attitude

Overall attitude was measured with four items that asked participants to indicate the extent to which a particular term (*positive, negative*, *for* and *against*) was applicable to their overall attitude towards GM food. Participants could give their answer on a scale ranging from 1 (not at all) to 7 (extremely). Overall attitude was computed from the mean of these four items (Cronbach's alpha = 0.88), with higher scores indicating a more positive attitude.

Affective and cognitive components

The measurement of affect and cognition was largely based on a questionnaire designed to measure different (affective and cognitive) components of attitudes (Crites, Fabrigar, & Petty, 1994)[1]. Items that were not directly relevant to the issue of GM food were removed and we added several items from earlier studies on attitudes towards GM food (Frewer et al., 1997; Magnusson & Koivisto Hursti, 2002). Participants indicated the degree to which each term described their feelings about GM food on a 7-point scale ranging from 1 (not at all) to 7 (completely). All items and their factor loadings in the model are reported in Table 2.

Behavioural intentions

Behavioural intentions were measured with two items: 'When I know a product contains GM food I don not eat it' and 'I have no problems with eating GM food', scored on a 7-point rating scale ranging from 1 (totally disagree) to 7 (totally agree). Scores on the first item were reversed and the two items were averaged into a composite measure of behavioural intentions (Cronbach's alpha = 0.78).

Ambivalence

To measure subjective ambivalence, respondents were asked to indicate their agreement with two statements: 'I have mixed feelings', and 'I have conflicted thoughts', on a 7-point scale ranging from 1 (not at all) to 7 (very much).

Involvement

Two items measured involvement: 'The topic of GM food is important to me personally', and 'I am not involved with this topic', again scored on a on a 7-point scale ranging from 1 (not at all) to 7 (very much). Scores on the second item were reversed to form a composite measure of involvement.

Confirmatory factor analyses

To investigate the structure of the attitude towards GM food, we conducted Confirmatory Factor Analyses (CFA) using EQS 6.1. CFA assesses the fit between the observed relationships between items and a hypothesized pattern of factors and factor loadings. In this case, for all the models we assessed, each item was allowed to load only on the factor it was supposed to indicate. Further, factors were allowed to correlate and measurement errors were assumed to be uncorrelated. To evaluate the fit of our proposed model we compared it to alternative models on a number of 'goodness of fit' indices. Apart from the χ^2 value, which is extremely sensitive to sample size, we included the goodness-of-fit index (GFI; see Jöreskog and Sörbom, 1981); the comparative-fit index (CFI; Bentler, 1990),

[1] Questionnaire research, to assess what people's feelings about an issue are, may seem problematic, because responses to such questionnaires require substantial cognitive processing. However, a recent study by Feldman Barrett (2004) shows that responses to such questionnaires do express the experience of the reported emotions rather that just the (cognitive) understanding of the meaning of the emotion-words.

Table 1
Goodness-of-fit statistics for competing models of attitude components

Model	χ^2	Df	AIC	CFI	GFI	RMSEA
1-factor	2656	135	2386	0.48	0.41	0.21
2-factor: affect—cognition	2190	134	1954	0.53	0.51	0.20
2-factor: positive—negative	1132	134	864	0.79	0.72	0.13
4-factor: pos. affect, neg. affect, pos. cognition, neg. cognition	636	129	378	0.89	0.83	0.09
5-factor model with risk perception as separate factor	484	125	234	0.93	0.91	0.07

AIC = Akaike information criterion, CFI = Comparative fit index, GFI = Goodness of fit index, RMSEA = Root mean square error of approximation.

the Akaike information criterion (AIC) and the root mean squared error of approximation (RMSEA). The GFI reflects the extent to which the hypothesized model fits the data better than no model at all (Jöreskog and Sörbom, 1993), whereas the CFI compares the performance of the estimated model to that of the independence model, in which the variables bear no relationship to one another. As a rule of thumb, values around 0.90 indicate good fit for the CFI and GFI (Hu & Bentler, 1995). For the AIC, which is a modification of the χ^2 that adjusts for complexity of the model, lower scores indicate better fit. The RMSEA indicates the average discrepancy between the model-implied and the observed covariances, lower values (typically <0.10) indicate higher correspondence between the relations between items in the model and observed relations.

Results

Due to incomplete questionnaires, data from seven respondents were excluded from the analyses. Order of the affect- and cognition-items had no effect on the analyses reported here and is therefore not included as a factor.

Distinction between positive and negative components

Fit statistics for the confirmatory factor analyses are summarized in Table 1. Goodness-of-fit statistics for the 4-factor model were better than those for the other models. Residual index (RMSEA) was below 0.10 and the goodness-of-fit indices were around 0.90. Inspection of the covariance residuals for the different items indicated a possible improvement of the 4-factor model. The negative affect item *worry* was highly related with the negative cognitive items *risky* and *dangerous*. It thus seemed that it would be useful to distinguish an additional factor *risk/worry* that combines both cognitive aspects related to the perception of risk and affective information about the specific accompanying feelings. Indeed, this exploratory derived 5-factor model provided a good fit with the data and the AIC was much lower than that of the four-factor model. The standardized factor loading coefficients and construct reliability for the measurement model are presented in Table 2. The individual item loadings on the constructs were all highly significant ($p<0.01$; t-value >6); all individual indicators have substantial variance that could be attributed to the underlying construct. There were no standardized residuals greater than 0.18. Taken together these results suggest that the attitude towards GM food can be structured into five components: a distinction in positive and negative affective and cognitive components as well as a factor specifically related to risk perception.

The reliability of all five factors was satisfactory, between 0.79 and 0.89 (Table 2). Means and standard deviations for the five components are presented in Table 2. Most means were located around the midpoint of the scale, indicating moderate levels of endorsement. Table 3 gives the correlations of the five components, and shows that they are moderately related. This holds most strongly for the factors with the same valence, e.g. positive cognition

Table 2
Standardized factor loadings, Cronbach's alpha and means (SD's) for components in 5-factor confirmatory model

Component/items	Standardized Factor loadings	Cronbach's alpha	Mean (SD)
Positive affect		0.89	2.25 (1.02)
Pleasure	0.82		
Satisfacton	0.86		
Trust	0.69		
Hope	0.75		
Happiness	0.78		
Negative affect		0.88	2.56 (1.29)
Anger	0.86		
Displeasure	0.84		
Disgust	0.85		
Sadness	0.79		
Positive cognition		0.83	3.26 (1.26)
Useful	0.88		
Necessary	0.76		
Healthy	0.74		
Negative cognition		0.79	3.27 (1.34)
Unhealthy	0.66		
Superfluous	0.82		
Useless	0.77		
Risk perception		0.85	3.96 (1.40)
Risky	0.80		
Dangerous	0.85		
Worry	0.77		

All individual factor loadings are significant, $t>8$, $p<.01$.

Table 3
Correlations between five components of attitude towards GM food

Component	1	2	3	4	5	6
1. Overall attitude		0.59	−0.64	−0.51	−0.63	0.69
2. Positive affect			−0.16	0.05	−0.26	0.67
3. Risk/worry				0.62	0.64	−0.33
4. Negative affect					0.61	−0.32
5. Negative cognition						−0.50
6. Positive cognition						

Note. All correlations are reliable, $p<0.01$, with the exception of the correlation between positive and negative affect.

and positive affect and much less for factors with a different valence, like positive and negative cognition. Most strikingly, correlation between positive and negative affect is virtually absent. Also, the correlation between positive and negative cognition was quite low, considering these factors consist of antonyms of similar items (useful vs. useless).

Relative importance of affective vs. cognitive components

One of the aims of this study was to investigate the relative importance of affective vs. cognitive components in determining the overall attitude. In a standard hierarchical regression analysis we compared the additive effect of affect over and above that of the cognitive components and risk perception in the prediction of the overall attitude. A first step with positive and negative cognition as predictors of the overall attitude resulted in 59% of explained variance, $F(2, 424)=310.01$, $p<0.01$. Adding the Risk-component improved the explained variance with 8%, $F_{\text{change}}(1, 423)=104.15$, $p<0.01$. Finally, positive affect ($\beta=0.28$, $p<0.01$) and negative affect ($\beta=-0.18$, $p<0.01$) added another 5% to the prediction of the overall attitude, $F_{\text{change}}\ (2, 421)=39.16$, $p<0.01$. This indicates that affect components have a reliable, albeit modest, influence on the overall attitude[2].

Positive and negative components have distinct relations with overall attitude and behavioural intentions

We next used the five components to predict overall attitude and behavioural intentions, using path analysis in structural equation modelling. As we indicated in the introduction, we expected all factors to affect the overall attitude, but in particular the negative factors were expected to directly influence behavioural intentions. We tested a model where all components were related to the overall attitude but only negative components and the overall attitude were related to behavioural intentions. Positive cognition and affect were not directly related to behavioural intentions (Fig. 1). This model provided a good fit of the data, $\chi^2\ (2)=2.5$, CFI = 0.99, GFI = 0.99, RMSEA = 0.008. In contrast, a model where the positive - but not the negative - components were related to behavioural intentions fitted the data significantly worse, $\chi^2_{\text{difference}}=54.63$, $p<0.01$. Especially the residual index was higher (RMSEA = 0.05, GFI = 0.96, CFI = 0.97), indicating that there was considerable covariance in the data that the model did not account for. Comparison of these two models thus indicates superior fit for the model where negative components, but not positive components were directly related to behavioural intentions.

Subjective ambivalence and involvement regarding GM-food

The above results show that the attitude towards GM food consists of separate positive and negative components. These positive and negative components differentially affect overall attitude and behavioural intention. The association of both positive and negative attributes with GM food is corroborated by our experienced ambivalence measure. Overall, respondents reported moderate levels of ambivalence ($M=3.87$, $SD=1.18$) and involvement ($M=4.18$, $SD=1.43$). As expected, we found that involvement and ambivalence were positively correlated ($r=0.40$). The experience of conflicting thoughts regarding GM food was related to perceiving the issue as more important.

As a final step we investigated whether attitude strength can shed some light on the specific 'risk'-component that we discovered in the earlier reported analyses. One possible reason that risk forms a separate factor from the other negative cognitions, is that the latter refers to the absence of positive attributes (useless, not healthy) whereas risk refers to the presence of an important negative attribute. Following this reasoning we might expect that the risk-component and negative cognition-component are differentially related to involvement: negative feelings and risk perception signal that something is wrong and this should increase involvement. In contrast, the finding that something is useless should make it *less* relevant. In line with this reasoning a regression analysis with involvement as dependent variable and negative cognition, negative affect and risk/worry entered simultaneously as predictors showed that while

[2] Analysis using path analysis with correlated predictors showed similar results.

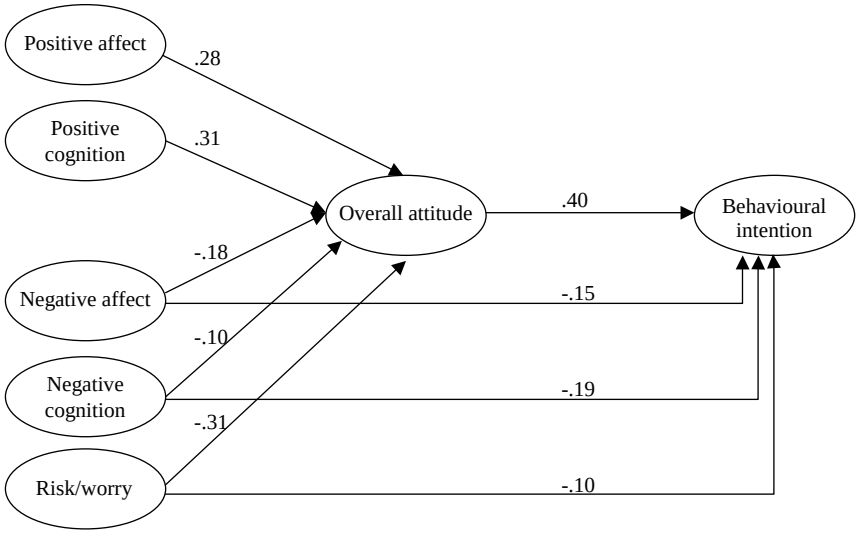

Fig. 1. Path coefficients for relations between attitude components, overall attitude and behavioural intentions.

negative cognition was negatively related to involvement ($\beta = -0.19$), negative affect and risk/worry were positively related ($\beta = 0.27$ and 0.48 respectively, all p's < 0.01, Overall $R^2 = 0.31$, $F(3,425) = 62.04$, $p < 0.01$)[3].

Discussion

The present results show that the attitude towards GM food is best described in terms of separate positive and negative and separate affective and cognitive components. Respondents distinguished between positive and negative aspects of GM food and they distinguished between feelings and thoughts they associated with GM food. At the same time, the structure of attitudes towards GM food also differed from our expectations. Our four-factor model provided a less than ideal fit of the data. This was primarily due to high correlations between specific affective- (worry) and cognitive (risky, dangerous) items. Fit improved considerably when a fifth component was added, consisting of these affective- and cognitive items related to risk-perception.

Results thus show a rather specific picture of the structure of attitudes towards GM food. The relative independence of both positive and negative components, and of affect and cognition adds to the existing literature on the structure of attitudes in general (see Van den Berg, Manstead, van der Pligt & Wigboldus, 2005 for similar findings in the domain of organ donation). Most studies to date have either focused on the distinction in affect and cognition (e.g. Crites et al., 1994) or on the independence of positive and negative components (e.g. Cacioppo et al., 1997). Our findings show a distinction in affect and cognition as well as a distinction in terms of valence. This may be due to the fact that, in contrast to many studies, we used unipolar scales. When using these scales respondents do not have to choose between being positive and negative (e.g. healthy - unhealthy) but can indicate agreement with both positive and negative aspects. The present results are also in line with a recent study on food attitudes (Aikman, Crites, & Fabrigar (in press)) that also found a distinction in positive and negative affective components.

Interestingly, correlations between positive and negative components were moderate to virtually absent, which is another indication that positive and negative components of the attitude are not mutually exclusive. Results are thus in line with the literature on attitudinal ambivalence (Cacioppo et al., 1997; Conner and Sparks, 2002): people can evaluate GM food both positively and negatively at the same time. For instance they may find it both healthy and useless. Our findings suggest that people can even judge GM food to be both useful *and* useless. This agreement with two statements that are antonyms may have to do with the broadness of the topic of GM food. People may find GM food useful for production enlargement in the third world, whereas at the same time they may find it useless in daily life. It would be interesting for future studies to investigate more closely where ambivalence towards GM food stems from: for instance is it predominantly positive beliefs (cognitions) that conflict with negative feelings?

The finding that positive and negative components differentially related to behavioural intentions underlines that they are best regarded as separate components. As we discussed in the introduction, the important role of negative components in predicting behavioural intentions is in line with other studies from the decision-making literature. In particular, the studies by Eyal and co-workers (Eyal et al., 2004) showed that negative considerations play a larger role than positive considerations when considering concrete events in the near future. In the present study we found the same effect when respondents considered their intentions to eat GM food.

[3] In this case we report standard regression analyses, because we wanted to compare the relation between predictors and dependent variable rather than examining the fit of an overall model.

Research on public attitudes towards GM food tends to emphasize the role of cognitive aspects. The finding that in this study a division in affective and cognitive components provided an improvement in fit of the measurement model compared to when only a distinction in valence was made, indicates that people do make a distinction between what feelings the topic evokes and what they think about it. Adding affective components resulted in a modest 5% increase in explained variance of the overall attitude. It is clear that respondents by no means drive entirely on their feelings in determining their evaluation of GM food. On the other hand, considering the correlations between affective and cognitive components, the fact that affect did improve the prediction of the overall attitude makes it in our view a relevant finding. In addition, affect and cognition were related in different ways to involvement. Negative affect was positively related to involvement whereas negative cognitions were negatively related to involvement. This is another cue that affect and cognition can be regarded as related but separate components that can have different consequences. An important next step is to investigate whether there are groups for which different components are more or less important. In the present sample and setting, (first year students in a mass testing setting), one would expect cognitive considerations to be relatively salient. It could be that for other groups or contexts, affective components would be more influential. In line with this reasoning Shiv & Fedorikhin (1999) showed that when people were under cognitive load, their affective (and fast) reactions towards food products determined their evaluation more than their beliefs.

As we mentioned before, risk-perception emerged as a separate component in the present study. This separate risk-perception factor was not hypothesized beforehand and therefore requires further confirmation. Nevertheless, the finding is in line with earlier studies (Frewer et al., 1997) showing that risk-perception is crucial to the perception of GM food. Our findings show that perceived risks of GM food are related to cognitions (beliefs) as well as feelings (Loewenstein, Weber, Hsee & Welch, 2001). In addition, risk and negative affect were positively related with involvement. This may be due to the fact that both risk perception and negative affect signal the presence of negative aspects that warrant vigilance and attention to the topic.

One focus of the present study was on attitude strength of the attitude towards GM food. To do this, we included measures of subjective ambivalence and involvement. The finding that ambivalence and involvement were positively related may seem counterintuitive. One would expect that people who find an issue more important are more likely to have a one-sided (positive or negative) evaluation about it. Tesser and co-workers (Tesser, Martin, & Mendolia, 1995 for an overview) showed that when people think more about a topic, their attitudes become more polarized. The positive correlation between involvement and ambivalence we found in this case may have to do with the relative novelty of the attitude object. It may therefore be interesting to investigate how this relation develops over time or as a function of new information. Attitude strength characteristics like ambivalence and involvement influence how people react to new information (Conner and Sparks, 2002; Holland, Verplanken & Van Knippenberg, 2002). Therefore it seems useful to include measures of attitude strength when investigating people's reactions to (Information on) GM food.

Establishing the structure of attitudes towards GM-food can provide information on the dynamics of attitude formation and change. The finding that positive and negative attributes are relatively independent, implies that providing only positive or negative information on the attitude object is not enough to sway a person's attitude. If positive and negative information are stored as separate attitude components, changing one component will not automatically transfer to other components. Therefore information should focus on both sides (see also Frewer et al., 1995). Unpacking attitudes in terms of both structure and strength should help to provide a more complete picture on the how's and why's of consumers' attitudes towards GM food.

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