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Attitude Formation On Nanotechnology Food Using Framing

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ABSTRACT

Nanotechnology is a technology that has been increasing throughout these years in the food industry. It is applied within the product like the orange juice using nanoencapsulated vitamin C or in the packaging as in a plastic bottle to protect the product from UV lights. However, few information is found about attitude formation using message framing and regulatory focus manipulation.

The aim of this research is to study the information-processing route choice that people make to form the overall attitude toward nanotechnology food and packaging.
Variables such as fluency, familiarity to nanotechnology and perceived risk is evaluated.

The data collection was done with an online questionnaire and a regulatory focus manipulation was done. Four advertisements were presented for a few seconds to measure the Primary Affective Response (PAR) and afterwards the same advertisements were presented for a longer period of time to measure the cognitive and affective response. Then, an overall attitude, familiarity and perceived risk were also measured. A ranking preference order was asked and finally a manipulation check was done. Statistical analysis such as ANOVA, regression and Friedman were used to determine significant differences between variables.

Unfortunately, the regulatory focus manipulation did not work and it was excluded from the study. However, the research showed that in the packaging evaluation the framing is more important than the juice evaluation in the rank order preference. The results of the former was based more on the technology that was applied (nano/non nano). When high fluency occurs, the affective route is more predominant. When low fluency is present, the cognition route is taken. PAR has an important role in the attitude formation because when it is high, it induces a person to go through feelings to make a decision. If PAR is negative in the orange juice evaluation the effect of the feelings on the overall attitude is more important than when the PAR is positive. They way around happens when the packaging is evaluated. The effect of cognition on the overall attitude also depends on the PAR and it is different for juice and packaging. The risk has an effect on the information processing: a high risk induces to a cognitive route and a low risk induces to a affective route. Affect is more important when the juice is evaluated than the packaging.

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I. INTRODUCTION

The nanotechnology is a technology at the atomic or macromolecular levels on the scale of approximately 1-100 nm (Buzby, 2010). The application of the nanotechnology has been used in the pharmaceutical industry, batteries, solar panels, (European Commission, 2012), cosmetics and food (Grobe *et al.,* 2008). The introduction of nanotechnology in food has contributed to the innovation in the food sector (Siegrist, 2007) in two ways: Nano food that corresponds to the nanotechnology applied in food and Nano packaging when it is incorporated in the packaging of the food (Duncan, 2011).

Researches about attitudes towards nanotechnology food, its acceptability and perceived benefits/risks have been done (Siegrist et al., 2007a; Siegrist and Keller, 2011; Bieberstein et al., 2013, Cook and Fairweather, 2007) but there is a lack of information about how the overall attitude is formed. The overall attitude is composed of cognitive and affective attitudes. The affective route concerns the feelings and emotions that a person has, which is an information processing that does not need much effort. The cognitive route is related on what the individual thinks and it needs a lot of effort to process the information (Epstein, 2010; Azjen, 1975). One of these two routes is more predominant than the other one in specific circumstances and it is useful to see whether the person makes a decision based on affective or cognitive information processing. Knowing which is the route that people choose, the companies can make marketing strategies to manipulate the affective or cognitive response in order to have a positive overall attitude.

It is important that the food industry marketers know how a message in a product influences the attitude. The former depends on how the message is presented in the product. Information can be given in different ways with the same content, which is named message framing. Studies have shown that the gain-framing leads to a higher persuasion (Keller et. al, 2003). This is also presented in food labeling to induce persuasion in marketing communication (Yuspeh, 1979). However the attention that the consumer will give to the product will also depend on their regulatory focus (promotion vs. prevention). Promotion oriented people pay more attention to the message that has a gain or have a positive outcome. Prevention oriented people pay

more attention to the message that has a loss or avoidance outcome (Aaker and Lee, 2000; Cesario, 2004). This fit increases fluency, which will determine the route, where the person will follow and could increase the persuasiveness of the message in the labeling and therefore will influence decision making (Aaker and Lee, 2000). This will be important to make a segmentation of products and determine a strategy for different people.

Fluency is how easy and comprehensible is the information processing. The feeling of good or rightness influence them on how fluent they elaborate the processing. It is also related to the familiarity of the product. If a person has seen or known the product before it is easier for them to process the information in a less effortful way. Making the consumer feel right will lead them to have fluency and have an affective route based on feelings. So, the persuasive messages would have to focus on how to make the people feel positive towards nanotechnology in food. (Lee and Aaker, 2004, Topolinski, 2011; Thompson and Morsanyi, 2012).

The main objective of this research is to investigate the information-processing route, which the people choose (cognitive or affective) to form the overall attitude toward nanotechnology food and packaging. This route will be expected to be influenced by the fluency that is related with the fit among the regulatory focus and message framing, the familiarity to nanotechnology, which are related to fluency characterized by the feeling of good.

II. THEORETICAL FRAMEWORK

Attitudes are judgments that are made by people towards an object or a situation that contain cognitive and affective components. In some cases, rational information processing is more important to define an attitude, while other times attitude is based more on feelings. Depending of the strength of the rational or heuristic information processing, a person will follow a cognitive or affective route to form the overall attitude. According to the Elaboration Likelihood Model (ELM) there are two routes for message elaboration: the central route (cognitive), in which the individual processes the information with effort using a systematic processing with thinking and the peripheral route (affective) which is less effortful and the use of heuristics is present (Petty and Cacioppo, 1986).

Previously, researches based their studies only in cognition to explain the decision making, but nowadays the affect has played an important role demonstrating that it can influence judgments and attitude formation (Anand et.al, 1998; Shiv and Fedorikhin, 1999; Berg et al., 2005). Affect is a feeling, which is composed by emotion and mood. It may or may not be related to a particular stimuli (Solomon, et.al, 2010, Zajonc, 1980). The judgment is built with hunches or gut feelings without being able to know which is the reason to choose the judgment or with the reasoning absence (Lieberman, 2000; Evans, 2010).

On the other hand, cognition is a rational/analytical information processing which is conscious, effortful and more elaborated because takes more time. The cognitive response is based on the experience by reasoning towards a specific stimuli, which could be about knowledge, opinions, thoughts and beliefs. (Epstein, 2010; Azjen, 1975). In Fishbein and Azjen´s (1975) Expectance-value model, the people have beliefs and attributes towards the object that influence the weight of importance and integrate them to have a final judgment (Anderson, 1981).

The affective and cognitive responses occur independently (Hoch and Loewenstein, 1991; Zajonc, 1980). The kinds of affective responses depend on how deep the evaluation of the stimulus is made. A primary affective response appears in the first stage of reaction towards a stimulus. When there is a short time stimulus exposition

the individual is not able to process in depth the information. Therefore, the response of the superficial evaluation is instant, automatic and gross (Zajonc, 1980; Berkowitz, 1993). After this stage the individual is able to do a deeper evaluation, which can elaborate more the feelings and can be different from the primary affective response (Zajonc, 1980; Berkowitz, 1993). The cognitive response is also present in the elaborated evaluation where people make the analysis and reasoning to have a judgment (Zajonc, 1980). These two kinds of routes (affective or cognitive) are present in the consumer while they make the information processing but one of them is more predominant than the other one to the form the attitude in different situations.

The information processing route choice is influenced by the primary affective response. This superficial heuristic processing valence will depend on how the person feels about the product. When there is coherence between what they already have in their memory and the product, the superficial evaluation produces a good feeling. The amount of effort needed to process the information is low so the affective route is followed. On the contrary, when the primary affective response has a lower valence showing that the person doesn´t feel so good because they feel that the product is incoherent. The person needs more effort in the information processing, rational and analytical thinking to make a decision (Camacho et al., 2003; Higgins et al., 2003; Topolinski, 2011)

H1: Primary affect response influences the information processing route choice.

H1a: Positive primary (high valence) affective response induces an affective route

H1b: Negative primary (low valence) affective response induces a cognitive route

After a superficial evaluation is made the person goes into a more elaborative information processing that consists of an affective and cognitive response. The route, which the individual chooses, depends on the fluency. Processing fluency is how easy a person processes the information (Lee and Aaker, 2004), which attributes to the "feeling right" denominated by Higgins (2003). This feeling is produced when there is a consistency with what the individual naturally think and the message that is presented. Thus, the information is easier to process and fluency is produced.

Fluency is considered in researches where regulatory fit and message framing are manipulated (Lee and Aaker, 2004).

Marketers can present messages in their products, which can be phrased in different ways but having the same objective meaning (Chandran and Menon 2004). This way of presenting the messages is called framing. The persuasive messages can be framed with a gain focus emphasizing the benefits, positive outcomes. Messages can also be framed with a loss focus highlighting the negative outcomes (Broemer, 2002).

Consumers can react differently to the framing that is presented because some may be more sensitive to the positive messages and others to the negative outcomes. Therefore, it is relevant to discuss the Regulatory Focus Theory. According to Higgins (1997) there are two kinds of orientation in people: promotion and prevention focus. The promotion focus consumers are sensitive to positive outcomes, achievements and gains. These people experience emotions linked to cheerfulness and happiness and use an approach strategy to achieve their goals. They are focused on gains and aspirations that will lead them to their ideals. However, the prevention focus consumers are sensitive on negative outcomes, avoidance and loss. They involve security and trust in their feelings and use avoidance strategy to reach their goals. Responsibilities and thinking on how they must act are characteristics that these people have.

The fit between the regulatory focus (promotion/prevention) and the framing (gain/loss) leads to a positive attitude and behavior intentions in consumers when the message framed is in congruence with the regulatory focus of the person (Cesario et. al, 2004; Lee and Aaker, 2004). In the research made by Fransen (2010) the consumers with a promotion focus had a better attitude towards genetically modified food when the message was presented as a gain than when it was presented as a loss.

When there is a regulatory fit between the framing and the regulatory orientation of the consumer, the person "feels right" and the information is processed easily leading to an increasing fluency (Camacho et al., 2003). As the fit increases the message processing happens more fluently, which moderates the persuasion (Lee and Aaker, 2004). Consequently the affect route can be activated automatically and the person

would choose this route for the decision making (Hoch et al., 1991). When the message framing doesn´t make the person feel right because of the inconsistent regulatory fit between the consumer´s orientation (promotion/prevention focus) and the framing (gain/loss) there will be a lower fluency (Higgins et al., 2003). Hence, we would expect that when people will have a regulatory fit between the message framing and the regulatory focus, people will have more fluency and will choose an affective response route toward the products. On the contrary, the low fluency leads consumer think a little bit more and make more effort to analyze the situation with a cognitive route (Zajonc, 1980).

H2: The fit among people´s regulatory focus (losses vs. gains) and the message framing (promotion vs. prevention) influences the information processing due to the fluency

> **H2a:** Fluency increases when there is a fit among people´s regulatory focus (prevention vs. promotion) and the message framing (loss vs. gain).
>
> **H2b:** The fit among people´s regulatory focus (prevention vs. promotion) and the message framing (loss vs. gain) leads to an affective route.
>
> **H2c:** The misfit among people´s regulatory focus (prevention vs. promotion) and the message framing will lead to the cognitive route.

People are familiar when they have experienced or heard about the topic in a certain kind of situation. They store the information in the memory and when the topic is presented again, the situation that was experienced before is brought to their mind again (Cleary, 2008). If a person has seen a nanotechnology product and has been exposed before several times that makes the individual familiar with the object and an effortful information elaboration is not needed. The feeling of security of knowing makes the person feel good and follow the affective route. However, the valence of the decision may be positive or negative depending of the perceived meaning of the product that the person receives (Zajonc, 1998; Forgas, 1994). Therefore,

H3: Nanotechnology familiarity influences the information processing

H3a: People familiar with nanotechnology follows the affective route.

H3b: People unfamiliar with nanotechnology follow the cognitive route.

Nano inside and Nano outside are terms that have been used in other researches to indicate if the application is in the food or in the packaging respectively (Siegrist, et al., 2008). Concerns about the safety and ethical issues have risen up towards technology as in the genetic modified food named also as "Frankenstein" food. The neophobia has appeared as an enemy of food technology, which opposes the uses of nanotechnology in food (Hosseini, et al., 2012). Nevertheless the direct and indirect application on food has different perceptions among the people. The first one is ingested by people, which is viewed more problematic in the society because people think that could be more risky for their health. On the other hand, the nanopackaging are more accepted by the consumers because they are not eaten and it is considered less risky (Siegrist et al., 2008; Siegrist et al., 2007a). So the packaging is considered as more preferred as an innovation in nanotechnology than applied in the food.

Risk perception in nanotechnology packaging and food is considered very important to see if the person would have a positive or negative overall attitude. When there is a high perceived risk by the people they tend to think more about things before they make a decision. Low perceived risk is much easier to reach the overall attitude and the feeling takes part of the decision making (Segrist et al., 2007a).

H4: People will follow the cognitive route for nanotechnology applications in food (nano-inside) and an affective route in nanotechnology application in packaging (nano-outside)

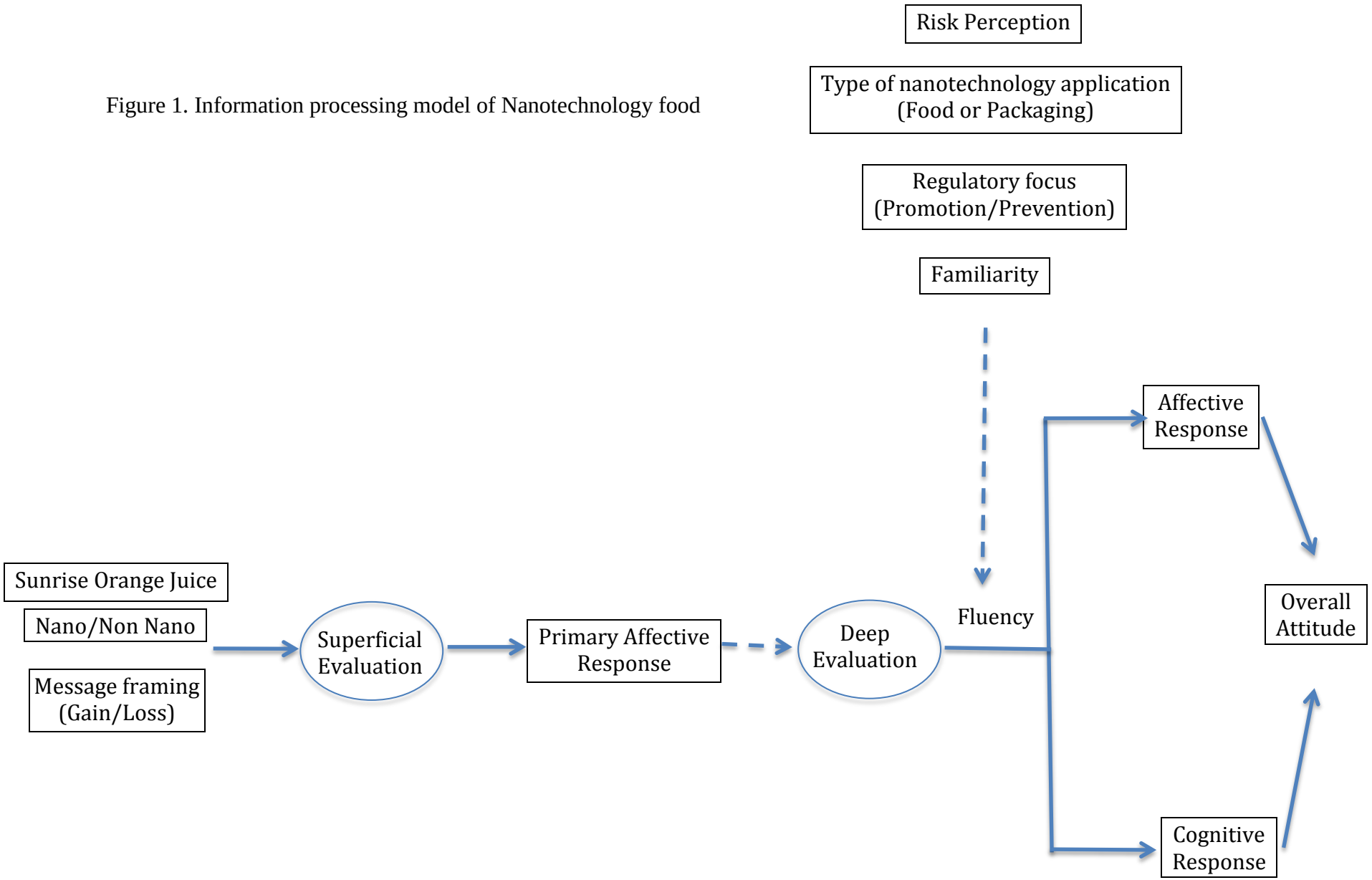
H4a: There is a higher perceived risk in nanotechnology food than in nanotechnology applied in the packaging.

H4b: People that have a high perceived risk follow a cognitive route and low perceived risk follow an affective route.

The scientists have developed products with improved sensory characteristics using antifoaming, colour additives and other additives made with nanotechnology (Grobe *et al*., 2008). The functional food has novel products with the nanoencapsulation process where the bioactive components will be released enhancing the maximum stability and functionality (Shefer and Shefer, 2003 a,b; Saguansri and Augustin, 2006). The packaging technology has created the "smart packaging" that can inform about the freshness and safety of the product in the way where the consumer can know that the food is free of microorganisms, toxins and chemicals that could affect their health. (Grobe *et al*., 2008; Imran, *et al.*, 2010) The nanotechnology also has improved the barrier of the UV light exposure, gas reduction and moisture exchange (Vandermoere, 2011). Nanotechnology applied in food is emerging as a new technology and the way it is communicated to the consumers leads to different attitudes towards the product (Kees, 2011; Fransen et al., 2010) .

The model of the research is presented in the next page.

Figure 1. Information processing model of Nanotechnology food



III. METHODOLOGY

3.1 Participants and design

213 students participated in the current research from Wageningen University (95 male and 118 female) 2 participants were excluded from the sample because they were outliers in the data screening. Therefore, the sample was composed of 211 participants (94 male and 117 female), ranging in age from 17-58 years old (M=27, SD=6.5).

The study used a 2 (Technology: Nanotechnology application x Non Nanotechnology application) x 2 (Framing: Gain x Loss) x 2 (Regulatory focus: Promotion vs. Prevention) applied to product and packaging separately. The technology and framing factors were applied to all the individuals (within subjects); meanwhile the regulatory focus and the type of application were factors that were randomized in two different groups (between subjects).

3.2. Stimulus material

The name SUNRISE was created to present the orange juice in an ad, generating the stimulus material composed of 8 ads (Appendix 1).

3.2.1 Nano and Non nano technology

The orange juice was presented as a great vitamin C Source. The nano product was a fortified orange juice with a nanoencapsulated vitamin C. The non nano product was an orange juice that had natural vitamin C that came from enriched vitamin C oranges.

The bottle of the orange juice had two types of technologies: the nano packaging and the anti-oxidant technology. The former protects the orange juice from the UV light, which preserves the vitamin C. The last one is an oxygen barrier that prevents the oxidation of the vitamin C.

3.2.2 Message Framing

Participants were exposed to a gain framing message regarding the benefits of Vitamin C in the orange juice (Strengthens immune system) or as a loss (Prevents flu and cold infection).

3.3. Dependent variables

3.3.1 Overall attitude

The overall attitude is measured with two questions (α=0.81): "My overall attitude towards the orange juice is…" rated by a 7-point Likert scale, which was ranged from 1 (very negative) to 7 (very positive) and "Do you like the orange juice?" which was ranged from 1 (not at all) to 7 (very much).

3.3.2 Affective and cognitive attitude

3.3.1. Affective attitude

The affective response measurement included two positive emotions (joy and satisfaction) and two negative emotions (fear and disgust) (α=0.78) (Desmet, 2003, and Russell, 1980). The question: "To what extent do you feel … toward this orange juice?" was asked with each emotion and the respondents had to rate with a 7-point Likert scale. The applicability of the adjectives was ranged from 1 (not at all) to 7 (very much).

3.3.2. Cognitive attitude

The cognitive response measurement included three positive cognitions: (useful, beneficial and healthy) and two negative cognitions (useless and harmful) (α=0.85). The question: "To what extent do you think this orange juice is…" was presented with each cognition, which participants had to rate with a 7-point Likert scale. The applicability of the adjectives was ranged from 1 (not at all) to 7 (very much).

3.4 Moderators

3.4.1 Primary affective response:

The PAR was measured with the following question: "How much do you like the Orange Juice?" Respondents had to answer with a smiling face scale which was ranged from 1 (saddest face) to 5 (happiest face).

3.4.2. Risk perception

The risk perception was measured with this question: "To what extent do you think this orange juice is risky", which participants had to rate with a 7-point Likert scale. The applicability of the adjectives was ranged from 1 (not at all) to 7 (very much).

3.4.3 Fluency:

The fluency based on fit was measured based on Aaker & Lee (2004) study which the participants evaluated the ease of processing with the question: How did you find the information of the advertisement in terms of…". This was rated by a 7-point Likert scale that was ranged from 1 (difficult to process) to 7 (easy to process) and comprehensibility ranged from 1 (difficult to understand) to 7 (easy to understand) (α=0.85).

3.4.4 Type of application

There are two types of nanotechology applications: Nanotechnology that is incorporated in the product and in the packaging. The nano product is the orange juice, which has the nanoencapsulated vitamin C incorporated and the nano packaging application corresponds to a plastic bottle that has an antioxidant material made with nanotechnology. The orange juice was chosen based on a literature review about nanotechnology applications on food. The product is mainly designed for the experiment and does not exist in the market (Bieberstein et al., 2012)

3.4.5 Regulatory focus

The regulatory focus was manipulated adopting Higgins et. al (1986) and Lockwood (2002) procedure. Participants in the promotion focus condition were asked to write down one or several situations they hope to achieve within the next few weeks and the prevention focus condition was asked to write one or several negative situations they would like to avoid. For each situation the participants had to write a brief explanation of the strategy to accomplish or prevent it.

3.4.6 Nanotechnology familiarity

Then, the familiarity with nanotechnology was asked: "To what extent have you heard about nanotechnology?" A 7-point Likert scale was used ranged from 1 (not at all) to 7 (a lot).

3.5 Product preference

The participants were asked to rank order in order of preference the 4 advertisements that were included in previous questions. The participants ranked them in order of preference from 1 (the most preferred) to 4 (the least preferred). The results could verify whether each advertisement is perceived differently by the participants.

3.6 Regulatory focus Manipulation check

To check the manipulation of the regulatory focus done at the beginning of the questionnaire, three questions were presented to the participants. Each question is given as pairs of statements with opposite ends of 7-point scales. These were: "I would prefer to:

i. "do whatever I want" (ideal) versus "do what is right" (ought);
ii. "take a trip around the world" (ideal) versus "payback my loans" (ought);
iii. "go wherever my heart takes me" (ideal) versus "do whatever it takes to keep my promises" (ought).

The participants indicated the direction they supported more and responses were

averaged into a single index, which was ranged from 1 (emphasis on ideals) to 7 (emphasis on oughts). Finally an ANOVA was executed to show if the participants had more emphasis in an ought self (prevention focus) or ideals condition (promotion focus) with the means (Pham and Avnet, 2004; Roy and Ng, 2012; and Yoon et al., 2012).

3.7 Procedure

An online survey using Qualtrics was used to distribute the questionnaire through emails, social networks and at Wageningen University.

Four conditions of the stimulus material were used in the research where 2 of them presented a gain framing. Within the 2 gain framing ads stimulus one had a nanotechnology product and the other had a normal product. The other 2 stimuli contained a loss framing, which also varied on nano and non nanoproduct.

Half of the participants evaluated the product-orange juice (nano and non nano) and the rest of them were presented with the packaging-bottle (nano and non nano). The promotion focus was induced to a 50% of the participants and the rest were manipulated for a prevention focus. Therefore, 25% of the population was assigned randomly for each condition and these contained the following factors:

Table 1. Questionnaires that were given to the participants

Questionnaire	A	B	C	D
Regulatory Focus	Promotion	Promotion	Prevention	Prevention
Type of application	Product	Product	Packaging	Packaging
Framing	Loss/Gain	Loss/Gain	Loss/Gain	Loss/Gain
Nano/Non Nano	Nano/Non Nano	Nano/Non Nano	Nano/Non Nano	Nano/Non Nano

Firstly, the individuals were told that they would be contributing a research to position the new SUNRISE Orange Juice in the market. Then, they were randomly assigned to one of the four conditions.

Respondents completed the survey at their own time with an Internet connection and compensation was given. When they started the questionnaire, an introduction of the survey was presented with a cover story:

"Dear respondent,

SUNRISE orange juice is a young and innovative brand. We have designed different prototypes ready to be launched on the market. We are interested in what you think and feel about the different prototypes so that we can determine the best marketing strategy to position SUNRISE on the market."

Firstly, the age and the gender were asked. Then, the regulatory focus was manipulated in promotion or prevention focus. They were asked to write achievements and negative situations they would avoid respectively. Then, the participants were told to look at the advertisements, which was randomly shown for 5 seconds as confirmed by the pretest (see Appendix 2 for pretest) followed by their primary affective response. This process was repeated for all 4 ads of the same application (product or packaging).

Subsequently, the same advertisements that were presented previously appeared randomized on the screen for 30 seconds and respondents were asked to look at them carefully. After each ad, they gave affective, cognitive, overall attitude and fluency.

Next, the previous ads (product or packaging application) were presented at the same time for the period that participants needed and they were asked to rank order to know their preference.[1]

A regulatory focus manipulation check was done with 3 questions with opposite ends statements that the participants answered. Finally the individuals were asked if they have heard about nanotechnology to measure their familiarity with nanotechnology. Comments about the questionnaire were asked and gratitude was expressed to the participant.

[1] The response time of the affective and cognitive responses measured but they were not used in the analysis.

For the people that participated in the survey in Wageningen University, an orange juice in a cup was given to them as a prize. One type of orange juice was served in plastic cups and these were labeled as normal orange juice, nanotechnology orange juice or nanopackaging orange juice. They could choose between these kind of orange juices and these were counted just to have a general idea of which would they prefer. This data was not used in the statistics analysis because it was only an empirical test with no scientific basis. However, a percentage of people that chose each kind is presented in the following table.

Table 2. Percentages of the people that chose the different kind of orange juice after the survey

Type of Orange Juice	(%)
Nano-Packaging	21.6%
Nano-Juice	33.6%
Normal	44.8%

One week later, participants that tried the orange juice received a debriefed explaining that the product they chose was the same as the others and this was only for the study purpose.

3.8 Data analysis

The negative affective (fear and disgust) and cognitive (useless and harmful) responses scales were recoded reversely before analyzing them. So, the high value 7 indicates a positive attitude and the low value 1 corresponds to a negative attitude for all the items.

The data was also used as standardized values to analyze them because PAR was measured with a 5-point scale while the rest of the questions were asked with a 7-point scale.

Firstly, a rank order preference was processed to see that the advertisements stimuli were in fact different from each other. Then, statistical tests were performed for

separate parts of the model and finally a test with all the predictors was run for the whole model.

3.8.1 Rank order preference

A Friedman analysis was conducted for nano and non nano orange juice and packaging separately. A mean rank was presented to show which product was the most and least preferred.

3.8.2 Primary affective response (PAR)

To see whether the primary affect response and the interaction with the former with affective and cognitive responses have an effect on the overall attitude a linear mixed model was carried out to run regression analysis. PAR, affective and cognitive responses were used as predictors and the overall attitude as a dependent variable.

If interactions were found, a spotlight analysis was conducted to see the effect of low and high PAR on the overall attitude. Betas were obtained for affect and cognition and the absolute number would determine the importance of the affective and cognitive route.

3.8.3 Fluency

The procedure was the same as 3.8.2, in PAR, however the predictors that were used were fluency, affective and cognitive responses. The spotlight analysis was carried out to determine the effect of low and high fluency on the overall attitude.

3.8.4 Framing

The procedure was the same as 3.8.2, in PAR, however the predictors that were used were framing, affective and cognitive responses. Instead of a spotlight analysis a regression analysis for loss and gain framing was conducted. Betas were also considered to see the importance of the affective and cognitive route.

3.8.5 Familiarity

The procedure was the same as 3.8.2 with PAR, however, the predictors were familiarity, affective and cognitive responses. Spotlight analysis was not conducted because familiarity was asked in the questionnaire as a general question.

3.8.6 Risk perception

A two way ANOVA 2 (juice x packaging) x 2 (nano and non nano technology) was conducted with risk perception as the dependent variable to see if there was a significant difference. The means are presented to see which product was perceived more or less risky.

Then, the same procedure as 3.8.2 with PAR was conducted, however the predictors were risk, affective and cognitive responses. The spotlight analysis was carried out to determine the effect of low and high risk perception.

3.8.7 Comparing b´s

To compare the b´s of the regression analysis to see which route (affective/cognitive) route is more important, the substract Affect – Cognition was done. Affect-Cognition were used as predictors and the overall attitude as dependent variable in a regression analysis.

IV. RESULTS

4.1 Manipulation Check

To assess if the regulatory manipulation operated as intended, the ANOVA was conducted and showed that there was no significant difference between the emphasis on ought self and primed-ideals in manipulated promotion focus (M=2.85) and prevention focus participants (M=2.81, (F(,540), p>0.05).

The inducted regulatory focus manipulation was not effective and we cannot be confident that the people are promotion or prevention focus as was intended. Therefore, the regulatory focus will not be considered in the research analysis.

4.2 Advertisements

To see if the advertisements were different among each other from the participants point of view, a Friedman Analysis was conducted and there is a significant difference in the preference between the products when the orange juice $x^2(3)= 520.9$, $p<0.000$ was evaluated and when the packaging $x^2(3)= 2876.7$, $p<0.000$ was evaluated.

For both types of application (Orange Juice or packaging) the most preferred was the product that doesn't contain nanotechnology and has a gain framing. The least preferred is the one with nanotechnology with a loss framing (Tables 3 and 4).

Participants that evaluated the orange juice preferred more the product that was didn't have nanotechnology despite the framing. However, when the packaging was presented in the questionnaire the gain framing was ranked as the first ones.

Table 3. Ranking order of nano and non nano orange juice

Advertisement	Mean Rank	Ranking
Nanotechnology Orange Juice (Gain)	2.87	3
Nanotechnology Orange Juice (Loss)	3.12	4
Non Nano Orange Juice (Gain)	1.88	1
Non Nano Orange Juice (Loss)	2.13	2

Table 4. Ranking order of nano and non nano packaging

Advertisement	Mean Rank	Ranking
Nanotechnology Packaging (Gain)	2.29	2
Nanotechnology Packaging (Loss)	3.05	4
Non NanoPackaging (Gain)	2.07	1
Non NanoPackaging (Loss)	2.58	3

4.3 Hypothesis Verification

4.3.1 Primary affect response influence

Hypothesis 1 (H1) states that PAR influences the information processing choice. To test it, the PAR, affective and cognitive responses were used as a predictor while overall attitude was used as dependent variable. There is a significant main effect of the PAR b=0.11, t(709.1)=4.45, p=0.000, affect b=0.31, t(684.4)=10.1, p=0.000 and cognition b=0.39, t(757.7)=11.98, p=0.000 on the overall attitude.

Table 5. Regression analysis using PAR, affective and cognitive responses as predictors on overall attitude

Variable	B	SE	df	t	Sig.
PAR	0.11	0.02	709.1	4.45	0.000*
Affect	0.31	0.02	684.4	10.10	0.000*
Cognition	0.39	0.03	757.7	11.98	0.000*
PAR*Affect	0.05	0.02	584.3	2.08	0.038*
PAR*Cognition	-0.02	0.02	551.4	-0.80	0.425

As a significant interaction between the PAR and affective response b = 0.05, t (584.3) = 2.08, p=0.038 exists (Table 5). A spotlight analysis was conducted to show that when PAR is high, affect (b=0.57) has a higher influence compared to when there is a low PAR (b=0.37) on the overall attitude. On the other hand, cognition influences more the overall attitude when PAR is low (b=0.37) than when PAR is

high (b=0.29). However when affect and cognition in a low PAR are compared, they are equally important (Table 6).

Table 6. Spotlight analysis with low and high PAR

	PAR_1			PAR_5		
Variable	**B**	**SE**	**Sig.**	**B**	**SE**	**Sig.**
Affect	0.37	0.04	0.000*	0.57	0.13	0.000*
Cognition	0.37	0.04	0.000*	0.29	0.13	0.028*

Therefore, when there is a high PAR, affective route induces the overall attitude (H1a) and when there is a low PAR affect and cognition are equally important (H1b). Therefore, hypothesis H1 is confirmed partially.

4.3.2 Fluency

Hypothesis H2 states that fit among regulatory focus and message framing influences the route that people would use due to the fluency. As the manipulation on regulatory focus didn´t work, there is no evidence that regulatory focus was manipulated among the participants. So, Hypothesis H2, H2a, H2b and H2c are not analyzed. However, fluency and framing are components that are important for the analysis so regression models analysis related to these variables are conducted.

Fluency b=0.17, t(703.25)=7.30, p=0.000, affective b=0.31, t(677.95)=10.37, p=0.000 and cognitive responses b=0.37, t(778.40)=11.45, p=0.000 influence significantly on the overall attitude (Table 7). There is an interaction among cognition and fluency b=-0.07 t(700.28)=-2.55 p=0.011 and between affect and fluency b=0.13 t(557.04)=5.33 p=0.000.

Table 7. Regression analysis using fluency, affective and cognitive responses as predictors on overall attitude

Variable	**B**	**SE**	**df**	**t**	**Sig.**
Fluency	0.17	0.02	703.25	7.30	0.000*
Affect	0.31	0.03	677.95	10.37	0.000*
Cognition	0.37	0.03	778.40	11.45	0.000*
Fluency*Affect	0.13	0.02	557.04	5.33	0.000*
Fluency*Cognition	-0.07	0.03	700.28	-2.55	0.011*

Therefore, a spotlight analysis shows that affect influences more the overall attitude when there is a high fluency (b=1.19) than when it is low (b=0.44). Cognition becomes more important on overall attitude in low fluency (b=0.30) than in a high fluency (b=-0.10) The difference between affect and cognition is significant when there is a high fluency (See appendix 4). So, when there is high fluency the affective response (b=1.19) becomes more important than the cognitive response (b=-0.10) (Table 8).

Table 8. Spotlight analysis with low and high fluency

	Low Fluency			High Fluency		
Variable	**B**	**SE**	**Sig.**	**B**	**SE**	**Sig.**
Affect	0.44	0.04	0.000*	1.19	0.17	0.000*
Cognition	0.30	0.04	0.000*	-0.10	0.19	0.578

Hence, when there is high fluency people follow the affective route and in low fluency people tend to use the cognitive route.

Framing is a variable, which is considered important to analyze in the research because it changed between ads to see if it influenced how people process the information. Framing b=0.058, t(209.74)=2.24, p=0.027, affect b=0.34, t(436.23)=9.19, p=0.000 and cognition b=0.40, t(488.98)=10.36, p=0.000 influences significantly on the overall attitude. However, there are no interactions between framing and the affective b=-0.02, t(430.09)=-0.51, p=0.610 or cognitive b=0.01, t(401.02)=0.27, p=0.791 responses (Table 9).

Table 9. Regression analysis using framing, affect, cognition as predictors on overall attitude

Variable	**B**	**SE**	**df**	**t**	**Sig.**
Framing	0.058	0.03	209.74	2.24	0.027*
Affect	0.34	0.04	436.23	9.19	0.000*
Cognition	0.40	0.04	488.98	10.36	0.000*
Framing*Affect	-0.02	0.04	430.09	-0.51	0.610
Framing*Cognition	0.01	0.04	401.02	0.27	0.791

However, a spotlight analysis is run to see how the effect of the loss and gain framing has on the overall attitude. In this case we can see that affect is more important in a loss framing (b=0.38) than in a gain framing (b=0.30). Cognition has a major influence when it is a gain framing (b=0.45), comparing it with loss framing (b=0.38) (Table 10).

Table 10. Regression analysis using affect and cognition as predictors for loss and gain framing on overall attitude

	Loss Framing					Gain Framing				
Variable	**B**	**SE**	**df**	**t**	**Sig.**	**B**	**SE**	**df**	**t**	**Sig.**
Affect	0.38	0.05	350.99	8.58	0.000*	0.30	0.05	347.97	6.25	0.000*
Cognition	0.38	0.05	391.30	8.12	0.000*	0.45	0.05	381.24	8.94	0.000*

Therefore, when the advertisements presented a loss-framing participants were using the affect route, while the participants followed the cognitive route when a gain framing was presented.

4.3.3 Familiarity With Nanotechnology

Hypothesis H3 states that familiarity influences the information processing. To analyze it, familiarity, affective and cognitive responses were used as predictors while overall attitude was used as dependent variable.

Familiarity b=0,12, t(204.20) = 3.08, p=0.002 affect b=0,32, t(696.19) = 10.53 p=0.000 and cognition b=0,42, t(788.84) = 12.62, p=0.000 has an effect on the overall attitude, but the interaction between affective response with familiarity b=-0,002, t(672.29)=-0,01, p=0.999 and cognitive response with familiarity b=-0,03, t(744.14)=-1.22, p=0,233 are not significant (Table 11). This means that familiarity does not have an effect on the information processing that leads to the overall attitude. So, hypothesis H3 is not confirmed. However, familiarity with nanotechnology influences directly on the overall attitude.

Table 11. Regression analysis using familiarity, affect and cognition as predictors on overall attitude

Variable	B	SE	df	t	Sig.
Familiarity	0.12	0.04	204.20	3.08	0.002*
Affect	0.32	0.03	696.19	10.53	0.000*
Cognition	0.42	0.03	788.84	12.62	0.000*
Familiarity*Affect	-0.002	0.03	672.29	0.01	0.999
Familiarity*Cognition	-0.03	0.03	744.14	-1.22	0.223

4.3.4 Type of Application and Risk

Hypothesis 4a states that there is a higher perceived risk in nanotechnology that is applied on food than in packaging. An ANOVA showed that there is a significant influence of nano and non nano technology $F(1,840)=29.78$, $p=0.000$ and the type of application $F(1,840)=5.65$, $p=0.018$ on risk perception. There is an interaction between nano or non nano products and the type of application on perceived risk $F(1,840)=8.34$, $p=0.004$ (Table 12). People perceive more risk in nanotechnology food ($M=2.39$) than nanotechnology packaging ($M=1.92$). Thus, hypothesis 4a is confirmed (Table 13).

Table 12. ANOVA for nano and non nano products and type of application on risk perception

Variable	F	Sig.
Nano	29.78	0.000*
Type of application	5.65	0.018*
Nano*Type of application	8.34	0.004*

Table 13. Perceived risk's means of nano and non nano products with type of application

Nano/Non Nano	Variable	Mean
Non Nano	Juice	1.65
	Packaging	1.69
Nano	Juice	2.39
	Packaging	1.92

Hypothesis 4b states that participants that had high-perceived risk would follow a cognitive route while when low risk perceived risk is present the affective route is used. To evaluate the effect of risk in the information processing, a regression analysis is done with risk, affect, cognition as predictors and overall attitude as dependent variable.

Table 14 shows that risk b=-0.02, t(699.13) = -0.54, p=0.590 does not influence the overall attitude. However, affect b=0,37, t(703.73) = 11.17, p=0.000 and cognition b=0,42, t(786.33) = 12.35, p=0.000 have a significant influence on overall attitude. There is an interaction between the perceived risk and the affect on the overall attitude b=-0,06, t(558.83) = -2.73, p= 0.007.

Table 14. Regression analysis using risk, affect and cognition as predictors on overall attitude

Variable	B	SE	df	t	Sig.
Risk	-0.02	0.03	699.13	-0.54	0.590
Affect	0.37	0.03	703.73	11.17	0.000*
Cognition	0.42	0.03	786.33	12.35	0.000*
Risk*Affect	-0.06	0.02	558.83	-2.73	0.007*
Risk*Cognition	0.004	0.02	528.76	0.16	0.869

A spotlight analysis was conducted. With this analysis the results show that affect in low risk (b=0.31) influence more the overall attitude than in high risk (b=-0.07). Cognition is more important when there is a high risk b= 0.45 than when there is a low risk (b=0.43) (table 15)

Table 15. Spotlight analysis with low and high risk

	Low Risk			High Risk		
Variable	**B**	**SE**	**Sig.**	**B**	**SE**	**Sig.**
Affect	0.31	0.04	0.000*	-0.07	0.16	0.655
Cognition	0.43	0.04	0.000*	0.45	0.16	0.008*

Hence, when there is high perceived risk people follow the cognitive route and with a low perceived risk people followed the affective and cognitive route. Hypothesis H4a is confirmed and H4b is not confirmed.

4.3.5 Relationships between variables in the model

The following table shows the relationship between the variables and the overall attitude related to the whole study and specifically to juice and packaging.

Table 16. Regression analysis using variables from the study on overall attitude

	Overall			Juice			Packaging		
Variable	B	t	Sig.	B	t	Sig	B	t	Sig
PAR	0.08	3.46	0.001*	0.15	4.08	0.000*	0.03	1.08	0.280
Familiarity	0.08	2.29	0.023*	0.11	2.26	0.026*	0.02	0.41	0.682
Affect	0.45	8.12	0.000*	0.40	6.13	0.000*	0.29	4.78	0.000*
Cognition	0.32	5.69	0.000*	0.40	6.07	0.000*	0.32	4.93	0.000*
Risk	0.007	0.24	0.810	0.00	0.01	0.993	-0.007	-0.18	0.858
Framing	0.043	1.68	0.094	-0.03	-0.83	0.408	0.11	3.28	0.001*
Nano/Non Nano	-0.02	-0.58	0.562	0.06	1.12	0.266	-0.04	-1.15	0.252
Type of application	0.006	0.08	0.935						
Fluency	0.12	5.06	0.000*	0.18	4.58	0.000*	0.11	3.46	0.001*
PAR*Affect	0.004	0.17	0.865	-0.10	-2.70	0.007*	0.08	2.37	0.018*
PAR*Cognition	-0.01	-0.51	0.610	0.10	2.96	0.003*	-0.14	-3.47	0.001*
Familiarity*Affect	-0.02	-0.70	0.485	0.06	1.34	0.181	-0.06	-1.46	0.146
Familiarity*Cognition	-0.013	-0.39	0.696	-0.06	-1.36	0.175	0.009	0.19	0.850
Affect*Risk	-0.068	-2.67	0.008*	-0.14	-3.66	0.000*	-0.005	-0.16	0.876
Cognition*Risk	0.02	0.67	0.502	0.07	1.89	0.060	-0.03	-0.73	0.465
Affect*Framing	-0.01	-0.30	0.763	0.06	0.96	0.340	-0.04	-0.75	0.453
Cognition*Framing	0.02	0.35	0.730	-0.08	-1.27	0.206	0.07	1.28	0.202
Affect*Nano	0.02	0.44	0.658	0.06	0.68	0.495	-0.06	-0.97	0.335
Cognition*Nano	-0.03	-0.71	0.479	-0.15	-2.01	0.045*	0.05	0.97	0.332
Affect*Type of application	-0.22	-3.49	0.001*						
Cognition*Type of application	0.12	1.80	0.072						

As it can be seen in table 16, when a statistical analysis is done to the packaging and juice together, PAR, familiarity, affect, cognition, fluency and the interactions affect*risk and affect*type of application are significant. When the juice is evaluated the same variables are significant, however, the interactions PAR*affect, PAR*cognition, Affect*risk and cognition*Nano are also significant. On the other hand, PAR, familiarity cognition*nano and affect*risk are not important when the packaging was assessed but framing is important.

The interaction PAR*Affect is significantly different in juice and packaging. The effect of affective response on the overall attitude is influenced by the PAR. When a negative PAR response is present, affect influences more than when PAR is positive when juice is evaluated. The effect in the packaging is the opposite. On the other hand, cognition has more influence on the overall attitude in the juice when PAR is positive.

The effect of the affective response on the overall attitude is also influence by the perceived risk. When a low risk is perceived in the orange juice the overall attitude is higher than when there is high risk. This also has to do with the interaction Affect*Type, which is significantly different for a person that evaluated the packaging or the product. The affect is more important on the overall attitude in a juice than a packaging evaluation.

Cognition is also a variable, which affects the overall attitude depending on the technology used in the product (nano or non nano technology). Participants use more the analytical processing route when a non nano technology was presented in the product.

V. DISCUSSION

This study provides an understanding on how a nanotechnology food product influences the information processing through a superficial (PAR) and a deeper evaluation considering factors as the type of nanotechnology application (food/packaging), regulatory focus (prevention/promotion), familiarity with nanotechnology, framing, fluency and perceived risk.

PAR and affect has an impact on the information processing to reach the overall attitude. However, it is more important when the orange juice is evaluated than when the packaging is evaluated. Perceived risk is a factor that also determines the overall attitude for nano-inside and nano-outside products. The rest of the factors will be explained in the chapter.

5.1 Regulatory Fit: Regulatory Focus and Framing

There was an interest on how regulatory focus could influence the information processing on the overall attitude in this research. Unfortunately, the induced manipulation to participants did not work with the manipulation check that was given at the end of the questionnaires. The interpretation of the results based on regulatory focus could not be done. Therefore, the regulatory fit among framing and regulatory focus is not analyzed.

The participants answered the questionnaire online, which they could have responded it while they were doing something else and their concentration was not enough to be manipulated. The respondents that participated at Wageningen University used computers that were located in a social area that could be interrupted by people that was passing by. Therefore, the manipulation might not work because of these reasons.

A deeper research was done concerning the manipulation check on regulatory focus. I consider that the manipulation check questions are referred more to the regulatory focus as a trait instead of checking if the person was induced correctly or not even if other researches such as Pham and Avnet (2004) and Roy and Ng (2012) used them and worked for them. However, I would recommend using questions in the induction

and the manipulation check that could be more related to the product or topic of the questionnaire as in Wen et. al (2009) instead of asking for a general situation and making the participants rate items that didn´t have anything to do with the topic of the research.

Furthermore, the framing was also considered to see if it influenced the overall attitude by itself. The results show that the framing does not affect the overall attitude in when the data was analyzed together (juice and packaging). According to the literature the gain-framing is more effective in persuasion than loss-framing (Chang, 2005). We would expect a significant difference of framing on the overall attitude, but it was not confirmed in the model.

However, the results show that loss framing influence people to go through the affective route and the gain framing lead them to go through a cognitive route. O´Keefe and Jensen (2008) relate the processing engagement with the loss framing. According to them, loss-framing presents a disadvantage and a recommendation in the message, which is the case of "Prevents flu and cold infection" in the advertisements in our research. On the other hand, the gain framing presents a positive outcome, which in our case is "Strengthen immune system". Information processing engagement is higher in the loss framing because the disadvantage appears in the message implicitly and other works has stated that negative events generate more cognitive routes (Peeters and Czpinski, 1990). Therefore, the results are not aligned with the theory but further research should be made between framing and information processing.

5.2 Primary Affective Response (PAR) and Fluency

The PAR is considered as a feeling based on a superficial evaluation in this and plays an important role in the information processing on this research. The PAR has a direct influence on how the people process the information they see in the advertisements in a few seconds. When there is a high PAR, the effect of the affective response on the overall attitude increases. This means that a deeper evaluation on the feeling on how people perceive the product at a glance happens in

the process. So, it is important to consider the first impression of the product from the people to have a more positive attitude.

The overall attitude is determined by the way people process the information, which could follow their feelings or an analytical reasoning to reach it. A bad feeling with a quick glance (PAR) of a product without having much time to evaluate it would lead the person to analyze it more or go through feelings when a deeper assessment of the product is done. A good feeling makes them to use less effort to reach the overall attitude. Therefore, when people has a good gut feel about the product, people don´t have to think so much about the product and they just make the decision based on their feelings (affective route) This confirms partially what Camacho et al. (2003); Higgins et al. (2003); Topolinski (2011) state in their research. On the other hand, a bad feeling makes them to follow a cognitive or an affective route. The PAR could be affected with other factors that could influence the route that the person chooses to get to the overall attitude. Further research of the PAR should be done to define the information processing.

An important factor considered in the research is the fluency, which makes the person to choose the affective or cognitive route. The literature shows that the feeling of rightness makes the message easier to process (Higgins et. al, 2003) and that is what the results show us. When there was a high fluency when people saw the advertisements an affective route was followed and with a low fluency participants followed a cognitive route.

5.3 Nanotechnology and type of application

Comparing non nano and nanotechnology products (orange juice and bottle) people preferred non nanotechnology with gain framing the most and the least preferred was nanotechnology application and loss framing. The literature already shows that the new technologies generate less preference than the traditional ones. One Swiss study stated that consumers consider new technologies more risky than the traditional ones. Many people are against technologies applied in food and one example of these is the genetically modified food, which has had a lot of controversies on these days and has

created a neophobia that can also influence the acceptance of nanotechnology in food (Siegrist et. al, 2006; Hosseini et al., 2012). Other studies have found that nanotechnology in other areas such as paints are more accepted than in food (Siegrist, et. al., 2007).

The perceived naturalness in food is very important for the acceptance of a product nowadays. People considers technology as artificial as in the case of GM food, which was perceived as less natural and therefore it is less preferred (Vries, et. al, 2005). The major part of the population was students or workers from Wageningen University and since this university is known for its environmental and "green" ideals, less people accepted nanotechnology applied in food than nanotechnology applied in the packaging. People that consider the natural resources, environment, etc do not approve nanotechnology because they think that the technologies are not going to solve the problems (Hosseini, et. al., 2012).

The two applications of nanotechnology (nano-packaging and nano-juice) were compared to see which of them would give a higher perceived risk to the consumers. According to the results, people perceive more risk in the nanoencapsulated vitamin C incorporated in the orange juice than the packaging that contains nanotechnology to protect the juice from UV lights. This conclusion is aligned with Siegrist et al. (2008 and 2007), which states that when the technology is incorporated in the food, it scares more people because it is going to be ingested (nano-inside) and considered more risky. The nanotechnology packaging has also been perceived as more beneficial than the application directly into the food (Siegrist, et. al, 2007).

The nano-packaging is considered to be safer because it is not directly eaten and is perceived as less risky, therefore, the affective route is followed by the people. Since the nano-juice is perceived as more risky people tend to follow a cognitive route, where they analyze and make more effort processing the information. This confirms what Peeters and Czpinski, (1990) states. When there is a perceived risk it is considered dangerous and is related to a bad situation. So more thinking and reasoning of accepting or not accepting the product is needed. Therefore, more analysis (cogniton) is done for nano-food than nano packaging.

Participants chose among the orange juice that had nanotechnology in the orange juice and the one without nanotechnology. These results were not statistically analyzed but it showed us a superficial insight of how the people reacted with the product. Participants were somehow scared on trying the orange juice containing the technology after the survey. So the majority of the population chose the normal orange juice. However, people were curious on how a nanoencapsulated vitamin C in an orange juice tasted even if they commented after participating that they were somehow scared on trying it. People from Wageningen University are based on scientific research that may cause them to look for a special taste in an orange juice with a new technology.

5.4 Model

Previously, an explanation of the variables involved in the research was explained. However, we will give an insight of the whole model in this section.

To get to the information processing the PAR is an important factor that makes the people choose a route, and it also influences on how positive/negative the overall attitude will be. So, it is important that the product is presented as a product that will have a positive quick first impression so that the attitude will also be good and have a major acceptance, especially when the nanotechnology is applied on food.

In general, when a positive PAR is present, the affective route is followed by the people as H1a stated. However when the juice and packaging is analyzed separately, we find different effects for each application. When people don't like much the product in 5 seconds, the feelings affect more the overall attitude than when they like it. This happens in the case of the people that evaluated the orange juice. On the other hand, when a packaging is evaluated, affect becomes more important in the overall attitude when the primary affective response is positive. As the juice is ingested the people follow more their feelings when there is no coherence at the beginning. When the packaging is evaluated, intuition is not so important when there is a negative first impression.

The influence of the primary affective response on the effect of the cognition on the overall attitude is the opposite as the effect of the affective response. Participants use more the analytic route when they like the juice in the superficial evaluation and in the case of the packaging the effect of the cognitive response is more important when the first impression is negative. This complements the information explained in the previous paragraph.

The fluency was also a factor that was analyzed in this research but the explanation that related it with regulatory fit among message framing and regulatory focus could not be done. However, high fluency leads to an affective route and low fluency makes people to go to a cognitive route. At the end fluency is also very important to have a positive attitude because the higher the fluency, the more positive is the overall attitude.

In the hypothesis verification, familiarity with nanotechnology did not have an influence on the effect of affect or cognition on the overall attitude. However, it has a direct influence on the overall attitude. As people have heard more about nanotechnology, their attitude is more positive. This is aligned with what Vandermoere et al. (2011) stated that new technologies are positively related with familiarity. In this research when the orange juice is involved, familiarity is important to reach the overall attitude.

According to the rank order results, the participants preferred more the advertisements that had the gain framing than the ones that contained loss messages while they were evaluating the packaging (bottle). However, when the people evaluated the orange juice, it was more important to see if they were classified as nano or non nano. The nano products were the least preferred despite the framing messages. This could be related to the risk people perceive on a technology that is applied inside the food as Siegrist et. al (2008) stated.

The results also show that there is a distinction on information processing among nanotechnology applied directly on food (orange juice) and nanotechnology applied indirectly (bottle). People use the analytic way when nano inside is presented and feelings in nano-outside products because of the perceived risk. There is a higher

perceived risk on nano food than in nano packaging. As affect influences more when there is a low risk, affect is more important when the nanotechnology applied to the bottle is evaluated than when it is added into the orange juice. Another result that shows the effect of the perceived risk is in the rank order preference of the orange juice advertisements. Participants preferred the most the orange juices that did not contain nanotechnology, while in the packaging the framing was more important as we discussed previously.

When the orange juice is evaluated, it is important that the person is familiar with the nanotechnology to have a more positive overall attitude. The food application has been increasing during the last years and for some people is still strange to hear about nanotechnology in food. Risk is more present when the juice is presented and the affect is also influenced by it. When the participants perceive a low risk the effect of affect in the overall attitude is higher.

The regression analysis of the whole model shows that affect plays an important role when the juice is evaluated. People use more their feeling when a product is going to be ingested. When the technology is compared (nano/non nano) cognition is more important when a non nano product is used. This may happen because with a nano product people may also use their feeling to a new technology.

5.5. Limitations and further researches

For further researches it is important to make a pretest of the manipulation of the regulatory focus and the manipulation check. In this research the pretest was done but the manipulation check didn´t work. However, since other authors used it and worked we stayed aligned with their methodology. With the proper procedure we can determine if there is an influence of the regulatory fit among these factors and the information processing.

Our study was done without establishing a certain type of population. It would be interesting to use population from a certain area, nationality or age. Recent studies have shown that there are differences on willingness to pay, attitudes, beliefs in different countries (Bieberstein et.al, 2012, Cook, 2007; Scheufele, 2009).

Although familiarity was not supported by the hypothesis, researches from emergent technologies have shown important results (Lee et.al, 2005). Nanotechnology is still a technology, which is not so known in the society and further research on nanotechnology familiarity with another research design would be interesting to work on. Knowing the results would be very useful to see how could the marketers or scientists manage the familiarity to have a more positive attitude towards nanotechnology.

It would have been very interesting if we would have known which orange juice did the people chose after showing the type of application (packaging or juice). People may be influenced by the ads and choose the one they already saw in the survey. Further research must be done to determine if familiarity with the product affects the choice of the people.

Nanotechnology has a lot of applications in food technology. It would be interesting to evaluate the attitude of people with a different food in which the technology has a different role in the product. There are other advantages such as food safety and texture improvement that could have different attitudes among them.

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VI. APPENDICES

APPENDIX 1. ADVERTISEMENT DESIGN

Gain Framing-Nano product	Loss Framing-Nano product	Gain Framing-Non Nano product	Loss Framing-Non Nano product
			
Gain Framing-Nano packaging	Loss Framing-Nano packaging	Gain Framing-Non Nano packaging	Loss Framing-Non Nano packaging
			

APPENDIX 2. PRETEST QUESTIONNAIRE

Dear respondent,

We are investigating attitudes of consumers toward the new SUNRISE orange juice. We would like to see how you feel and think about the them in order to help them position in the market.

On the next pages you will see one advertisement per page, followed by some questions. It is important that you carefully view and read each ad. After that, you can answer the questions. First some general questions will be asked. We are interested in YOUR opinion, so there are no right or wrong answers. This survey will take approximately 10 minutes. The results are processed anonymously.

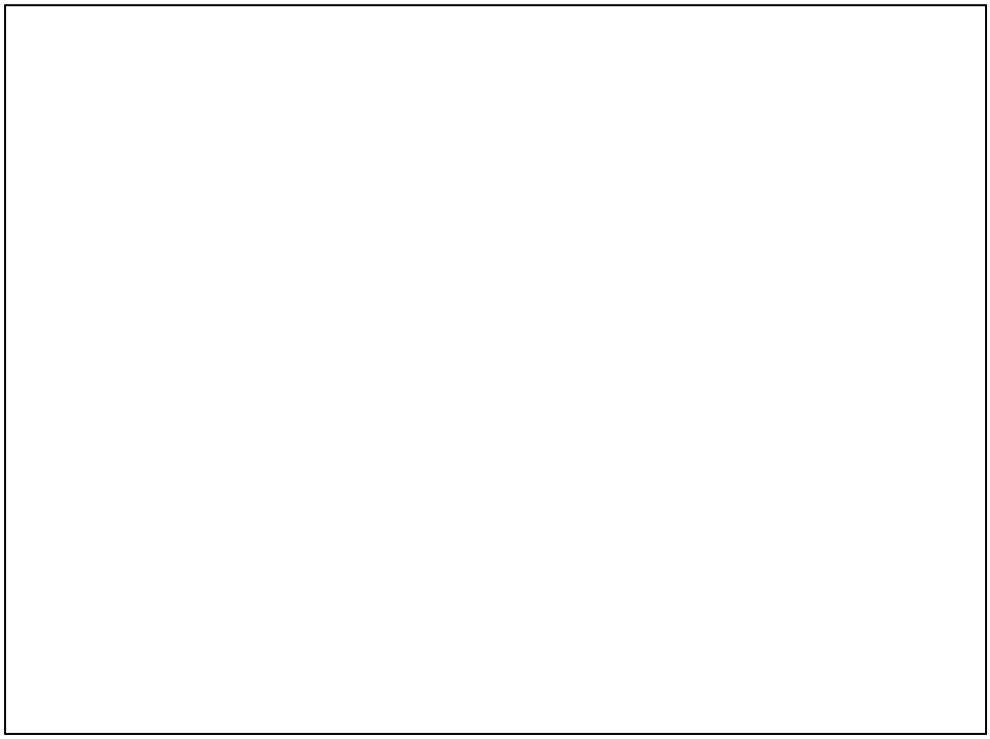
Thanks for your cooperation!

First some general questions:

1. What is your age _____?
2. Gender: ____ Female ____Male

2. Please write down one or several positive situations that you would like to achieve within the next few weeks (a certain outcome from your study or personal life). Next, describe the strategies that you could use to successfully promote this goal. (For promotion focus manipulation)

   (2) Please write down one or several negative situations you would like to avoid within the next few weeks (a certain outcome from your study or personal life). Next, describe the strategies that you could use to prevent those negative situations (For prevention focus manipulation)



On the next pages you will see 4 ads of SUNRISE orange juice. Please look and read carefully the advertisement after which you can start answering the questions. The questions are on 7-point scales with endpoints "negative" and "positive" You will have to choose the number that fits the most with your opinion. Please select only one alternative.

Please look and read carefully the advertisement and answer the questions

3. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

4. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7

5. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

6. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

7. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

8. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

9. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

Please look and read carefully the advertisement and answer the questions

10. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

11. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7

12. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

13. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

14. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

15. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

16. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

Please look and read carefully the advertisement and answer the questions

17. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

18. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7

19. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

20. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

21. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

22. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

23. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

Please look and read carefully the advertisement and answer the questions

24. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

25. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7

26. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

27. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

28. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

29. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

30. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

You will see the previous ads and 4 more ads on the following page. Please take a look at them and choose the one you prefer most and least.

A

B

C

D

E


NEW
sunrise
orange juice
NANO-ENCAPSULATED VITAMIN C FORTIFICATION
¡A delicious new beginning!
WITH NANOTECHNOLOGY:
Your body will absorb more Vitamin C.
Strengthens immune system
sunrise
High Pulp
Great Vitamin C Source

F


NEW
sunrise
orange juice
NANO-ENCAPSULATED VITAMIN C FORTIFICATION
¡A delicious new beginning!
WITH NANOTECHNOLOGY:
Your body will absorb more Vitamin C.
Reduces cold and flu infection
sunrise
High Pulp
Great Vitamin C Source

G


NEW
sunrise
orange juice
NATURAL VITAMIN C
¡A delicious new beginning!
WITH ORANGES RICH IN VITAMIN C:
Your body will absorb more Vitamin C.
Strengthens immune system
sunrise
High Pulp
Great Vitamin C Source

H


NEW
sunrise
orange juice
NATURAL VITAMIN C
¡A delicious new beginning!
WITH ORANGES RICH IN VITAMIN C:
Your body will absorb more Vitamin C.
Reduces cold and flu infection
sunrise
High Pulp
Great Vitamin C Source

32. Now rank the orange juices in order of preference. Begin with the one you like the most and assign it as number 1 and continue this procedure until you assign a rank of 8 to the least preferred. Fill out the next table:

Ad	A	B	C	D	E	F	G	H
Ranking								

33. This set of questions asks you how frequently specific events actually occur or have occurred in your life. Please indicate your answer to each question by circling the appropriate number below it.

	Never		Some-times		Very often
1. Compared to most people, are you typically unable to get what you want out of life?	1	2	3	4	5
2. Growing up, would you ever 'cross the line' by doing things that your parents would not tolerate?	1	2	3	4	5
3. How often have you accomplished things that got you 'psyched' to work even harder?	1	2	3	4	5
4. Did you get on your parents' nerves often when you were growing up?	1	2	3	4	5
5. How often did you obey rules and regulations that were established by your parents?	1	2	3	4	5
6. Growing up, did you ever act in ways that your parents thought were objectionable?	1	2	3	4	5
7. Do you often do well at different things that you try?	1	2	3	4	5
8. Not being careful enough has gotten me into trouble at times.	1	2	3	4	5
9. When it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to do.	1	2	3	4	5
10. I feel like I have made progress towards being successful in my life.	1	2	3	4	5
11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.	1	2	3	4	5

35. Can you give a brief explanation of what you think is the aim of the study?

36. Do you have any suggestions or comments about this study?

34. To what extent have you heard about nanotechnology?

Not at all						A lot
1	2	3	4	5	6	7

This is the end of the questionnaire, thank you for your cooperation

APPENDIX 3. QUESTIONNAIRE

Dear respondent,

SUNRISE orange juice is a young and innovative brand. We have designed different prototypes ready to be launched on the market. We are interested in what you think and feel about the different prototypes so that we can determine the best marketing strategy to position SUNRISE on the market.

On the next pages you will see one advertisement per page, followed by some questions. It is important that you carefully view and read each ad. After that, you can answer the questions. First some general questions will be asked. We are interested in YOUR opinion, so there are no right or wrong answers. This survey will take approximately 15 minutes. The results are processed anonymously.

Thanks for your cooperation!

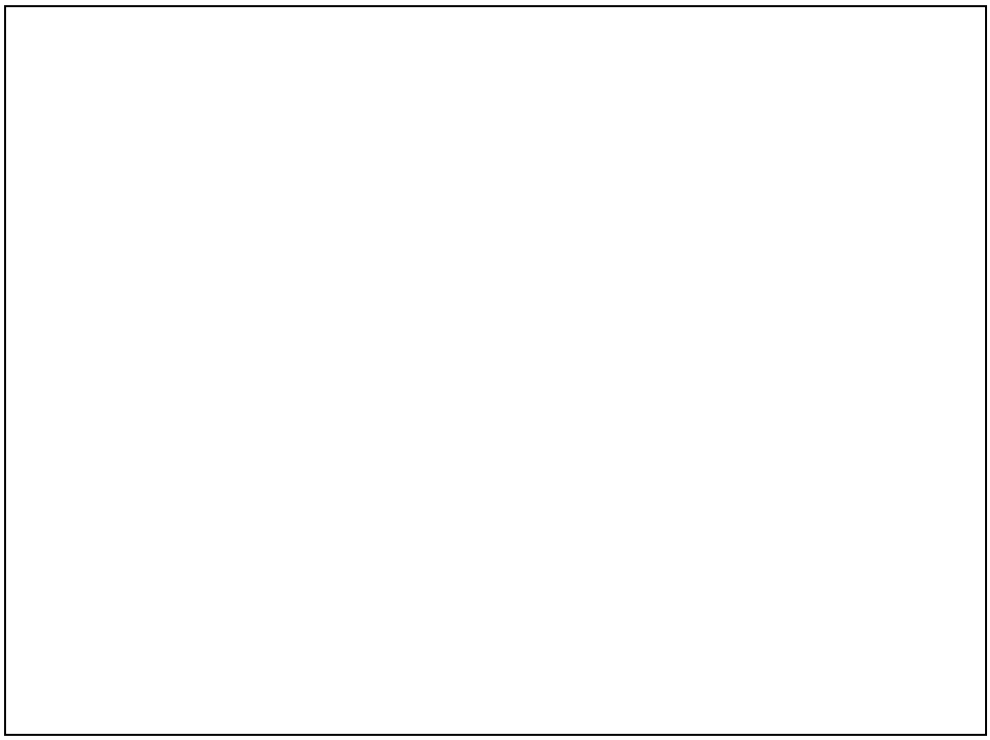
First some general questions:

1. What is your age _____?

2. Gender: ____ Female ____Male

3. Please write down one or several positive situations that you would like to achieve within the next few weeks (a certain outcome from your study or personal life). Next, describe the strategies that you could use to successfully promote this goal. (For promotion focus manipulation)

   (2) Please write down one or several negative situations you would like to avoid within the next few weeks (a certain outcome from your study or personal life). Next, describe the strategies that you could use to prevent those negative situations (For prevention focus manipulation)



First of all we are interested in your very first impression about several SUNRISE advertisements. These are similar but the products characteristics are different. You will see 4 advertisement for 5 seconds each, which will be followed by a question.

4. How much do you like the orange juice? (Scale with smiling faces)

Besides your first impression we are also interested in how you feel and think toward the advertisements. You will again see the advertisements, followed by several questions. Please have a careful look at the advertisements and then start answering the questions. Each advertisement will be displayed for 30 seconds. The scale is a 7-point scale with endpoints "negative" and "positive" . Choose the number that fits the most with your opinion. It is only possible to select one alternative.

Please look and read carefully the advertisement and answer the questions

5. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

6. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7
Risky	1	2	3	4	5	6	7

7. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

8. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

9. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

10. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

11. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

Please look and read carefully the advertisement and answer the questions

12. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

13. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7
Risky	1	2	3	4	5	6	7

14. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

15. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

16. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

17. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

18. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

Please look and read carefully the advertisement and answer the questions

19. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

20. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7
Risky	1	2	3	4	5	6	7

21. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

22. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

23. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

24. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

25. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

Please look and read carefully the advertisement and answer the questions

26. To what extent do you feel.... toward this application?

	Not at all						Very much
Joy	1	2	3	4	5	6	7
Satisfaction	1	2	3	4	5	6	7
Fear	1	2	3	4	5	6	7
Disgust	1	2	3	4	5	6	7

27. To what extent do you think this application is.....?

	Not at all						Very much
Useful	1	2	3	4	5	6	7
Beneficial	1	2	3	4	5	6	7
Harmful	1	2	3	4	5	6	7
Useless	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7
Risky	1	2	3	4	5	6	7

28. My overall attitude toward this application is…

Very negative						Very positive
1	2	3	4	5	6	7

29. Do you like the orange juice?

Not at all						Very much
1	2	3	4	5	6	7

30. How did you found the information of the advertisement in terms of …

	Difficult						Easy
Ease of processing	1	2	3	4	5	6	7
Comprehen-sibility	1	2	3	4	5	6	7

31. To what extent do you like the advertisement?

Not at all						Very much
1	2	3	4	5	6	7

32. Would you be willing to buy this orange juice?

Not at all						Definitely
1	2	3	4	5	6	7

32. You will now see all the previous ads together. Please take a look at them and choose the one you prefer the most and least. Rank the orange juices in order of preferences. Begin with the one you like the most and assign it as number 1 and continue this procedure until you assign a rank of 4 to the least preferred. Fill out the boxes with the numbers.

Ad	A	B	C	D	E	F	G	H
Ranking								

A


NEW
sunrise
orange juice
¡A delicious new beginning!
WITH NANO-PACKAGING TECHNOLOGY:
The UV protection package preserves Vitamin C.
Reduces flu and cold infection.
Reduces cold and flu infection
sunrise
High Pulp
100% orange juice
UV PROTECTION PACKAGE
NANO PACKAGING TECHNOLOGY

B


NEW
sunrise
orange juice
¡A delicious new beginning!
WITH NANO-PACKAGING TECHNOLOGY:
The UV protection package preserves Vitamin C.
Strengthens immune system.
Strengthens immune system
sunrise
High Pulp
100% orange juice
UV PROTECTION PACKAGE
NANO PACKAGING TECHNOLOGY

C


NEW
sunrise
orange juice
¡A delicious new beginning!
WITH ANTI-OXIDANT PACKAGING TECHNOLOGY:
The Vitamin C shielding package preserves Vitamin C.
Strengthens immune system.
Strengthens immune system
sunrise
High Pulp
100% orange juice
VITAMIN C SHIELDING PACKAGE
ANTI-OXIDANT PACKAGING TECHNOLOGY

D


NEW
sunrise
orange juice
¡A delicious new beginning!
WITH ANTI-OXIDANT PACKAGING TECHNOLOGY:
The Vitamin C shielding package preserves Vitamin C.
Reduces flu and cold infection.
Reduces cold and flu infection
sunrise
High Pulp
100% orange juice
VITAMIN C SHIELDING PACKAGE
ANTI-OXIDANT PACKAGING TECHNOLOGY

33. Please indicate your inclination of what you prefer in life in the following statements:

Do whatever I want				Do what is right
1	2	3	4	5
Take a trip around the world				Payback my loans
1	2	3	4	5
Go wherever my heart takes me				Do whatever it takes to keep my promises
1	2	3	4	5

34. Can you give a brief explanation of what you think is the aim of the study?

35. Do you have any suggestions or comments about this study?

36. To what extent have you heard about nanotechnology?

Not at all						A lot
1	2	3	4	5	6	7

This is the end of the questionnaire, thank you for your cooperation

APPENDIX 4. Affect and Cognition differences

Table 17. Linear regression of affective and cognitive responses differences

	Variable	Beta	SE	df	t	Sig.
PAR	AFFplusCOG	0.36	0.01	679.78	25.64	0.000*
	AFFminCOG	-0.04	0.03	709.07	-1.27	0.206
Fluency	AFFplusCOG	0.33	0.01	594.07	25.17	0.000*
	AFFminCOG	-0.02	0.03	718.03	-1.04	0.301
Framing	AFFplusCOG	0.37	0.01	422.35	25.64	0.000*
	AFFminCOG	-0.03	0.03	455.09	-0.86	0.390
Nano Familiarity	AFFplusCOG	0.37	0.01	591.64	28.61	0.000*
	AFFminCOG	-0.05	0.03	735.69	-1.57	0.117
Risk	AFFplusCOG	0.40	0.02	749.27	23.48	0.000*
	AFFminCOG	-0.03	0.03	702.42	-0.87	0.385

Table 18. Linear regression of affective and cognitive responses differences

		Low/Loss			High/Gain		
	Variable	Beta	SE	Sig.	Beta	SE	Sig.
PAR	AFFplusCOG	0.37	0.02	0.000*	0.43	0.05	0.000*
	AFFminCOG	-0.001	0.04	0.977*	0.14	0.12	0.251
Fluency	AFFplusCOG	0.37	0.02	0.000*	0.54	0.06	0.000*
	AFFminCOG	0.07	0.04	0.059	0.65	0.17	0.000*
Framing	AFFplusCOG	0.38	0.02	0.000*	0.37	0.02	0.000*
	AFFminCOG	-0.00	0.04	1.000	-0.07	0.05	0.103
Risk	AFFplusCOG	0.37	0.02	0.000*	0.19	0.06	0.001*
	AFFminCOG	-0.06	0.03	0.076	-0.26	0.15	0.087