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**Erasmus School of Economics**

**Master Thesis**

**Regret and Curiosity in Food Choice**The effect of information and feedback

Name: Rachelle Leukel  
Student number: 376567  
Supervisor’s name: Han Bleichrodt  
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Abstract

Curiosity and regret are two opposing factors influencing decision-making, which individually have been widely investigated in previous literature. However, little research has been conducted to acknowledge the concurrent influence of curiosity and regret. Zeelenberg and Van Dijk (2007) were one of the first to combine these two factors and test their influence on decision-making. They found that curiosity has the potential to override regret aversion. The experiment used in this research combined the study of Zeelenberg and Van Dijk (2007) with a translation to the food domain. In this way, implications for healthy versus unhealthy food decision-making are found.

In this study, two theories were used. Information gap theory was used to increase curiosity. Conversely, regret theory was used to increase regret aversion. The experimental setting tested if these two theories had an effect on the decision-making of the subjects and which of the two had a larger influence. Using a sample of 126 subjects, experimental results indicated that the results found by Zeelenberg and Van Dijk (2007) are not observable to the same extent in this study. Overall, no statistical evidence was found for the hypotheses. This was mainly due to the fact that the control treatment showed an exceptionally high amount of curiosity. Interestingly, a gender difference was observed. For the male participants, it seems there is no correspondence to the theories. However, the female participants seem to behave in accordance to both theories. Additionally, it seems that females are influenced by regret aversion to a higher extent than curiosity. This study presents a critical note on the external validity of the results found in previous studies and demonstrates the need for further research in this domain.

*Keywords:* Regret, Curiosity, Information gap theory, Regret theory, Food choice, Gender

Preface

During my Master Behavioural Economics at the Erasmus University in Rotterdam, I have followed the marketing track. This has allowed me to combine my interest for marketing with economic theories and models. Therefore, when it was time to think about a topic, I decided to combine these two areas of research. The behaviour of human beings and specifically human decision-making has always interested me since it is often unpredictable and deviates from classical behavioural theories. There is much to be explored and I would like to contribute a little piece to solving the puzzle.

The topic of regret and curiosity attracted my attention straight away because it clearly shows the contradiction in people’s behaviours and has clear implications for marketing. Curiosity can make people buy more and choose more ‘risky’ options while the fear of regret can decrease purchasing and make people more likely to opt for the ‘safe’ option.

When thinking about an interesting area to link this topic to, I quickly thought about the food domain. I often experience curiosity myself when wanting to try a product but also occasionally experience regret after consuming. This is especially true for unhealthy food. Also, the fear of anticipated regret seems applicable to the food domain.

Nowadays, consumers have a huge amount of options. This, combined with the fact that many people are becoming increasingly unhealthy, shows the relevance of looking into the unhealthy food issue. This research can shed led on the importance of behavioural factors in this area, of which curiosity and regret are of most interest in this study. Thanks to the cooperation of Graaf Huyn College, theory was tested in an experimental setting.

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# Chapter 1: Introduction

Regret and curiosity are both relevant concepts in decision-making (Zeelenberg & Van Dijk, 2007). On the one hand, people might feel regret for choosing certain (often unhealthy) products but on the other hand they are often habitually curious about these products. Another important factor, which is often discussed when it comes to food choices, is impulse buying. Impulse buying can be enhanced by curiosity (Loewenstein et al., 1996) and it is identified as one of the most influential precursors of the consumption of unhealthy food (Thomas et al., 2011). Read and Van Leeuwen state, “preferences often fluctuate as a result of transient changes in hunger and other visceral states” (1998, p. 189). When looking at the large increase of obesity rates around the world, visceral influences seem to have a large effect. Curiosity is such a visceral factor (Loewenstein et al., 1996). This research can therefore have marketing as well as societal implications.

Curiosity and regret can be contradictory forces in decision-making under uncertainty (Zeelenberg & Van Dijk, 2007). This study tries to observe which of the two has the strongest impact on healthy versus unhealthy product decision-making. Hence, this study will tackle the following question;

*How do curiosity and regret influence food choices?*

More specifically, this research investigates the effect that information and feedback can have on curiosity and regret when making a decision in the food domain. The focus of this study will be on two theories and their relative impact will be tested in an economic experiment.

First, the focus is on information gap theory. Previous research by Zeelenberg and Van Dijk (2007) explains the possibility of curiosity overcoming regret aversion. Using information gap theory in a hypothetical setting, the authors find that providing people with more information leads to more curiosity and therefore to opting for the more risky/unknown option. The current study translates the findings of Zeelenberg and Van Dijk (2007) to see if they hold in a societal relevant area, namely food choices. This research will give more insight into the effects of regret and curiosity, as modelled by information gap theory.

Second, regret theory will be introduced and also tested in an experimental setting. In this way, the effect of anticipated regret on decision-making will be examined. Studies have shown that making anticipated regret more salient to people can lead to an increase in risk-seeking behaviour and not only risk-avoiding behaviour (Zeelenberg, 1999). Although regret is a contradicting force to curiosity it is important to note that the second part of this experiment will be about regret aversion.

When analysing the results, a distinction will be made between male and female participants in order to draw possible conclusions about gender differences. Differences in gender have been observed in varies domains (Daymont & Andrisani, 1984). It has for instance been found that women prefer less risky options (Croson & Gneezy 2009). Therefore, it could be possible that gender differences exist for decision-making in the food domain.

All in all, the degree to which curiosity is satisfied and/or expected regret is minimized will be examined.

This research consists of the following parts. First, the theories and all relevant variables are addressed. Second, the methodology is explained. Next to this, the results are statistically tested and discussed in chapter 4, where after a general discussion and theoretical as well as managerial implications are introduced in chapter 5. Finally, in chapter 6 and 7, limitations and suggestions for further research are provided and a conclusion is given.

# Chapter 2: Theoretical background

In this section, relevant theoretical background will be reviewed. The table below gives an overview of the main theories discussed in this chapter.

|  |  |  |
| --- | --- | --- |
|  | Topic | Theories |
| *Section 2.1* | Food choice | - Healthy vs unhealthy product decision-making  - Affect vs. cognitions  - Rational worries vs. emotional influences  - Unhealthy = tasty intuition |
| *Section 2.2* | Influences in decision-making: regret | - Emotions vs. visceral influences - Risk-avoiding versus risk-seeking behaviour  - Feedback versus no feedback |
| *Section 2.3* | Regret theory | - Adapted form of Standard Expected Utility theory  - Assumptions of regret theory |
| *Section 2.4* | Influences in decision-making: curiosity | - Visceral factors  - Definitions and effects of curiosity - Impulse buying as a consequence of curiosity |
| *Section 2.5* | Information gap theory | - Explanation of information gap theory  - Zeelenberg & Van Dijk (2007)  - Mathematical representation |

## 2.1 Food choice

*“Men, as well as women, are much oftener led by their hearts than by their understandings* (Lord Chesterfield)”.

Food choice is a domain where desires change quickly. Additionally, it is a domain where good intentions are subject to fail because consumers cannot control themselves (Read & Van Leeuwen 1998). This can initiate impulsive behaviour, which evolves from a desire or urge to consume (Thomas et al., 2011). People often use food for emotional purposes like for rewarding themselves (Wardle et al., 2002). Emotional eating of non-nutritive products can be dangerous (Sleddens et al., 2009). The consequence is that consumers impulsively buy unhealthy products even though they consider the products to be unhealthy and might even experience regret after the purchase. Decision-making in the food domain will now be discussed in more detail.

### 2.1.1 Decision-making in the food domain

The unhealthy food consumption, which is increasingly observable in current society, has considerable consequences for health (Raghunathan et al., 2006). Therefore, it is important to look into the decision making at hand. Three relevant studies will be discussed which find evidence for the statement that people do not always decide with their minds.

First of all, Shiv and Fedorikhin (1999) explain an experiment in which participants choose between healthy and unhealthy food to show that heart and mind can be in conflict. Participants were asked to choose between a chocolate cake and a fruit salad. These differ in degree of positive affect and favourable cognitions. The authors relate choices made by the respondents to the amount of processing recourses. Affective processes tend to occur automatically while cognitive processes tend to occur in a more controlled manner (Shiv & Fedorikhin, 1999). When processing resources were limited, the study found that positive affect overruled cognitions and thus most participants chose the chocolate cake. The participants who cognitively processed more had a higher capability to use their cognition and thus resisted the chocolate cake more often (Shiv & Fredorikhin, 1999). The strength of the effect was higher when the mode of presentation was real instead of symbolic (Shiv & Fredorikhin, 1999) since this can increase the vividness and thus make it more likely to feel the pleasure from consumption (Loewenstein, 1996).

Second, in the study by Hoch and Loewenstein (1991) it is discussed that desire often occurs automatically and is characterized by behaviour with almost no cognition. It is indicated that decision-making can lead to regret while this regret could have been avoided by using sufficient forethought. Two forces simultaneously shape a consumer’s decision. On the one hand it is shaped by rational worries, which are often of a long-term fashion. On the other hand it is shaped by emotional influences, which mostly have a short-term character (Hoch & Loewenstein, 1991). These short-term and long-term goals can be in conflict when engaged in decision-making in the food domain. The authors develop a decision-theoretic model based on reference points. With this model, it is shown that consumers can feel an abrupt intensification in the amount of desire they feel for a product. This increase of desire can make people likely to shift their reference point, which leads to satisfying short-term preferences instead of long-term preferences.

Self-control is described as a battle between desire and willpower and consumers use self-control to make their behaviour more consistent (Hoch & Loewenstein, 1991). Desire and willpower can be seen as two psychological factors that are relevant in the food domain. For instance, preventing doing groceries when you are hungry is a way to use self-control in order to decrease the struggle between desire and willpower.

Thirdly and finally, Raghunathan et al. (2006) studied the effect of the “unhealthy = tasty intuition”. They provided participants with information about the healthiness of food. Their main conclusion seems to contradict other studies that see unawareness of consequences or a low degree of self-control to resist unhealthy food as main reasons for unhealthy food consumption. They concluded that one of the main reasons that consumers choose unhealthy food is because they feel such food tastes better (Raghunathan et al. 2006). In other words, when a hedonic goal was made prominent to the participants, the unhealthier an option seemed, the better the participants thought the taste would be. This led to a greater enjoyment of consumption and ultimately to priority of the unhealthy food choice (Raghunathan et al., 2006).

## 2.2 Influences in decision-making: regret

Decision-making can be highly emotional (Zeelenberg & Van Dijk, 2007) and emotions have been recognized as a valid area of scientific analysis in the marketing field (Huang, 2001).

Emotions can help explain behaviour for which good explanations seem to be lacking when focusing on the reason behind a decision (Elster, 1998). As Elster (1998) argues in his paper, it is of importance to distinguish between emotions and visceral influences. First of all, emotions are activated by beliefs. The beliefs, which a person has about the environment, trigger a specific emotion. These beliefs do not need to be real but can also be imagined. Visceral influences, for instance hunger, do not necessarily have to be triggered by beliefs. Second, an emotion is felt towards a person or a circumstance in society. Additionally, emotions induce physiological arousal by hormonal changes and they are reflected in physiological expressions while visceral factors do not necessarily have this characteristic. Further explanation and elaboration on visceral factors can be found in section 2.4. Also, emotions can be measured on a scale from pain to pleasure. This can ultimately have an effect on the tendency to act. Elster (1998) additionally modelled emotions as temporary preferences.

There are numerous emotions that could explain behaviour. The emotions of most interest here are counterfactual emotions, which are generated by thoughts about what might have happened (Elster, 1998). Regret is such an emotion and will be discussed in more detail.

After making a decision about a purchase, consumers sometimes regret this decision (Simonson, 1992). Landman defined regret as “the sense of sorrow, disappointment, or distress over something done or not done” (1987, p. 524). Regret is an emotional state, which can be seen as painful. When people realize that the situation they are in at that moment would have been better if they had chosen otherwise, regret can arise. Thus, regret is a negative emotion and it is cognitively based (Zeelenberg, 1999). Additionally, regret is an experience with a temporal pattern as all other emotions (Gilovich & Medvec, 1995). Specifically, Gilovich and Medvec (1995) state that actions can lead to more regret in the short term while inactions can lead to more regret in the long term. Related concepts of regret are guilt and responsibility (Thaler, 1980).

### 2.2.1 Risk-avoiding versus risk-seeking behaviour

Regret has been identified as a crucial factor in risky decision-making (Zeelenberg et al., 1996). The authors argue that consumers tend to make choices that minimize regret instead of risk. Thus, people are generally averse to regret (Zeelenberg, 1999). In fact, it is concluded that regret-minimizing choices can be either risk avoiding or risk seeking. On the one hand, when looking at an example of making a choice between a gamble and something for sure, risk-avoiding behaviour is often observed. When somebody chooses the safe option, the outcome of the gamble will most likely not be made known to that person. Thus, it cannot be judged if the gamble would have been a better choice and therefore regret can be avoided. Since the riskless option is a protection from regret while the gamble is characterized by some degree of risk, the option with the most certainty is chosen when regret is anticipated (Zeelenberg, 1999). On the other hand, Zeelenberg (1999) explains that there are also studies that show that in real life, regret-minimizing choices can be risk seeking and thus the risky option is seen as carrying the least regret. Circumstances that show this are characterized by a choice between two outcomes where one of these outcomes is more risky of which the outcome will always be given. In this way, when people choose the riskless option, there is a chance of finding out that the foregone more risky option had a better outcome. This would lead to regret and shows that the anticipation of regret can lead not only to risk-avoiding behaviour but also to risk seeking behaviour (Zeelenberg, 1999).

### 2.2.2 Feedback versus no feedback

The most important factor determining if an option minimizes regret or not is if feedback of the foregone option(s) is expected. Regret, which arises after a decision has been made, is largely dependent on awareness of the outcomes of the alternatives that were not chosen (Zeelenberg, 1999). Post-decisional regret can be made more salient by manipulating somebody’s attention on future regret at the time of the decision. In this way, these emotions will be taken into account more when making the decision (Zeelenberg, 1999).

Zeelenberg and Van Dijk (2007) explain that there are two main strategies to avoid regret. First, consumers might give priority to selecting options that protect them from feedback on the options not chosen. Second, after a decision has been made, consumers might avoid information that could show that any of the foregone options dominated the actual choice. Thus, when a consumer is provided with information about a particular foregone option and is made aware of this before a decision is made, the expected regret might influence decision-making.

Ultimately, emotions could improve decision-making. The reason for this is that decisions will be better if they are guided by reason and emotions instead of only reason (Elster, 1998). This could also be of relevance for this study since expected regret could potentially lead to less unhealthy food choices.

## 2.3 Regret theory

Regret is a useful emotion when making a choice because anticipating regret forces people to consider their options more before deciding and thus engages them in more ‘rational’ decision-making (Zeelenberg, 1999).

Regret theory is an action-based theory and it assumes that people take into account the chance of feeling regretful when they engage in decision-making under uncertainty (Ritov, 1996). Thus, regret theory is based on the concept that emotional reactions to potential results are considered during the process of decision-making (Zeelenberg, 1999). Zeelenberg (1999) stresses that the main assumption of regret theory is that the fact that people tend to elude regret and other negative emotions is a crucial factor in decision-making.

Regret theory can be seen as an adapted form of standard expected utility theory. Expected utility theory and regret theory have some similarities but also some important differences. The main similarity is that in both theories the assumption is made that the utility that is expected from a choice is dependent on the trade-off between pain and pleasure of the outcomes of a particular choice. The main difference between the theories is that in regret theory the utility that is expected from an option also depends on the regret that can potentially be felt when comparing outcomes of the option chosen and outcomes of a foregone option. Expected utility theory, on the other hand, only takes the option that is chosen into account. In this way, regret theory has the potential to clarify nonconformities of expected utility (Zeelenberg, 1999).

Simonson (1992) discussed the influence of anticipating regret and responsibility on purchase decisions. It is argued that the choices of consumers could be affected by requesting the consumers to anticipate the regret and responsibility they would feel if they made the wrong decision. As discussed in regret theory, humans are often capable of anticipating post-decision emotions. This anticipated regret and responsibility is integrated in the assessment of the possible outcomes and in this way can impact decision-making (Simonson, 1992).

Thus, people will always try to minimize regret. The anticipation of feedback about the options will influence which prospects minimize regret (Zeelenberg, 1996).

### 2.3.1 Assumptions of regret theory

Essential in regret theory is the occurrence of feedback and therefore the main assumption of this theory is that all options, chosen and unchosen, are made salient. This is due to the fact that, if no feedback will be given, there is no reason to expect regret since regret can be avoided (Zeelenberg, 1999). Thus, the assessment of the same outcome can greatly differ and this depends on if the outcome of the foregone option is salient (Ritov, 1996). This is explained by the fact that the amount of uncertainty resolution regulates the comparison points that are used for evaluating. Uncertainty can be solved for all options or for only part of the options. When uncertainty is solved for all options, the chosen option is compared to the unchosen option. Conversely, when uncertainty is solved for only part of the options, the comparison point is the expected outcome or an estimate of the current situation (Ritov, 1996). In other words, the comparison point changes. It is concluded that when both options in a gamble are resolved, the potential for regret influences preferences. This can make the more risky gamble more appealing because by knowing that the foregone option will be made salient, this turns into the comparison point.

Apart from this, regret theory has two main assumptions (Loomes & Sugden, 1982). First, it is assumed that humans make a comparison between the true outcome and the potential outcome (if a different choice would have been made). This in turn leads to emotions. If the option, which was not chosen, is ultimately evaluated as better, regret will follow. When people receive something that is better than they would otherwise have obtained, rejoice can occur. Second, it is assumed that these potential emotional consequences are thought about during the decision-making. It seems reasonable that people will take the possible emotional consequences of regret into consideration if they are aware of these (Ritov, 1996).

## 2.4 Influences in decision-making: curiosity

Often, people tend to act in contrary to their self-interest. They experience a feeling of being out of control (Loewenstein, 1996). Loewenstein explains this by visceral factors. As discussed in section 2.2 of this study, visceral influences differentiate from emotions by not needing to be triggered by beliefs, not needing to be felt towards a person or circumstance, and not needing to be accompanied by hormonal changes and reflected in physiological expressions.

Visceral states can be the source of desire for a product (Thomas et al., 2011). One of the main characteristics of visceral factors is that they are characterized by an effect on the relative desirability of goods or actions. Visceral factors can crowd out pre-existing goals through their disproportionate effect on behaviour. Additionally, the effects of visceral factors are often underestimated. Loewenstein (1996) argues that visceral factors should be taken into account to make a rational choice. However, the higher the intensity of a visceral factor is, the higher the influence is on behaviour, which ultimately can lead to suboptimal patterns of behaviour.

When looking at hunger as a visceral factor, the way this leads to behaviour is the following; hunger leads to motivation and focus on activities and forms of consumption associated with food. Additionally, temporary changes in hunger can lead to unsteady priorities (Read & Van Leeuwen, 1998).

Among others, visceral factors include moods, cravings, physical pain, and drive states (Loewenstein, 1994). Curiosity is generally regarded as a drive state (Loewenstein et al., 1996) and therefore curiosity can be seen as a visceral factor. More literature about curiosity will now be discussed.

### 2.4.1 Definitions and effects of curiosity

Curiosity has been described as a drive comparable with hunger and thirst; an “appetite” for knowledge (Loewenstein, 1994). Litman (2005) explains that curiosity is strongly related to approach behaviour and feelings of reward. This is similar to other appetitive desires, for instance for food.

In spite of many definitions of curiosity, a generally shared view stated by Byman is that curiosity is “on the one hand a trait-like disposition and on the other hand a state of subjective uncertainty” (2004, p. 1366). Thus, besides curiosity being a personality trait, a situation can also evoke curious behaviour (Livson, 1967). Curiosity can simply be defined as the desire to know (Zeelenberg & Van Dijk, 2007) and this definition will be used in this study. It seems that literature describes curiosity as a driving force behind wanting to know something or wanting to learn something. In this study, the focus is purely on the desire to know. Kang et al. (2009) explain that curiosity can be seen as a complex feeling and cognition.

Curiosity is a factor that is seen as having the potential to positively and negatively influence behaviour (Loewenstein, 1994). Curiosity has mainly been seen as positive. Exploration and curiosity have been proven to increase the development of students (Pierce et al., 2004). Additionally, curiosity has often been seen as a way to increase consumption of a product among new consumers (Pierce et al., 2004). This is of great relevance for this study since it can have marketing as well as governmental implications. Thus, on the one hand, curiosity can be useful and helpful and it is an important factor in innovation and learning. On the other hand, curiosity can also lead to dangerous consequences because of its incentives to explore, for instance for unhealthy activities like alcohol use, drug use, and smoking (Kang et al., 2009; Pierce et al., 2004). The desire to know might persuade consumers to undertake actions and specific behaviour that contradict with their best interests. This shows that curiosity does not always have positive effects. However, perhaps using curiosity could enhance the choice for healthy food if used in the correct way.

### 2.4.2 Impulse buying as a consequence of curiosity

One of the four qualities of curiosity is its association with impulsivity (Loewenstein, 1994). This leads us to another consequence of curiosity: impulse buying.

In all kinds of decision-making situations, humans are found to engage in behaviour that contradicts with pre-existing plans and this leads to regret (Loewenstein et al., 1996).Impulsive buying behaviour can lead to conflicting emotions (Hoch & Loewenstein, 1991). Particular food items that can be identified as unhealthy have the potential to evoke these impulsive responses (Thomas et al., 2011). Impulsive behaviour is related to visceral influences (Loewenstein et al., 1996). A visceral state, such as curiosity, can lead to the desire to consume which in turn can lead to impulse buying. Thus, curiosity is often associated with impulsive behaviour (Zeelenberg & Van Dijk, 2007). When curiosity is high, it can turn into a powerful motivational force. Impulse behaviour regularly is a consequence of motivation and a certain stimulus that is activated (Baumeister, 2002). An example would be when a consumer is hungry (motivation) and encounters food (stimulus), which activates the urge to eat. When encountering a product and immediately experiencing positive emotions, impulse behaviour is likely to arise since a desire will develop to achieve these positive emotions (Shiv & Fedorikhin, 1999). The influences of visceral factors are often underestimated and these factors are able to alter capabilities for decision-making (Loewenstein et al., 1996). This is referred to as the “hot/cold empathy gap” (Loewenstein et al., 1996). Simply put, this gap means that consumers are not fully capable of imagining their feelings in a different state than they are in at the moment. Bernard and Schulze (2005) explain that when consumers are faced with a desirable novel product, curiosity can lead them to get into a ‘hot’ state. Consumers will then be unable to judge future behaviour (when in a ‘cold’ state). When a consumer is in a ‘hot’ state, excessive value may be attributed to an item. This is caused by the curiosity they feel from not having the product (Bernard & Schulze, 2005). This was proven to also influence food consumption (Raad & Van Leeuwen, 1998).

Impulse behaviour is more often related to costs than to benefits (Hoch & Loewenstein, 1991). Thus, although the feelings are positive, the cognitions are often not. When impulse decision-making challenges the long-range objectives of a consumer, regret may arise (Baumeister, 2002).

## 2.5 Information gap theory

As discussed before, regret aversion can lead consumers to avoid uncertainty. However, curiosity increases the appeal of uncertainty. When in a state of curiosity, consumers can be motivated to select an option they might regret (Zeelenberg & Van Dijk, 2007). Zeelenberg and Van Dijk (2007) demonstrate that curiosity might overcome regret aversion. They explain that the same decisions that avoid regret may not shield consumers from curiosity and thus curiosity will remain.

There are multiple explanations about the source of curiosity. The one this study focuses on is information gap theory (Loewenstein, 1994).

### 2.5.1 Explanation of information gap theory

Curiosity can be associated with emotional responses of deprivation. This deprivation is a consequence of desired knowledge, which is absent (Litman, 2005). Therefore, the primary reason why people will seek information is to decrease these states of aversive curiosity (Loewenstein, 1994).

Providing consumers with some information might stimulate the occurrence of curiosity. Information gap theory explains curiosity as a result of a gap in one’s knowledge or understanding (Zeelenberg & Van Dijk, 2007; Loewenstein, 1994). People have an amount of current knowledge and they compare this to a certain reference point, which is mostly explained as the amount of information people feel is still out there and they are missing. As the amount of knowledge increases, curiosity might increase as well (Zeelenberg & Van Dijk, 2007). Thus, curiosity stems from an incongruity (Kang et al., 2009). When knowledge is slightly increased, the goal of the amount of knowledge one wants to have strongly increases. In other words, when initial learning occurs, the information gap increases. Curiosity is like a hunger for knowledge (Kang et al., 2009). Slightly priming someone with information can enhance this hunger. Thus, the knowledge of a consumer is one of the central factors in information gap theory.

The size of the gap is dependent on feeling-of-knowing judgements (Litman, 2005). These are approximations of a person’s obtainable and accessible knowledge. If the feeling-of-knowing is higher, the information gap will be smaller (Loewenstein, 1994). Additionally, Loewenstein explains that when this occurs, feelings of curiosity could increase. This is mainly due to the fact that people feel they are almost able to close the knowledge gap. Thus, the magnitude of the information gap is the main stimulator of curiosity (Loewenstein, 1994).

Since curiosity might be strong enough to kill the desire not to know, this could be effectively used in marketing to impact consumer behaviour (Menon & Soman, 2002). Enhancing the amount of novice users for trial of a specific product is an important motive of marketing (Burnett et al., 2000). Curiosity about a specific product can be increased through marketing efforts that focus on the benefits of the product that are unknown to the customer (Smith & Swinyard, 1988). This will make the information gap salient.

### 2.5.2 Zeelenberg & Van Dijk (2007)

The first experiment conducted by Zeelenberg and Van Dijk will now briefly be discussed. The second experiment will not be discussed since only the basic idea of the first experiment will be used in this study. In chapter 3 it will be explained how this study differentiates itself from and contributes to the existing study.

In the first experiment, which was named “The more I know, the more I want to know”, insights from information gap theory are used to test the relationship between regret aversion and curiosity. They introduced the “sealed-package paradigm”. They let participants read a written scenario in which they had to decide between receiving 15 Euros or a closed package. The closed package thus is the unknown option while the 15 Euros is the known option. They split the participants into three groups. The first group only got the information above. The second group received information about the package being round. The third group received information about the package being not round. This third group was added to make sure that choices made were not dependent on the type of information given. They found that the added knowledge increased curiosity and therefore increased the willingness to choose the unknown option.

The authors additionally noted that it is important to look at what effect unconditional feedback has since there can be two main motivations. First of all, the goal can be to minimize regret. Second of all, the goal can be to satisfy curiosity. They expected that when no additional information about the unknown option was provided, participants would more often choose the regret avoiding option. When unconditional feedback was provided about the unknown option, participant should be more likely to choose this option (participants read: “The researcher informs you that after you have chosen you will always learn what’s in the package, regardless of whether you opt for the 15 Euros or for the package”). Thus, there was one control treatment and two information treatments. The findings of Zeelenberg and Van Dijk (2007) suggest that subtle manipulations can increase the level of curiosity and kill regret aversion, as modelled by information gap theory.

### 2.5.3 Mathematical representation

Loewenstein (1994) used the following formula as an entropy coefficient that

measures the level of information a person has.

*n*

−Σ*pi*log2*pi*

*i=1*

In the formula above, which can be applied in many situations that cause curiosity, n stands for the options there are in a choice. P stands for the judged probability that a certain option will dominate all other options. With the formula above, the entropy measure of three situations can be measured; the current situation of a person, the information goal of a person (to attain a level of zero), and sometimes also a measure of a situation of complete ignorance. Using these outcomes, the size of the information gap can be calculated. A distinction can be made between the relative magnitude and absolute magnitude. Loewenstein (1994) explains this by giving the example that people often are more likely to see the difference between 0.8 and 0.9 as smaller than the difference between 0.1 and 0.2. The main reason for this is that, even though the absolute difference is exactly the same, the ratio between 0.1 and 0.2 is higher. In order to calculate the absolute magnitude of the information gap, the entropy measures of the individual’s current situation is subtracted from the information goal. In order to calculate the relative magnitude of the information gap, the absolute magnitude is divided by the entropy measures of the information goal minus the situation of total ignorance. Loewenstein (1994) notes that the values are basic approximations and it is difficult to quantify these values in the real world. Therefore, it is often not needed to quantify the exact size of an information gap and it is enough to make predictions on an ordinal level. In this case, it is satisfactory to create an economic experiment with treatments with different amounts of information in order to for instance make a conclusion that curiosity will intensify when more information is provided.

# Chapter 3: Methodology

As can be concluded from the previous chapter, regret is a counteracting force to curiosity and regret avoiding behaviour leaves curiosity unsatisfied (Zeelenberg & Van Dijk, 2007). However, curiosity can overcome regret in some situations.

In this experimental research it will be relevant to see if providing the participants with a bit of information will lead to more curiosity and therefore to an increased choice for the unknown (more risky) alternative. Additionally, it will be of interest if giving participants information that they will receive feedback about the foregone risky option will influence their decision-making. Specifically, it will be of relevance to see if this information increases expected regret of not choosing the risky option and finding out that the risky option was a better choice. Thus, this could lead to regret aversion and therefore to more choice for the unknown alternative. Finally, it will be of interest to see if curiosity overall is higher than regret aversion. This study will thus reveal if participants are more likely to satisfy curiosity or minimize regret.

## 3.1 Hypotheses

Based on the theory described in the previous chapter, three hypotheses can be formed. In the experiment performed, evidence will try to be found to support these hypotheses.

*Hypothesis 1: Curiosity influences decision-making through information gap theory in food choice*

It is tested if providing participants with more information about the uncertain option will lead to more curiosity. This would be consistent with information gap theory and therefore predicts that the increase in curiosity will lead to more choice for the unknown (risky) option.

*Hypothesis 2: Regret aversion influences decision-making through regret theory in food choice*

Providing participants with feedback about the foregone (more risky product) will lead to more regret aversion and therefore could potentially lead to more risky decision-making.

Regret is a contradicting force to curiosity. In the first experimental treatment curiosity and regret will be measured. However, in the second experimental treatment, which is based on regret theory, the focus will be on regret *aversion*. This means that when participants know that they will hear the outcome of the foregone option, anticipated regret becomes more salient and therefore the aversion to regret can lead to an increased choice for that option. Thus, as participants know that they will get feedback about their choice, they might be afraid of regret since regret will be unavoidable. In other words, they will always be confronted with the feeling of making the wrong choice if it turns out that the utility of the foregone option is higher than the utility of the chosen option. This is consistent with regret theory and therefore predicts that the increase in regret aversion will lead to more choice for the unknown (risky) option. It could also be argued that the fact that regret cannot be avoided in this treatment could lead to a smaller role of regret avoidance. However, we hypothesize that the knowledge that the unknown product will always be revealed will make the possible experience of regret of not receiving that product more salient. More about this will be explained when the treatments are discussed in section 3.5.

*Hypothesis 3: Regret aversion will have a stronger effect than curiosity in food choice*

In order to draw an overall conclusion this hypothesis tests which of the former hypotheses has the strongest effect. We want to see if the choice for the unknown product is driven most by the urge to satisfy curiosity or the urge to avoid regret. The main prediction is that regret aversion will be more important than curiosity when looking at the food domain. As mentioned before, the fact that consumers often impulsively buy food products even though they consider the products to be unhealthy and might experience regret (Thomas et al., 2011) shows the big influence of regret. Thus, curiosity will still have an influence but regret avoidance has the potential to intensify the choice for the unknown/risky product further.

## 3.2 Subjects & design

In total, 126 students participated in the experiment. All participants are students of a high school in the south of the Netherlands. Within one high school, seven classes are used from the same level (HAVO/VWO). All experiments are conducted at approximately the same time (between 09.00 am and 11.30 am) in order to control for some influences of hunger. In total, 57.1% of the participants are male (72 male, 54 female). Male and female data are also analysed separately in order to find possible gender differences.

Overall, the ages of the treatments are approximately equal (15.95, 16.05, 16.84) with the average age being 16.3. Likewise, education levels are equal (HAVO 4/5 and VWO 4/5).

A between-subject design is chosen. This has the advantage that no learning confounds occur. Participation in the experiment was obligatory for the student’s economics course. Additionally, participants are incentivized since they can keep the product that they chose. In this way they have an incentive to participate in the experiment as well as an incentive to do their best in the experiment. This makes the experiment incentive compatible. During the experiment, it was not made explicit that there were multiple treatments and students did not know which treatment they were randomly assigned to. As a way to thank the school for their cooperation, a presentation was given about behavioural economics and the details and results of the study performed.

This experiment can be seen as a framed field experiment since it does not use the standard subject pool of a conventional lab experiment and field context is added to the nature of the commodity. The choice is no longer hypothetical but it concerns a real food choice. This design will not lead to straightforward conclusions about unhealthy versus healthy food choices. However, it does lead to conclusions about the role of curiosity and regret aversion in food choices, which could have important implications for the unhealthy food issue. These implications will be discussed in section 5.

## 3.3 Treatments & procedure

In order to test the hypotheses of this study, an economic experiment is conducted to find the effect of curiosity and regret aversion in food choice. Information gap theory is used in an experimental setting to find if curiosity can overcome regret. Additionally, regret theory is used to find the influence of feedback on expected regret. Thus, in total there are three treatments: one control treatment and two manipulation treatments. Respondents are randomly assigned to one of three treatments. The three treatments are each performed on a different day.

### **3.3.1 Control treatment**

First of all, there is a control treatment. Participants are asked to make a decision between two food choices; one of which was packed in a box to make the product unknown. In this way a known, ‘safe’ choice is created and an unknown, ‘risky’ choice. The salient product is a fruit biscuit. This product is chosen since it is often seen as a snack that is not very unhealthy but also not very healthy. By choosing a neutral product as the known product it is tried to prevent the effect that people always choose the known product (for instance when the known product is a chocolate bar). The product that is made unknown to the participants can be any product and this product varies between participants. Participants are told that the product in the box changes every session in order to maintain privacy effects. In this treatment the subjects are simply asked to make a decision between the two products. After reading the instructions they write their answers on the form (see appendix 1 for the form). When all students have made their choice and turned their papers so no changes can be made, the experimenter passes each student individually to read their choice and then give them their product. This was designed in order to exclude the possibility of students looking at the content of the other students who already received their product and making their own choice after this. If subjects choose the box this shows curiosity. The participants in this group can avoid regret since if they choose the fruit biscuit they will not be told what was in the box.

### 3.3.2 Curiosity treatment

In the second treatment, the basics of the experiment are the same as in the control treatment. However, subjects in the curiosity treatment are asked to make a decision between the two products while getting extra information about the unknown product. This information is not specifically relevant for the decision. This information is given to trigger curiosity and thus can show the effect of information gap theory. In order to control for framing effects it needs to be made sure that the information given cannot influence curiosity or regret in a specific way (e.g. by giving information about ingredients which can lead to participants seeing the product as unhealthy and in this way anticipate regret). The extra information given to participants is the country of origin of the product in the box (for instance; «‘The product in the box was produced in the Netherlands’»). The information given is always true; the participants are in no way deceived. This information is thought to make the participants more curious towards the content of the box. This treatment is similar to the experiment of Zeelenberg and Van Dijk (2007) and tests whether by inducing more curiosity through information gap theory, people will choose the risky option more and feel less regret avoidance. Thus, it is tested if curiosity can kill regret. If subjects choose the box more in this treatment than in the control treatment, this confirms information gap theory. Thus, for hypothesis 1 (curiosity influences decision-making through information gap theory in food choice) the control treatment and this treatment will be compared.

Looking back at the literature, a distinction can be made between curiosity as a personality trait and curiosity being induced by a specific situation (Livson, 1967). Thus, while in the control treatment it can be observed if students are curious by nature, this treatment can show that a specific situation can also evoke curiosity.

### 3.3.3 Regret treatment

The assessment of the same outcome can greatly differ and this depends on if the outcome of the foregone option is salient (Ritov, 1996). Therefore, in the second manipulation treatment, participants are told that they will find out what is in the box if they do not choose the box. In this way, participants will always know what is in the box whether they choose for the box or not. Knowing that the unknown product will be made known can increase expected regret and therefore increase the choice for the unknown product. Thus, the difference between this treatment and the control treatment is that it is not possible to avoid regret. If participants in the control treatment choose the fruit biscuit, they will never know what was in the box and thus they can avoid regret. However, in this treatment, regret aversion is induced towards the box since regret cannot be avoided. Instead of feeling regret avoidance and therefore choosing the safe option, this treatment can shift the regret avoidance to the more risky option. Thus, to test hypothesis 2 (regret aversion influences decision-making through regret theory in food choice) the control treatment and this treatment will be compared.

To test for the third and last hypothesis (curiosity will have a stronger effect than regret aversion in food choice) the curiosity and regret treatments will be compared. By looking at the effects of information gap theory and comparing this with the effects found of regret theory, it can be concluded in which treatment participants choose the box more often. In this way, information to confirm or reject the third hypothesis can be found.

The table below gives on overview of the different treatments and the amount of subjects in each treatment.

|  |  |  |  |
| --- | --- | --- | --- |
| Session | Information provided |  | # of subjects |
| Control treatment | No information |  | 43 |
| Curiosity treatment | Information before choice about the content of the box (information gap theory) |  | 39 |
| Regret treatment | Feedback about the content of the box if the box was not chosen (regret theory) |  | 44 |

Table 1; overview of experimental treatments

As mentioned before, every treatment is conducted on a different day. It is decided to divide every treatment in two groups. It is not possible to conduct the experiment with all students for one treatment at the same time since classes are not big enough and the group needs to be small enough for the experimenter to maintain control. Therefore, the experimenter first does the experiment with the first class and after that immediately goes to the second class to do the experiment. Thus, the two classes have no way to communicate. It is not possible to let each participant individually execute the experiment because of time concerns of the school. Since the experiment is conducted in a group, all students in the same group have a different content of the box. In total, there are 24 different contents used (see appendix 2) in order to encourage students to individually make their choice.

## 3.4 Contribution

This study extends the study of Zeelenberg and Van Dijk (2007). In their study, one control treatment and two information treatments are used. In the first information treatment, subjects received information about the package being round/not round. The second information treatment informed the participants that after the choice was made, they would always get to know the content of the package, regardless of whether the package or the 15 Euros was chosen. In the current study there are also two information treatments and one control treatment. The most noteworthy differences between this experimental design and the experimental design of Zeelenberg and Van Dijk (2007) are the following two points.

First of all, Zeelenberg and Van Dijk let participants hypothetically choose an option. They found a significant effect, which made them conclude that curiosity could kill regret. The strength of the effect will be higher if the mode of presentation is real instead of symbolic since this increases the vividness (Shiv & Fredorikhin, 1999). Zeelenberg and Van Dijk noted that their study was limited since scenario studies have restrictions and the anticipations found are therefore not automatically correct. They conclude that future research is needed to supplement the study with findings on actual decisions to see if curiosity concerns still override regret concerns. In this research, we try to find similar results when people make a physical decision.

Second, Zeelenberg and Van Dijk used lotteries in order to give a safe and risky option. The current study uses a different setting. The food domain is a real-world everyday social situation, which could have implications for marketing and government. Thus, they are not able to win 15 Euros but instead they receive a food item.

# Chapter 4: Data & results

In this chapter, the data that was gathered with the economic experiments is analysed and results are discussed. In this study, multiple chi-squared analyses and Fisher exact tests are conducted. First, results of all treatments will be provided and discussed individually, after which comparisons will be made between treatments in order to find support for or reject the hypotheses of this study.

## 4.1 Control treatment

In the control treatment, 43 students participated. When the students arrived, they all received a brief explanation after which they were instructed to read the information in front of them and make their choice. Out of the 43 students, 26 were male and 17 female. Thus, the majority (60.5%) was male.

Only eight out of the 43 students (18.6%) chose for the fruit biscuit while the majority (81.4%) chose the box. In the control treatment of Zeelenberg and Van Dijk (2007), 33% chose the package when receiving no additional information and thus 67% chose the ‘safe’ option. It thus seems like the control treatment in this study differs substantially from the results found by Zeelenberg and Van Dijk. The fact that the experiment they performed was hypothetical could be of influence.

When looking at only the male participants, three of the in total 26 males chose the fruit biscuit (11.5%). Alternatively, out of the in total 17 female participants, five chose the fruit biscuit (29.5%). This means that for males the percentage that chose the ‘risky’ option was 88.5% whereas for females this was 70.5%. When performing a chi-squared analysis on the 2x2 table for choice (box or fruit biscuit) and gender (male or female) the outcomes are insignificant.

### 4.1.1 Discussion

It seems plausible that the overall low percentage of students choosing for the fruit biscuit (18.6%) is due to a few factors.

First of all, the fact that there were more males in this treatment could have brought the overall percentage down. It is possible that there is a gender difference. After talking to some students and teachers it seems likely that girls are overall more careful and more concerned about their health. Therefore, they might have been more afraid to choose the unknown product. Boys on the other hand were mainly curious.

Additionally, since the students would get the food item that they chose for free, they might lack a feeling of responsibility and regret. As discussed in the literature review, choices of consumers can be affected by requesting consumers to think about the amount of regret and responsibility they would feel if they made the wrong decision (Simonson, 1992). The students perhaps did not feel responsible. It might even be difficult for them to imagine this responsibility since they probably are not responsible for groceries and still live with their parents. If the students would have to pay for the product, the degree of cognitive processing and possible regret might be higher and thus less curiosity would prevail.

Another possible influential factor could be that the experiment was performed in groups. Due to organizational limitations it was necessary to perform the experiment in groups instead of individually. To our best knowledge, it is not clear how the experiment by Zeelenberg and Van Dijk (2007) was organized. However, since they mainly used decision scenarios instead of real choices, this might have been of less importance in their study. The design of this experiment was adapted in order to minimize group effects. However, it could be possible that students make different choices when in a group than when they are alone.

A final reason for the high amount of students choosing for the box could be that the fruit biscuit was not sufficiently attractive. This will further be discussed in the general discussion (section 5).

## 4.2 Curiosity treatment

When the experiment for the curiosity treatment was performed, 39 students participated. The experiment was again performed in two consecutive groups. The procedure was the same as for the control treatment, the only difference being an extra sentence of information on the form stating where the product in the box was produced (see appendix 1). Out of the 39 students, 18 were male and 21 female (53.8%).

Seven out of the 39 students (17.9%) chose for the fruit biscuit and thus 82.1% chose the box. In the treatment group of Zeelenberg and Van Dijk (2007), about 70% chose the package when receiving additional information about the content being round or not round. The difference between the results of this treatment group and the treatment group of Zeelenberg and Van Dijk thus do not seem very large. However, recall that the control treatment differed significantly.

When looking at only the male participants, five out of the in total 18 males chose the fruit biscuit. Alternatively, out of the in total 21 female participants, two chose the fruit biscuit. This means that for males the percentage that chose the ‘safe’ option is 28% and the percentage that chose the box is 72%. For females, only 9.5% chose the fruit biscuit and 90.5% chose the box. After performing a chi-squared analysis on the 2x2 table for gender and choice, the results again turned out to be insignificant.

### 4.2.1 Comparing control treatment & curiosity treatment

The second experimental treatment in comparison to the control treatment allows us to test one of the central hypotheses proposed in this paper; additional information about a product can increase curiosity. While in the control treatment the majority (60.5%) was male, in this treatment the distribution was slightly more equal (46.2% male). While it seemed that in the control treatment the overall high percentage of participants choosing for the box could be driven by the percentage of male participants, this cannot be the case in the curiosity treatment.

It seems that women are more sensitive to extra information. When only looking at the females, there seems to be an effect of information gap theory. While in the control treatment 70.5% chose for the box, this percentage increased to 90.5% in the curiosity treatment. Thus, it seems that information gap theory is applicable to the female participants. For males, this percentage actually dropped from 88.5% to 72%. Therefore, this effect cannot be explained by information gap theory.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | | | **Choice** | | Total |
| Fruit biscuit | Box |
| **Treatment** |  | Control | Count | 8 | 35 | 43 |
| Expected Count | 7.9 | 35.1 | 43.0 |
|  | Information gap theory | Count | 7 | 32 | 39 |
| Expected Count | 7.1 | 31.9 | 39.0 |
| Total |  | | Count | 15 | 67 | 82 |
| Expected Count | 15.0 | 67.0 | 82.0 |

A chi-squared analysis was performed on the data gathered from the control treatment and curiosity treatment (row=treatment [only include 1 and 2], column = choice, N = 82), which can be seen below.

Table 2: Treatment (Control-Information gap theory) \* Choice Crosstabulation

The output above shows the expected counts as well as the true counts. It is interesting to look at the difference between expected values (values if there would be no association between choice and treatment) and the true count. These are overall the same, which means there is no obvious association between choices made and the subject being in the control treatment or curiosity treatment. Additionally, the difference is statistically insignificant (p = 0.939, see appendix 4.4). This means that it is statistically probable that the small differences that are observable have occurred by chance.

Overall, the results of the two treatments are rather equal. Thus, overall there is not enough statistical evidence found for hypothesis 1 (curiosity influences decision-making through information gap theory in food choice).

The main reason for the insignificant outcomes seems to be the high amount of curiosity in the control treatment. The students were already very curious without receiving extra information and therefore no high increase was possible and the extra information did not have a large effect. However, the results for only the female participants seem more in line with information gap theory; the percentage of females choosing for the box increased.

## 4.3 Regret treatment

The third and final experimental treatment tests the other central hypothesis proposed in this paper, namely that feedback influences decision-making through regret aversion.

When the experiment for the regret treatment was performed, 44 students participated. The procedure was the same as for the other two treatments; the only difference being extra information that the content of the box would always be revealed after the choice was made (see appendix 1). Out of the 44 students, 28 were male and 16 female (42.9%).

Four out of the 44 students (9.1%) chose for the fruit biscuit and thus 90.9% chose the box. When looking at only the male participants, three out of the in total 28 males chose the fruit biscuit. Alternatively, out of the in total 16 female participants, only one chose the fruit biscuit. This means that for males the percentage that chose the ‘safe’ option is about 11% and 89% chose the box. For females, about 6% chose the fruit biscuit and about 94% chose the box.

### 4.3.1 Comparing control treatment and regret treatment

When looking at the total amount of students choosing for the fruit biscuit, a decrease of about 60% can be observed. In the control treatment, eight out of 43 students chose the fruit biscuit (18.6%) while in the regret treatment only four out of 44 students chose the fruit biscuit (9.1%). This could imply that knowing that feedback will be given increases anticipated regret and therefore increases regret minimizing decision-making.

If we focus on the difference between the control treatment and regret treatment for the male participants, this difference seems almost nil (11,5% in regret treatment, 11% in control treatment). However, the results for the female students are again more interesting and will receive more attention in the rest of this study. While in the control treatment five out of 17 female students chose for the fruit biscuit (29.5%), this dropped to one out of 16 female students (6%) in the regret treatment. This decrease is in line with predictions of regret theory.

A chi-squared analysis was performed on the data gathered from the control treatment and regret treatment (row=treatment [only include 1 and 3], column = choice, N = 87), which can be seen below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | | **Choice** | | Total |
| Fruit biscuit | Box |
| **Treatment** | Control | Count | 8 | 35 | 43 |
| Expected Count | 5.9 | 37.1 | 43.0 |
| Regret theory | Count | 4 | 40 | 44 |
| Expected Count | 6.1 | 37.9 | 44.0 |
| Total |  | Count | 12 | 75 | 87 |
| Expected Count | 12.0 | 75.0 | 87.0 |

Table 3: Treatment (Control-Regret theory) \* Choice Crosstabulation

It is again interesting to look at the difference between expected values and the true count. In the control treatment, the count for fruit biscuit is a bit higher than expected while the count for the box is a bit lower than expected. For the regret treatment, the results are exactly the other way around. The results are insignificant (p = 0.198, see appendix 4.5). Thus, overall there is not enough statistical evidence found for hypothesis 2(regret aversion influences decision-making through regret theory in food choice*).* Again, the main reason for the insignificant outcomes is the high amount of curiosity in the control treatment. The students were already very curious without receiving extra information/feedback and therefore no high increase was possible and the extra information did not have a large effect. However, there is an increase in the percentage of females that chose for the box, which could be a sign that regret theory is applicable to the female students.

## 4.4 Comparing curiosity & regret

First, the two treatments will be compared in order to conclude whether support can be found for hypothesis 3. After that, all treatments will be compared to give a clear overview of the results. Additionally, the results will be split for males and females in order to see these differences more clearly.

### 4.4.1 Comparing curiosity treatment and regret treatment

In order to test hypothesis 3, a chi-squared analysis was performed.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | | | **Choice** | | Total |
| Fruit biscuit | Box |
| **Treatment** |  | Information gap theory | Count | 7 | 32 | 39 |
| Expected Count | 5.2 | 33.8 | 39.0 |
|  | Regret theory | Count | 4 | 40 | 44 |
| Expected Count | 5.8 | 38.2 | 44.0 |
| Total |  | | Count | 11 | 72 | 83 |
| Expected Count | 11.0 | 72.0 | 83.0 |

Table 4: Treatment (Information gap theory-Regret theory) \* Choice Crosstabulation

As can be seen, there are more people than expected that chose for the box in the regret treatment while there are less people than expected that chose for the box in the curiosity treatment. This could mean that regret has an overall higher influence than curiosity. However, these results are statistically insignificant (p = 0.235, see appendix 4.6), which means that no conclusions and thus no statistically significant evidence can be found for hypothesis 3 (regret aversion will have a stronger effect than curiosity in food choice). However, the hypothesis seems partially true for women. Therefore, although not statistically proven, it seems likely that women are influenced more by feelings of regret aversion then by feelings of curiosity when making a food choice (control treatment: 29% fruit biscuit, curiosity treatment: 9.5% fruit biscuit, regret treatment: 6% fruit biscuit). In other words, although hypothesis 3 is overall statistically insignificant, the results of the study show some support for the hypothesis when focusing on the female participants.

### 4.4.2 Comparing all treatments

Besides looking at the chi-squared statistics, the outcomes of the Fisher’s exact test were also taken into account. This test judges whether differences between proportions truly exists or are just coincidence. The Fisher exact test analyses the data in a more conservative way and is therefore more precise than chi-squared. None of the 2-sided tests appeared to be significant (Treatment 1-2 / Choice: p=1.000, Treatment 1-3 / Choice: p=0.229, Treatment 2-3 / Choice: p=0.333, Gender / Choice: p=1.000, Treatment1: Gender / Choice: p=0.230, Treatment2: Gender / Choice: p=0.215, Treatment3: Gender / Choice: p=1.000).

The tables and graphs below give a summary of the data. The first table and graph show the division of choices for each treatment in numbers as well as percentages for the total sample.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TOTAL | No info (43 subjects) | Country of production (39 subjects) | | | Feedback (44 subjects) | |
| Fruit biscuit | 8 (18.6%) |  | 7 (17.9%) |  | | 4 (9.1%) |
| Box | 35 (81.4%) |  | 32 (82.1%) |  | | 40 (90.9%) |

Table 5; Number of participants choosing fruit biscuit or box

Overall, as can be seen in the table and graph, no large differences can be found between treatments. The main reason for this is the very large fraction of students choosing for the box in the control treatment. This will be discussed in more detail in the general discussion presented in the next section since it is possible that other factors have influenced the results as well.

Graph 1; Number of participants choosing fruit biscuit or box

It was found that there are differences between males and females and the influence that regret aversion and curiosity has on their decision. The second pair of table and graph represents the data for only the male participants.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MALE | No info (26 males) |  | Country of production (18 males) | Feedback (28 subjects) |
| Fruit biscuit | 3 (11.5%) |  | 5 (27.8%) | 3 (10.7%) |
| Box | 23 (88.5%) |  | 13 (72.2%) | 25 (89.3%) |

Table 6; Number of males choosing fruit biscuit or box

For males, there are no very large differences between the treatments. The difference between the control treatment and the regret treatment is very small. Therefore, it seems like the male participants were not affected much by feelings of regret aversion. The difference between the control treatment and the curiosity treatment seems in the opposite direction than information gap theory would suggest. Hence, it is difficult to make conclusions about the results for the male participants.

Graph 2; Number of males choosing fruit biscuit or box

The final pair of table and graph shows the data for the female students only.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| FEMALE | No info (17 females) | | Country of production (21 females) | | | Feedback (16 females) | | |
| Fruit biscuit |  | 5 (29.4%) | |  | 2 (9.5%) | |  | 1 (6.2%) |
| Box |  | 12 (70.6%) | |  | 19 (90.5%) | |  | 15 (93.8%) |

Table 7; Number of females choosing fruit biscuit or box

For females, the control treatment shows the least risky decision-making followed by the outcomes of the curiosity treatment and finally by the outcomes of the regret treatment. Thus, even though there is again a high amount of curiosity in the control treatment, there does seem to be an effect of information gap theory as well as regret theory. Since there is no effect of regret theory for the male participants, the overall effect is carried almost completely by the female participants. In the general discussion in the next section, more will be discussed concerning the results of the female participants since these seem in line with the theories and hypotheses.

Graph 3; Number of females choosing fruit biscuit or box

# Chapter 5: General discussion

In this chapter a general discussion will be given after which theoretical as well as managerial implications will be described.

## 5.1 Discussion

Overall, this study cannot fully confirm the findings of Zeelenberg and Van Dijk (2007) due to the statistically insignificant results. However, the results found are still economically interesting. After discussing the experiment with some of the students and teachers, it became clear that the results can be caused by multiple factors of which a few of the most probable ones will briefly be mentioned.

First of all, perhaps the product was relatively small and therefore was felt as relatively unimportant. The product for sure (fruit biscuit) was “just a fruit biscuit”, as some students said. It was not an enormous and extremely important choice. Therefore, some students said they just chose the box because of the surprise it would be for them. Thus, it seems like for most of the students the product was not valued enough to feel the possibility of regret and therefore the influence of curiosity overruled the decision. In other words, the product might have been too “simple” which made the feeling of curiosity dominate.

Second, the fact that food was used instead of money could also have had an influence. If the students would receive either 15 Euros or a product in the box (like in the experiment of Zeelenberg and Van Dijk), the outcomes could have been different. This again has to do with the fact that the options, which were presented to the students in this experiment, might have been too small and therefore effects of the theories might not have been observable.

Perhaps because curiosity is already very high, there is no real change observable in the curiosity treatment. However, there is some change in the regret treatment, especially for women. This could be due to the fact that there is already a big focus on curiosity in the control treatment, and this focus is shifted somewhat towards regret aversion in the regret treatment.

Another possibility for the results of the control treatment is the effect that the product had on the subjects. Perhaps the fruit biscuit was not as neutral as was expected when setting up the experiment. It can be argued that this product had an influence on the choices made and specifically on the choices made by males versus females. No information was collected beforehand on the consumption of fruit biscuits and the differences between males and females. It could for instance be the case that males eat fruit biscuits less often and that this is a reason for males choosing the box more than females. If this is the case, there could be a less important role of curiosity, mainly for the results of the males. Thus, perhaps the fruit biscuit was seen as not sufficiently attractive.

It seems plausible that in the final treatment there was a *mutual* effect of curiosity and regret; regret could be avoided by choosing the box and curiosity would also be satisfied when choosing the box. Thus, it appears likely that curiosity still had an influence and regret avoidance potentially intensified the choice for the unknown/risky product even further.

### 5.1.1 Gender difference in the food domain

When looking into some of the literature on gender differences, it seems plausible that a gender difference exists in this domain. Women are often more concerned with their weight and tend to diet more than men (Grogan et al., 1997). For a great extent this has to do with social pressure and the widely accepted association between femininity and “light eating” (Grogan et al., 1997). Additionally, it has been observed that women overall are more risk averse (Croson & Gneezy, 2009). As mentioned, there seems to be a gender difference in this study. The effect of information gap theory and regret theory on the decision-making for the female participants seems stronger than for male participants. There seem to be effects of both theories for the female students and the effect of regret seems a bit larger than the effect of curiosity. After observing the students during the experiment, asking some students for motivation of their choice, and talking to the teachers about the results, it seems that females overall have the tendency to be more careful. This could have to do with self-esteem. When a person has a high amount of self-esteem, the possibility increases that this person will want to be exposed to information that possibly has a non-satisfying result (Zeelenberg & Van Dijk, 2007). This could mean that when a person has a high degree of self-esteem, the decision is based less on concerns about regret and more on concerns about curiosity (Zeelenberg & Van Dijk, 2007). Thus, perhaps for the male participants the decision is based more on curiosity and for the female participants the decision is based more on regret aversion.

## 5.2 Theoretical implications

Many studies have been performed on the influence of regret as well as curiosity in decision-making. Zeelenberg and Van Dijk (2007) were one of the first that combined regret aversion and curiosity to be able to conclude that curiosity has the potential power to overcome regret aversion. Additionally, there are many studies that discuss the unhealthy food issue. This study shows that the findings of Zeelenberg and Van Dijk (2007) are not entirely transferable to the food domain. Even though the hypotheses of this study are only partially supported, this study does provide some contributions to previous research. Thus, the results of Zeelenberg and Van Dijk seem to be very specific for the participants used, the products presented, and/or the way the experiment was conducted. Therefore, their results are not widely applicable and more research is needed in order to draw an overall conclusion concerning the topic of curiosity and regret.

The goal of this study was to conduct an experiment in the food domain of which the results could be transferable to the promotion of healthy versus unhealthy food. It is proven that the unhealthy food consumption, that is increasingly observable in current society, has considerable consequences for health (Raghunathan et al., 2006). In section 2.1, theory has been discussed about healthy versus unhealthy product decision-making. One of the studies discussed found that short-term and long-term goals can be in conflict when making a decision (Hoch & Loewenstein, 1991). The short term, more emotional influences, seem to have a much larger influence in this study. Thus, when making a decision about food, it seems that the decision is mostly based on short-term emotions.

Additionally, it seems that there is a difference between males and females and the amount of curiosity and regret aversion experienced when making a food choice. This difference was not found in the previous studies about the simultaneous effect of regret and curiosity.

## 5.3 Marketing & governmental implications

The past two decades have witnessed a rapid increase in obesity (Thomas et al., 2011) and therefore obesity is in the spotlight more than ever (Jebb, 2005). Accordingly, food intake and food habits have developed into an important area of research (Raghunathan et al., 2006). The consumption of unhealthy food is increasing and sheds light on the need for research on factors that influence the decisions to choose unhealthy food (Chopra et al., 2002). If providing certain information can affect curiosity and regret aversion and in this way influence decision-making for unhealthy food, governmental and marketing implications exist. These implications will now be discussed.

In this study, the influences of regret and curiosity on the decisions for food were investigated. In the experiment, no difference was made between healthy and unhealthy food. Every student had a different content of the box but the distinction between healthy or unhealthy products was not taken into account in the analysis. However, implications can be found since the decision-making for healthy or unhealthy food could be influenced by curiosity and regret. The findings could be used to create a situation in which the healthy food option is preferred. Increasing regret for the unhealthy option or increasing curiosity for the healthy option could achieve this. Also, by making regret aversion more salient, an “unknown” product can potentially be opted for more. Therefore, this research shows that it could be interesting to look into ways to make healthy products more ambiguous or surprising. By creating a surprise effect, curiosity can be activated in the minds of the consumers.

Marketing has had a big influence on changes in dietary plans (Chopra et al., 2002). The marketing of low nutritional foods can lead to overconsumption and is one of the causal factors for the epidemic of obesity (Coon & Tucker, 2002). However, advertising for unhealthy food remains at a high level (Chapman et al., 2006). Additionally, there is a lot more advertisement for unhealthy options than for healthy options. This unbalanced marketing can increase motivation for unhealthy food choice. The government could take actions in order to decrease the marketing of unhealthy food. In order to prevent and manage this issue in an effective way, all sectors of society need to be involved (World Health Organization, 2000). Besides education about nutrition on an individual level, changes in the environment are also needed to encourage and enable healthy food choices (Jebb, 2005). Yet, the fact that large multinational companies are involved in this issue (since they are often the ones that create and try to sell unhealthy food) makes it more difficult. Therefore, cooperation is needed and new and innovative ways to tackle the challenge should be proposed (Chopra et al., 2002). This is where the government plays an important role.

Simonson (1992) argued that consumers are likely to evaluate options that have different degrees of associations with regret. One example of this is a default option. When comparing the default option with another option, the associations with regret and responsibility most likely will differ. In this way, increasing the saliency of failure can increase regret aversion and therefore affect decision-making (Simonson, 1992). Important to note is that, at the level of probability and scale of regret and responsibility, an asymmetry must be observable between the options that are considered. Only then will regret have a true effect on decision-making (Simonson, 1992). Since it is found that regret aversion mainly has an effect on females, it could be interesting to look into this effect in more detail when considering the marketing of certain products.

When looking at the subject group, the young students can be influenced by the social context in which food choices are made (Sleddens et al., 2009). Curiosity should be handled carefully since it has the potential to both create very positive as well as negative consequences and young people seem to be more vulnerable to this. Curiosity is frequently seen as a way to intensify consumption of a product among new users (Pierce et al., 2004) but needs to be used with caution. Perhaps by using regret aversion or curiosity, consumers can be encouraged to choose unhealthy products less often.

The findings about regret and curiosity seem relevant to take into account when making decision in this field, specifically for women. This study opts that it might be interesting to target males and females in a different way since their decision-making is influenced by different factors. This research provides a first step and shows the possible importance of adopting marketing efforts based on gender. All in all, emotions should be taken into account in marketing and governmental decision-making (Huang, 2001).

# Chapter 6: Limitations & suggestions for further research

In this study there are some limitations to keep in mind when reviewing the results. From these limitations, suggestions for further research in this area of interest will follow.

In this study, the mean age of the sample group is 16.3 and all subjects were high school students. The young subject group was very enthusiastic and excited about the experiment. Therefore, it might be difficult to know how much of the curiosity was induced by the information and how much merely by the experiment taking place. This might have clouded the results on curiosity. Perhaps even the level of education could be of influence here. The effect of intelligence on the effect of curiosity and regret seems interesting for future research.

Another limitation could be the type of product used. For this study, a neutral product was chosen. However, the results might have been different if the known product was very healthy or very unhealthy. A product could be used that is seen as more attractive in order to find out how the results would be affected. Furthermore, it could be the case that curiosity and/or regret aversion is felt more for certain product categories, which is also a suggestion for further research. Additionally, perhaps the fruit biscuit was not as neutral as was expected when setting up the experiment and was seen as relatively unattractive. It can be argued that this product had an influence on the choices made and specifically on the choices made by males versus females. Thus, further research should take this into account and perhaps include data about how frequently a product is consumed when analysing the data since this could have clouded the results found in this study.

Moreover, in this study curiosity as a personality trait was not taken into account. Curiosity can be induced by a situation (Livson, 1967), as was attempted in this study, but it is also a trait-like disposition (Byman, 2004). Thus, it could be interesting to look at the effect of the theories when a person is naturally more or less curious. Subjects could for instance be asked to fill in a questionnaire that includes scenarios. From this, their degree of curiosity can be assessed and this can be taken into account when reviewing results.

As with all experiments, the subjects were faced with artificial outcomes. This means that subjects have only a limited number of choices. In the real world, the strategy space is much wider. Moreover, normally subjects always have an option to avoid certain situations. In this experiment the students only had the opportunity to choose between two food options. In the real world, especially in the food domain, the number of choices is much larger, which is itself a cause of unhealthy food consumption.

Another suggestion for future research is to let participants pay for the product they choose. Due to organizational and financial limitations, it was not possible to ask the students to pay for the products. This could have made participants more impulsive and less concerned about the outcome of their choice. Future research could look into the effects of curiosity and regret aversion in a situation in which consumers pay for the product of their choice.

Finally, perhaps the theories used in this study are not suitable for the food domain. Information gap theory seems to create different effects than in previous studies and might only be applicable to for instance hypothetical settings or experiments concerning money. The same applies for regret theory. More research is needed to draw solid conclusions about these theories in this field.

# Chapter 7: Conclusion

This study attempted to answer the following question: “How do curiosity and regret influence food choices?”

An economic experiment was performed with three treatments among 126 subjects to test the degree to which curiosity was satisfied and/or regret minimized. The goal of the experiment was to find support for the three hypotheses of this study; curiosity influences decision-making through information gap theory in food choice, regret aversion influences decision-making through regret theory in food choice, and regret aversion will have a stronger effect than curiosity in food choice.It can be concluded that in this study no statistically significant results were found. Overall, none of the hypotheses received enough statistical support. Thus, while in the study of Zeelenberg and Van Dijk (2007) it is concluded that curiosity concerns can dominate regret concerns, these results do not seem entirely transferable to this study. The authors concluded that future research would be needed to supplement their study with findings on actual decisions to see if curiosity concerns still override regret concerns when not in a hypothetical situation. The results of the current study suggest that it is likely that the results are not entirely transferable to real world decision-making.

Nonetheless, the results seem to point out that there is a difference between men and women. When looking at the results of males and females separately, no effect of the theories is found for the male subjects in this study. However, the women in this study seem to be affected by information gap theory as well as regret theory. Additionally, it seems that regret aversion has a higher influence on the decision-making of women than curiosity. Thus, for women, the results do point in the direction of the three hypotheses.

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# Appendices

## Appendix 1; Experimental form

Beste student,

Op dit moment ben ik bezig met afstuderen aan de Erasmus Universiteit in Rotterdam. Om mijn master Behavioural Economics met marketing af te ronden, doe ik experimenten bij het GHC. Zelf heb ik van 2002 tot 2008 hier op school gezeten.

Het experiment is volledig anoniem. Ik zal alleen een aantal gegevens van je vragen die ik uitsluitend gebruik voor mijn analyse. Er zijn geen goede of fouten antwoorden, het gaat om jouw voorkeur. Alvast bedankt voor je deelname!

Geslacht:  
Leeftijd:  
Opleiding (bijvoorbeeld HAVO4):

In dit experiment maak je een keuze tussen de twee producten die voor je liggen. Zoals je ziet is het eerste product een Fruit biscuit (Sultana). Het andere product is verpakt in een doos zodat je niet weet wat erin zit. Aan jou de keuze welk product je het liefste wilt hebben. Het product wat je kiest is dus voor jou. Het is niet mogelijk om naderhand te ruilen.

De inhoud van de doos verschilt bij elke student dus deze zal niet hetzelfde zijn als bij de andere studenten. De inhoud is ook iets eetbaars maar kan verder alles zijn.

Het is niet toegestaan om de doos aan te raken.

*treatment 2*

*[Het product in de doos is gemaakt in ……]*

*[Als je niet kiest voor het product in de doos zal je alsnog te horen krijgen wat erin zit maar deze mag je dan dus niet houden. Je mag alleen het product houden waar je in eerste instantie voor kiest]*

*treatment 3*

Jou keuze:

* Fruit biscuit
* Product in doos; *namelijk ………..*

## Appendix 2: Experiment details

|  |  |
| --- | --- |
| Product; | Produced in (for curiosity treatment); |
| Fruitreep | **The Netherlands** |
| Peanut crisp | **China** |
| Meuslireep Chocola | **The Netherlands** |
| Mueslireep Rozijnen en Noten | **The Netherlands** |
| Tiktak fruit | **Spain** |
| Nougat | **Brasil** |
| Crackers | **The Netherlands** |
| Lollypop \* | **China** |
| Koetjesreep | **Belgium** |
| Tomatoes | **The Netherlands** |
| Sesame crisp | **China** |
| Gedroogd fruit \*\* | **The Netherlands** |
| Maoam | **Germany** |
| Hiker’s mint strong peppermint | **The Netherlands** |
| Hiker’s mint freshmint | **The Netherlands** |
| Werther’s Original | **Germany** |
| Lakerol | **Belgium** |
| Haribo | **Nederland** |
| Fudge | **Nederland** |

\* These were used in 4 different flavors

\*\* These were used in 3 different flavors

Everybody:

> Small box with one of the above products

> Fruit biscuits

## 

## Appendix 3: Pictures







## Appendix 4; SPSS results

### 4.1 Treatment 1

**Descriptives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Male\_0 | 43 | 0 | 1 | .40 | .495 |
| Age | 43 | 15 | 18 | 15.95 | .785 |
| Study | 43 | 1 | 3 | 1.65 | .686 |
| Choice | 43 | 0 | 1 | .81 | .394 |
| Valid N (listwise) | 43 |  |  |  |  |

**Frequency tables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Male\_0** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Male | 26 | 60.5 | 60.5 | 60.5 |
| Female | 17 | 39.5 | 39.5 | 100.0 |
| Total | 43 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Age** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | 15 | 12 | 27.9 | 27.9 | 27.9 |
| 16 | 23 | 53.5 | 53.5 | 81.4 |
| 17 | 6 | 14.0 | 14.0 | 95.3 |
| 18 | 2 | 4.7 | 4.7 | 100.0 |
| Total | 43 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | | | | | | | | | |
|  | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | HAVO4 | 20 | | 46.5 | | 46.5 | | 46.5 | |
| VWO4 | 18 | | 41.9 | | 41.9 | | 88.4 | |
| GYM4 | 5 | | 11.6 | | 11.6 | | 100.0 | |
| Total | 43 | | 100.0 | | 100.0 | |  | |
| **Choice** | | | | | | | | | | |
|  | | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | Fruit biscuit | | 8 | | 18.6 | | 18.6 | | 18.6 | |
| Box | | 35 | | 81.4 | | 81.4 | | 100.0 | |
| Total | | 43 | | 100.0 | | 100.0 | |  | |

**Crosstabs: gender & choice**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Male\_0 \* Choice | 43 | 100.0% | 0 | 0.0% | 43 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Male\_0 \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Male\_0 | Male | 3 | 23 | 26 |
| Female | 5 | 12 | 17 |
| Total | | 8 | 35 | 43 |

**Crosstabs: group 1 & males:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 26 | 100.0% | 0 | 0.0% | 26 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | control | 3 | 23 | 26 |
| Total | | 3 | 23 | 26 |

**Crosstabs: group 1 & females**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 17 | 100.0% | 0 | 0.0% | 17 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | control | 5 | 12 | 17 |
| Total | | 5 | 12 | 17 |

**Chi-squared: gender & choice (group 1)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Male\_0 \* Choice Crosstabulation** | | | | | |
|  | | | Choice | | Total |
| Fruit biscuit | Box |
| Male\_0 | Male | Count | 3 | 23 | 26 |
| Expected Count | 4.8 | 21.2 | 26.0 |
| Female | Count | 5 | 12 | 17 |
| Expected Count | 3.2 | 13.8 | 17.0 |
| Total | | Count | 8 | 35 | 43 |
| Expected Count | 8.0 | 35.0 | 43.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-Square Tests** | | | | | |
|  | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | 2.168a | 1 | .141 |  |  |
| Continuity Correctionb | 1.149 | 1 | .284 |  |  |
| Likelihood Ratio | 2.124 | 1 | .145 |  |  |
| Fisher's Exact Test |  |  |  | .230 | .142 |
| Linear-by-Linear Association | 2.118 | 1 | .146 |  |  |
| N of Valid Cases | 43 |  |  |  |  |
| a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.16. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

### 4.2 Treatment 2

**Descriptives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Male\_0 | 39 | 0 | 1 | .54 | .505 |
| Age | 39 | 15 | 18 | 16.05 | .759 |
| Study | 39 | 1 | 2 | 1.18 | .389 |
| Choice | 39 | 0 | 1 | .82 | .389 |
| Valid N (listwise) | 39 |  |  |  |  |

**Frequency tables**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Male\_0** | | | | | | | | | | |
|  | | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | Male | | 18 | | 46.2 | | 46.2 | | 46.2 | |
| Female | | 21 | | 53.8 | | 53.8 | | 100.0 | |
| Total | | 39 | | 100.0 | | 100.0 | |  | |
| **Age** | | | | | | | | | |
|  | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | 15 | 9 | | 23.1 | | 23.1 | | 23.1 | |
| 16 | 20 | | 51.3 | | 51.3 | | 74.4 | |
| 17 | 9 | | 23.1 | | 23.1 | | 97.4 | |
| 18 | 1 | | 2.6 | | 2.6 | | 100.0 | |
| Total | 39 | | 100.0 | | 100.0 | |  | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Study** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | HAVO4 | 32 | 82.1 | 82.1 | 82.1 |
| VWO4 | 7 | 17.9 | 17.9 | 100.0 |
| Total | 39 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Choice** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Fruit biscuit | 7 | 17.9 | 17.9 | 17.9 |
| Box | 32 | 82.1 | 82.1 | 100.0 |
| Total | 39 | 100.0 | 100.0 |  |

**Crosstabs: gender & choice**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Male\_0 \* Choice | 39 | 100.0% | 0 | 0.0% | 39 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Male\_0 \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Male\_0 | Male | 5 | 13 | 18 |
| Female | 2 | 19 | 21 |
| Total | | 7 | 32 | 39 |

**Crosstabs: group 2 & males**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 18 | 100.0% | 0 | 0.0% | 18 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | information gap theory | 5 | 13 | 18 |
| Total | | 5 | 13 | 18 |

**Crosstabs: group 2 & females**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 21 | 100.0% | 0 | 0.0% | 21 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | information gap theory | 2 | 19 | 21 |
| Total | | 2 | 19 | 21 |

**Chi-squared: gender & choice (group 2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Male\_0 \* Choice Crosstabulation** | | | | | |
|  | | | Choice | | Total |
| Fruit biscuit | Box |
| Male\_0 | Male | Count | 5 | 13 | 18 |
| Expected Count | 3.2 | 14.8 | 18.0 |
| Female | Count | 2 | 19 | 21 |
| Expected Count | 3.8 | 17.2 | 21.0 |
| Total | | Count | 7 | 32 | 39 |
| Expected Count | 7.0 | 32.0 | 39.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-Square Tests** | | | | | |
|  | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | 2.193a | 1 | .139 |  |  |
| Continuity Correctionb | 1.129 | 1 | .288 |  |  |
| Likelihood Ratio | 2.229 | 1 | .135 |  |  |
| Fisher's Exact Test |  |  |  | .215 | .144 |
| Linear-by-Linear Association | 2.137 | 1 | .144 |  |  |
| N of Valid Cases | 39 |  |  |  |  |
| a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.23. | | | | | |

### 4.3 Treatment 3

**Descriptives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Male\_0 | 44 | 0 | 1 | .36 | .487 |
| Age | 44 | 16 | 18 | 16.84 | .645 |
| Study | 44 | 5 | 6 | 5.11 | .321 |
| Choice | 44 | 0 | 1 | .91 | .291 |
| Valid N (listwise) | 44 |  |  |  |  |

**Frequencies**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Male\_0** | | | | | | | | | |
|  | | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | Male | | 28 | | 63.6 | | 63.6 | | 63.6 | |
| Female | | 16 | | 36.4 | | 36.4 | | 100.0 | |
| Total | | 44 | | 100.0 | | 100.0 | |  | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Age** | | | | | | |  | | Frequency | Percent | Valid Percent | Cumulative Percent | | Valid | 16 | 13 | 29.5 | 29.5 | 29.5 | | 17 | 25 | 56.8 | 56.8 | 86.4 | | 18 | 6 | 13.6 | 13.6 | 100.0 | | Total | 44 | 100.0 | 100.0 |  |   **Study** | | | | | | | | | |
|  | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | VWO5 | 39 | | 88.6 | | 88.6 | | 88.6 | |
| GYM5 | 5 | | 11.4 | | 11.4 | | 100.0 | |
| Total | 44 | | 100.0 | | 100.0 | |  | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Choice** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Fruit biscuit | 4 | 9.1 | 9.1 | 9.1 |
| Box | 40 | 90.9 | 90.9 | 100.0 |
| Total | 44 | 100.0 | 100.0 |  |

**Crosstabs: gender & choice**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Male\_0 \* Choice | 44 | 100.0% | 0 | 0.0% | 44 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Male\_0 \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Male\_0 | Male | 3 | 25 | 28 |
| Female | 1 | 15 | 16 |
| Total | | 4 | 40 | 44 |

**Crosstabs: group 3 & male**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 28 | 100.0% | 0 | 0.0% | 28 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | regret theory | 3 | 25 | 28 |
| Total | | 3 | 25 | 28 |

**Crosstabs: group 3 & female**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 16 | 100.0% | 0 | 0.0% | 16 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | regret theory | 1 | 15 | 16 |
| Total | | 1 | 15 | 16 |

**Crosstabs: gender & choice (group 3)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Male\_0 \* Choice Crosstabulation** | | | | | |
|  | | | Choice | | Total |
| Fruit biscuit | Box |
| Male\_0 | Male | Count | 3 | 25 | 28 |
| Expected Count | 2.5 | 25.5 | 28.0 |
| Female | Count | 1 | 15 | 16 |
| Expected Count | 1.5 | 14.5 | 16.0 |
| Total | | Count | 4 | 40 | 44 |
| Expected Count | 4.0 | 40.0 | 44.0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-Square Tests** | | | | | |
|  | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | .246a | 1 | .620 |  |  |
| Continuity Correctionb | .000 | 1 | 1.000 |  |  |
| Likelihood Ratio | .259 | 1 | .611 |  |  |
| Fisher's Exact Test |  |  |  | 1.000 | .537 |
| Linear-by-Linear Association | .240 | 1 | .624 |  |  |
| N of Valid Cases | 44 |  |  |  |  |
| a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.45. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

### 4.4 Treatment 1 & 2

**Crosstabs: choice & group**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 82 | 100.0% | 0 | 0.0% | 82 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | control | 8 | 35 | 43 |
| information gap theory | 7 | 32 | 39 |
| Total | | 15 | 67 | 82 |

**Chi-squared control – information gap**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-Square Tests** | | | | | |
|  | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | .006a | 1 | .939 |  |  |
| Continuity Correctionb | .000 | 1 | 1.000 |  |  |
| Likelihood Ratio | .006 | 1 | .939 |  |  |
| Fisher's Exact Test |  |  |  | 1.000 | .584 |
| Linear-by-Linear Association | .006 | 1 | .939 |  |  |
| N of Valid Cases | 82 |  |  |  |  |
| a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.13. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

### 4.5 Treatment 1 & 3

**Crosstabs: choice & group**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | | | | | | |
|  | | Cases | | | | | | | | | |
| Valid | | | | Missing | | | | Total | |
| N | | Percent | | N | | Percent | | N | Percent |
| Group \* Choice | | 87 | | 100.0% | | 0 | | 0.0% | | 87 | 100.0% |
| **Group \* Choice Crosstabulation** | | | | | | | | |
| Count | | | | | | | | |
|  | | | Choice | | | | Total | |
| Fruit biscuit | | Box | |
| Group | control | | 8 | | 35 | | 43 | |
| regret theory | | 4 | | 40 | | 44 | |
| Total | | | 12 | | 75 | | 87 | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-squared control - regret** | | | | | |
| **Chi-Square Tests** | | | | | | |
|  | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | |
| Pearson Chi-Square | 1.655a | 1 | .198 |  |  | |
| Continuity Correctionb | .952 | 1 | .329 |  |  | |
| Likelihood Ratio | 1.681 | 1 | .195 |  |  | |
| Fisher's Exact Test |  |  |  | .229 | .165 | |
| Linear-by-Linear Association | 1.636 | 1 | .201 |  |  | |
| N of Valid Cases | 87 |  |  |  |  | |
| a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.93. | | | | | | |
| b. Computed only for a 2x2 table | | | | | | |

### 4.6 Treatment 2 & 3

**Crosstabs: choice & group**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Group \* Choice | 83 | 100.0% | 0 | 0.0% | 83 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group \* Choice Crosstabulation** | | | | |
| Count | | | | |
|  | | Choice | | Total |
| Fruit biscuit | Box |
| Group | information gap theory | 7 | 32 | 39 |
| regret theory | 4 | 40 | 44 |
| Total | | 11 | 72 | 83 |

**Chi-squared information gap – regret**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-Square Tests** | | | | | |
|  | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | 1.411a | 1 | .235 |  |  |
| Continuity Correctionb | .746 | 1 | .388 |  |  |
| Likelihood Ratio | 1.418 | 1 | .234 |  |  |
| Fisher's Exact Test |  |  |  | .333 | .194 |
| Linear-by-Linear Association | 1.394 | 1 | .238 |  |  |
| N of Valid Cases | 83 |  |  |  |  |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.17. | | | | | |

### 4.7 All treatments

**Descriptives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Age | 126 | 15 | 18 | 16.29 | .830 |
| Valid N (listwise) | 126 |  |  |  |  |

**Frequency tables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Male\_0** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Male | 72 | 57.1 | 57.1 | 57.1 |
| Female | 54 | 42.9 | 42.9 | 100.0 |
| Total | 126 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Age** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | 15 | 21 | 16.7 | 16.7 | 16.7 |
| 16 | 56 | 44.4 | 44.4 | 61.1 |
| 17 | 40 | 31.7 | 31.7 | 92.9 |
| 18 | 9 | 7.1 | 7.1 | 100.0 |
| Total | 126 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Study** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | HAVO4 | 52 | 41.3 | 41.3 | 41.3 |
| VWO4 | 25 | 19.8 | 19.8 | 61.1 |
| GYM4 | 5 | 4.0 | 4.0 | 65.1 |
| VWO5 | 39 | 31.0 | 31.0 | 96.0 |
| GYM5 | 5 | 4.0 | 4.0 | 100.0 |
| Total | 126 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Choice** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Fruit biscuit | 19 | 15.1 | 15.1 | 15.1 |
| Box | 107 | 84.9 | 84.9 | 100.0 |
| Total | 126 | 100.0 | 100.0 |  |