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# How thinking in a foreign language could affect risk and loss aversion

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## **A B S T R A C T**

With an increasingly fast globalization, investors from different countries come in contact with foreign companies on a daily basis. When investors want to do research for investing, they often come in contact with a non-native language.

In our study, we investigate how thinking in a foreign language affects the native Dutch speaking people from Belgium. We study whether these people take more or less risk when making decisions in a second language. We used a sample of 344 native Dutch speaking students from Belgium to conduct our study. We distributed the same survey in three languages to investigate how risk averse they are in Dutch, French and English. We found that the students who received an English survey, are less risk averse than their fellow students who received the same survey in Dutch (their native language). For the students with French questionnaires, we could not find significant results indicating more or less risk aversion compared to our test group. A possible explanation for these results could be found in a more methodical way of processing the information when thinking in a foreign language. However an increased cognitive load and more uncertainty would reduce this effect slightly.

## **A C K N O W L E D G E M E N T S**

This thesis is the concluding piece of our studies, Commercial Sciences, at the University of Ghent. It is the result of hard work and a lot of studying over the past four years. However, we could not have done it alone. A lot of people helped us over the years to get to where we are and we would like to thank them for all their support and guidance.

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# 1. INTRODUCTION

## 1.1 BACKGROUND

We are living in a fast-paced world that just keeps on accelerating. Borders are disappearing and international travel is getting more accessible to larger groups of society. The same goes for cheaper transportation and the shipping of goods. This is easily reflected by all the local grocery stores being challenged by big international supermarket chains. If one turns on the television or one uses the Internet, one will very likely stumble upon international content.

This trend can also be seen in finance, where international portfolio diversification has been the integral feature of global capital markets (Gholamreza, et al., 2010). Over the past decades many researchers have investigated the effects of diversifying investment portfolios internationally and concluded that the diversification of one's assets in an international portfolio gives substantial diversification benefits (Solnik, 1974; Tesar & Werner, 1995; Fadhlaoui, et al., 2009).

These benefits allow investors to get the same or better return on their portfolio without taking more risk. This means that investors can be tempted to enter the international capital markets. However for a lot of people there still is the border of language. According to the Ethnologue Organization, which has the most extensive catalog of the world's languages (Anderson, 2004), there are currently 7,106 distinct languages (Anon., n.d.). This means that it is likely for an investor to come in contact with foreign languages when he is researching foreign companies.

When an investor conducts a research in a second or third language, he could interpret this information differently than another investor who undertakes the research in his native language. This is because people experience emotions differently in foreign

languages (Pavlenko, 2002; Caldwell-Harris & Ayçiçeği-Dinn, 2009; Ervin-Tripp, Unpublished; Dewaele & Pavlenko, 2002; Harris, et al., 2003; Schrauf, 2000; Anooshian & Hertel, 1994).

This difference in emotions while making investment decisions could impact the risk aversion of investors (Quartz, 2009; Nguyen & Noussair, 2013; Naqvi, et al., 2006) and thus impact the final investment decision of investors.

Further, the investors are not only experiencing the information in a different way but reading in a foreign language can also put the investor under a higher cognitive load. This can have an effect on risk aversion and decision making (Malhotra, 1982; Shiv & Fedorikhin, 1999).

Finally, the foreign investor will also be exposed to more uncertainty than the local investor who will have better insight in his native language. This increased ambiguity can lead to ambiguity aversion (Ellsberg, 1961; Daniel, et al., 2002; Segal, 1985). This can be linked to risk aversion (Segal, 1985).

## 1.2 JUSTIFICATION

We studied how thinking in a foreign language can affect an investor's decision making in a financial context. Our research is based on the work of Keysar et al. who published the "The Foreign-Language Effect: Thinking in a Foreign Tongue Reduces Decision Biases" in 2012. They investigated whether the use of a foreign language affects judgment and decision making. They conducted six experiments on native English and Korean speakers. With these experiments, Keysar et al demonstrated that people who make foreign language decisions rely more on systematic processes than those who make their decisions in a native tongue (Keysar, et al., 2012). In their paper they call this "The

foreign language effect”. This effect occurs when people are less biased when making a decision in a foreign language.

We chose to do our research on native Dutch/Flemish<sup>1</sup> speakers from Belgium. We believe this is a very interesting population choice due to the multilingual culture that exists in Belgium. Belgians come in contact with foreign languages on a daily basis. Particularly in Flanders, it is impossible to go through life without being exposed to foreign languages such as English and French. Both of these are not only mandatory at school but they can also be found in everyday life (*e.g.*, television, social media, slang, *etc.*).

If there is a relationship between thinking in a foreign language and judgment and decision making among Flemish people, this would mean that the investor’s perception of information in a foreign language is affected without the investor being aware of it. This would also implicate that investors perceive financial news in a foreign language in a different way than a native speaker does. With the globalization and the increased importance of having an international portfolio, a lot of Belgian investors rely on more than just nationally published news but usually read international articles published in English or French.

## 1.3 RESEARCH OBJECTIVES

### 1.3.1 General Objective

We have the following general objective for our research:

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<sup>1</sup> The Flemish are inhabitants of the Flanders, the Dutch speaking part of Belgium.

- i. To investigate if thinking in a foreign language affects risk aversion for the Dutch speaking population of Belgium.

### **1.3.2 Specific Objectives**

We have the following specific objectives for our research:

- i. To study whether there is a difference between French and English as a foreign language.
- ii. To assess how the differences in language proficiency affect the foreign language effect.
- iii. To learn if there are differences between men and women.

## **1.4 RESEARCH HYPOTHESES**

### **1.3.1 General Hypothesis**

We have the following general hypothesis for our research:

- i. Thinking in a foreign language will likely reduce risk aversion.

### **1.3.2 Specific Hypotheses**

We have the following specific hypotheses for our research:

- i. There will likely be no difference between both languages.
- ii. A higher language knowledge level will likely reduce the foreign language effect.

- iii. The foreign language effect will likely be different for men and women as both genders experience emotions in another way.

## 1.5 OUTLINE

In this thesis we will first discuss the impact of thinking in a foreign language on one's emotions. We will discuss how a foreign language could lead to more distant emotions and how this can result in a more methodical processing of decisions. We will also discuss the literature opposing this theory.

Then we will take a look at the factors that contradict our hypothesis. We will discuss how increased ambiguity due to a foreign language can increase risk aversion.

In chapter 2.3, we will look into how an increased cognitive load can also impact the judgment and decision making of a person. We will again have a look at how thinking in a foreign language can increase one's cognitive load and how this can affect one's decision making.

Next, we will present a short overview on the prospect theory as this can give us valuable insights on the process of judgment and decision making as an entity.

Finally, we will proceed to our own study in which we investigated the foreign language effect on a sample of Flemish students.

## 2. LITERATURE REVIEW

### 2.1 THE IMPACT OF EMOTIONS

We will start our literature review by taking a closer look at the emotional aspect of thinking in a foreign language and decision making. We will first discuss the literature on the relationship between multilingualism and emotions. Then we will investigate how emotions and decision making are connected. We start from the hypothesis that one is less sensitive to emotions in a non-native language and that this will lead to more rational decision making.

#### 2.1.1 Emotions and non-native language

##### *2.1.1.1 Research indicating that emotions are different in a second tongue*

**Moods and emotions.** Before we discuss how emotions and foreign languages are intertwined, it is important to explain what emotions really are and how they are different from moods. Robbins and Judge define moods as feelings that are less intense than emotions and often lack a contextual stimulus. They can last for several hours and can be impacted by stress or even what day of the week it is. For example, on Monday people are in a more negative mood than they would be on a Friday (Robbins & Judge, 2013).

Emotions on the other hand are intense feelings that are directed at someone or something. This means that one feels emotions more strongly. Emotions come and go more quickly (Robbins & Judge, 2013). One of the triggers for emotions is language. Different researchers have found that words with strong emotions attached to them, such as childhood reprimands, are better recalled and recognized (Harris, et al., 2006; Rubin & Friendly, 1986). Dewaele (2004) also suggests that swear words are emotionally stronger felt in a native language than in a non-native language (Dewaele, 2004).

**Effect of foreign language on emotions.** Anoshian and Hertel (1994) were among the first researchers that did research on how emotions are affected by a foreign language. With their experiments, they found that emotion words were recalled more frequently than neutral words when they were presented in their native language. However, when the emotion words were presented in a foreign language, they were not recalled more frequently than the neutral words (Anoshian & Hertel, 1994). According to Anoshian and Hertel, these results can be attributed to heightened emotional processing in a native language compared to a non native language (Harris, et al., 2006).

These results were later confirmed by several other researchers who found that there is a greater emotional distance in a foreign language than there is in a native language. The experiments were expanded by introducing the measurement of skin conductance activity with fingertip electrodes. *“Electro dermal recording is a robust and sensitive method for investigating physiological concomitants of language”* (Harris, et al., 2003).

**Age of acquisition.** Harris et al. (2006) measured the skin conductance responses of respondents when they were exposed to different taboo words and other emotion words. In these experiments, they discovered that physiological responses of emotional arousal were weaker for emotional stimuli in a foreign language. More importantly, they also found that these results only hold when the second language was acquired after the age of seven years (Harris, et al., 2006). These findings also confirm the findings of Harris et al. who found that the emotional distance in a second language only occurs in bilinguals who immigrated as adults but not for those exposed to both languages during childhood (Harris, et al., 2003).

This means that there is a connection between the age of learning a new language and the degree of emotions this person has in this language. This could be because the emotional

regulation systems and language are being developed at the same time in life (Harris, et al., 2003; Bloom & Beckwith, 1989).

**Effect of foreign language on emotions in practice.** The assumption of having more emotions in a native language compared to a non-native language has also been accepted outside the laboratories and experiments of the researchers above. In 2002, a Spanish speaking person was arrested in the USA with murder charges. During the police investigation a lie detection test was taken in English to learn whether the suspect was lying or not. After passing the test, the decision was made to re-do the test in Spanish with a translator. This decision was made to avoid the possibility that this person passed the test because he could be more emotional distant in a second language (Caldwell-Harris & Ayçiçeği-Dinn, 2009).

Some researchers take it a step further and say that it is not only one's panel of emotions that is different in a second language. They say that every language has its culture and personal history of use. According to these statements, for every language one uses, one draws out of a different pool of personal memories and values (Ervin-Tripp, Unpublished; Dewaele & Pavlenko, 2002).

Ervin-Tripp supports the above claim with an experiment she did on Japanese students. In the experiment, she asked the Japanese students to complete sentences in English and in Japanese. The results of her experiment were as follows:

- “ *Japanese:* I LIKE TO read about sociology.  
*English:* I LIKE TO read comics once in a while because they sort of relax my mind.
- Japanese:* IF THE WORK IS TOO HARD he says “well, this is merely ...” and as if whipping himself, he works all the harder.

*English*      *IF THE WORK IS TOO HARD for me, I'll just quit.*

*Japanese:*    *MY GREATEST PLEASURE IS to graduate from graduate school.*

*English:*      *MY GREATEST PLEASURE IS to be able to lie on the warm sands of the beach out west."*

(Ervin-Tripp, Unpublished)

The results are clearly astounding. In almost every sentence, it is possible to detect an accurate representation of the culture behind the language. In Japanese the answers are more about hard work, honor, respect, humbleness, *etc.*, while the English answers are more representing the typical relaxed Western lifestyle with no worries. For our study this would implicate that the degree of risk aversion could be different for every language. Regardless of it being a native or non-native language.

#### *2.1.1.2 Research suggesting that emotions are not different in a second tongue*

**Similar emotions in different languages.** Ferré et al. (2010) suggest that the affirmation that a first language is always more emotional than a second language is too simplistic. These authors did memory tests with neutral and emotion words on three different groups. The first two groups consisted of bilinguals who were proficient in Spanish and Catalan. These bilinguals had acquired their second language very early in life. The third test group consisted of Spanish speakers who were also proficient in English but learned this second language later in life.

The results of these memory tests contradict the results of the researchers discussed above. Ferré et al. (2010) confirmed that emotion words are better recalled than neutral words but they could not find a difference in magnitude between the first and second language. Considering the later acquisition age of English in the third group, the authors not only suggest that a first and second language have the same emotional intensity but

they also suggest that the age of learning a new language is irrelevant. However, they do suggest that there is a difference between a first and second language for childhood reprimands. This could be explained by the links these have with fear and punishment that are not present in a second language (Ferré, et al., 2010; Caldwell-Harris & Ayçiçeği-Dinn, 2009).

**Emotional Stroop test.** Ferré et al (2010) also discussed how Sutton et al. (2007) and Eilola et al. (2007) found the same results using another research approach. They used the emotional Stroop test, a variant of the color-word Stroop test. The emotional Stroop test is an experiment where the subject gets to see an emotional word printed in a certain color. The subject is being timed and should tell as fast as possible what the color of the word is. When the words are experienced negative, the participant will respond slower than when he sees a neutral word (Williams, et al., 1996). The main difference between the emotional Stroop test and the color-word Stroop test is that the former uses emotional words.

Sutton et al. (2007) and Eilola et al. (2007) conducted the Stroop task on different groups of bilinguals of which one group consisted of bilinguals that had acquired the second language in early childhood. The results of the Stroop test indicated no difference in the emotional magnitude between a first and a second language. The authors also found these results in the group of bilinguals that had learned their second language later in life suggesting that age of learning has no influence on the emotional development of a language (Ferré, et al., 2010).

**Comments.** These suggestions however, should be taken with caution as the mean age of acquisition of this last group was eight years and eight months. This does not necessarily tell us that the age of acquisition has no influence on the emotional development of a language. It could imply that the ‘turning point’ of seven years old that Harris et al. (2006) suggested is too low. Perhaps one’s range of emotions in a second

language is similar to one's first if one learns the second language before the age of eight/nine years old, but drops significantly when this age increases.

There is also controversy around the emotional Stroop task. Different researchers, such as Algom et al. (2004) and Koizumi et al. (2007), claim that the emotional Stroop task is not analogous to the color-word Stroop test. The experiments of Algom et al. (2004) showed that color naming is slower with emotional words but that there is no difference in the importance of the words and colors.

### *2.1.1.3 Conclusions*

**Conclusions.** Researchers still have not come to an agreement on how a second language influences one's emotions. A lot of the above discussed authors believe that there is some kind of emotional distance present in a second language compared to a native language (Harris, et al., 2006; Pavlenko, 2002; Rubin & Friendly, 1986; Dewaele, 2004; Anooshian & Hertel, 1994; Harris, et al., 2003; Mortier, 2013; Caldwell-Harris & Ayciçegi-Dinn, 2009) (Ervin-Tripp, Unpublished; Dewaele & Pavlenko, 2002) .

However, other authors challenge these ideas and argue that this emotional distance is not present in a second language (Ferré, et al., 2010; Sutton, et al., 2007; Eilola, et al., 2007). The criticism that Ferré et al (2010) give is that there is a great disparity in the stimuli used for the different studies. As experiments were formed from own intuition or according to the pleasantness of the authors, it is almost impossible to make reliable comparisons between the different studies. Another problem that is addressed is the difference in proportions of positive, negative and neutral words (Ferré, et al., 2010). Finally there are also emotions that simply do not have translations in other languages (Mortier, 2013).

This calls for normalized data to be used in further research (Ferré, et al., 2010). One solution could be the use of a "balanced bilingual design". In this design the first language

of the first group is used as the second language of the second group and vice versa. This would solve most of the stimulus problems. The only remaining problem would be cultural effects (Harris, et al., 2006).

In short, with research pointing in different directions, there is still a lot of uncertainty around this topic. Standardized tests and further research are needed. These have to take into account different variables such as the proficiency of the second language, age of acquisition, culture, *etc.* It is also important to note that if these variables can influence the development of emotions in a second language, they could also affect the judgment and decision making process in a foreign language. We discuss this below.

### **2.1.2 Emotions and decision making**

Decision-making can influence a person's feelings and vice versa. Regret and disappointment can play an important role when making decisions. People try to avoid these feelings and that has an influence on the choices they make. When making decisions, people are always influenced by "the prediction of future feelings" even when we cannot always predict these feelings correctly (Schwarz, 2000).

This has also been confirmed by Nguyen and Noussair who found that emotions such as fear, happiness, anger and surprise are all positively correlated with risk averse decisions (Nguyen & Noussair, 2013). However some researchers argue that anger is negatively correlated with risk aversion. (Kugler, et al., 2010; Lerner & Keltner, 2001)

There still is some disagreement in the literature on the impact that the different emotions have on judgment and decision making. However there seems to be a consensus between the authors that emotions affect one's decisions.

## 2.2 AMBIGUITY AND DECISION MAKING

### 2.2.1 Ambiguity aversion and the Ellsberg paradox

*“Better the devil you know than the devil you don't”* (English proverb)

**Ambiguity aversion.** Another factor that should be taken into consideration when looking at the effect of a foreign language on one's decision making is ambiguity and more specifically ambiguity aversion. In this context ambiguity can be seen as uncertainty. Ambiguity aversion is the situation where decision makers prefer taking gambles with known-risk probabilities over equivalent gambles with unknown probabilities (Ellsberg, 1961).

In 1961, Ellsberg supported the existence of ambiguity aversion with the Ellsberg paradox. This paradox shows the shortcomings of traditional decision making models, such as the subjective expected utility. This model, based on the work of Von Neumann and Morgenstern (1947) and Savage (1954), explains how the preferences of a decision maker are based upon the probability of the outcomes and their subjective expected utility (Von Neumann & Morgenstern, 1944; Segal, 1985).

**Savage's Sure Thing Principle.** Ellsberg uses his paradox to illustrate how people violate Savage's Sure Thing Principle when making decisions. Savage's Sure Thing principle shows how one's preferences should remain consistent throughout one's choices (Segal, 1985).

**Ellsberg paradox.** Ellsberg (1961) conducted two separate experiments to illustrate the Ellsberg paradox. For his first experiment, he used two urns and balls in two different colors. In his second experiment he used one urn and balls in three different colors. For the purpose of this thesis, it is sufficient to look at only one of the two experiments. The first experiment goes as follows:

Suppose that there are two urns. Urn 1 contains 100 balls that can either be red or black, but the ratio of red/black is unknown. Urn 2 contains 50 red balls and 50 black balls. One is then given the possibility to gamble four times with a 100 euro stake:

- 1) Gambling on Red1<sup>2</sup> or Black1;
- 2) Gambling on Red2 or Black2;
- 3) Gambling on Red1 or Red2; or
- 4) Gambling on Black1 or Black2.

Ellsberg (1961) found that people tend to be indifferent in the first two gambles but that the majority of people prefer Red2 over Red1 and Black2 over Black1 in the last two gambles. These results contradict the Savage's Sure Thing Principle.

The reasoning behind the contradiction in the Ellsberg's experiment is as follows. When one prefers Red2 over Red1 in the third gamble, it could be assumed that this person believes that there are less than 50 red balls in the first urn with the unknown ratio. If this is true, there would be more than 50 black balls and this would make Black1 more attractive over Black2 in the fourth gamble. However participants consistently preferred Black2 over Black1 and Red2 over Red1. This indicates that the second urn, where probabilities are known, is more attractive than the first urn, where the probabilities are unknown. As a result, there is an aversion for the uncertain. These attention-grabbing results have also been confirmed by several other researchers (Sarin & Weber, 1993; Slovik & Tversky, 1974; MacCrimmon & Larsson, 1979).

**Ambiguity and risk aversion.** Fox and Tversky (1995) say that ambiguity aversion of an individual over a bet can be increased by showing this individual how incompetent he

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<sup>2</sup> Red1 = The red balls in the first urn

is in making a decision. This incompetence can be highlighted in different ways. One way would be showing the person other bets in which they have more expertise. Another possibility would be mentioning other, more qualified, people that can assess the bet for them. This shows that ambiguity aversion in the real world has a lot to do with the capabilities of people and how capable they feel to make different choices (Fox & Amos, 1995).

**Comments.** When linking these results to our research, we can assume that uncertainty aversion increases one's risk aversion in an uncertain, foreign language, situation. It is more likely to come across unknown vocabulary or expressions in a foreign language. Even when one understands everything, it will still feel less familiar as one's own native language. Therefore, people will be more risk averse in a foreign language.

### **2.2.2 Home bias and ambiguity aversion in the real world**

**Home bias.** Another field where it is possible to identify ambiguity aversion in a real life context is as a possible explanation for the home bias. The concept of home bias occurs when investors persist on investing domestically. Even when an investor is aware of the diversification benefits that investing internationally brings, he will still prefer domestic holdings over foreign securities (Philips, et al., 2012). This behavior can also be seen in the Ellsberg paradox described above, where people still chose to violate the norms of rational decisions after they had been made aware of their irrationality (Ellsberg, 1961).

**Rejected explanations.** Over the years, many researchers have taken interest in this phenomenon and have tried to explain this from financial points of view as well as from a psychological perspective. However almost all of the possible explanations these researchers could think of, had to be discarded. In 1994, Cooper and Kaplanis could not succeed in explaining the home bias with possible inflation hedging motives of investors. Tesar and Werner (1995) explored the field of variable costs to account for the home bias

(Tesar & Werner, 1995). However, no explanation could be found here either. Finally international diversification benefits could not be disputed either (Lewis, 1999).

**Ambiguity aversion as possible explanation.** One of the few possible explanations of the home bias that the literature has not yet discarded is the one of ambiguity aversion. There could be a relation here with foreign language as well. It is possible that the increased ambiguity caused by investing abroad and foreign languages, makes people subject to behavioral biases (Sendi & Bellalah, 2010). Feeling more familiar with domestic companies and one's home country in general, an investor can be drawn to investing the majority of his portfolio domestically. It can be said that investors are reluctant to investing in situations where they feel relatively ignorant (Fox & See, 2003).

This reasoning would also explain the empirical finding of employees preferring to invest in their employer's stock. As these investments do not predict the stock's future returns, insider trading can be excluded, and we can assume ambiguity aversion to be present (Daniel, et al., 2002). As these employees are more familiar with their own company than with others, it can be inferred that the degree of ambiguity is decreased and the investment becomes more attractive. If research can confirm that there is no relation between an employee investing in his employer and the expected return (Benartzi, 2001), then the presence of a small scaled home bias could be a possible explanation.

### **2.2.3 Conclusions**

**Conclusions.** First brought to light by Ellsberg in 1961 and later confirmed by many other authors, it is possible to conclude that ambiguity aversion exists. There are also several real life occasions where ambiguity aversion could be used to explain certain biases (Cooper & Kaplanis, 1994). In home bias, where investors are avoidant of foreign investments, ambiguity aversion could be used to bring more clarity to the rationale of

these investors. The same goes for people who prefer to invest in the stock of the company for which they work, rather than in other companies.

Reviewing the literature, it is not unimaginable that one is impacted by ambiguity aversion when one needs to make a decision in a foreign language. If this is the case, we could even imply that a foreign language works as a catalyst for the home bias. When investors want to invest in a foreign company and they decide to do their background research in a second language, they would not only be exposed to the uncertainty of another country, culture and laws but also to the ambiguity a foreign language could bring. Considering the mayor implications and the importance of this topic, we think further research could be very interesting.

### 2.3 COGNITIVE LOAD

**Cognitive Load.** Diao and Sweller define cognitive load as “the load that performing a particular task imposes on the learner’s cognitive system” (Diao & Sweller, 2007). They say three different sources are stated: intrinsic cognitive load (cannot be changed by structural interventions), extraneous cognitive load and germane cognitive load. If a person wants to learn a language one must see to it that the cognitive load should not exceed the working memory limits.

**Intrinsic cognitive load.** The intrinsic cognitive load refers to the difficulty of the information. If the information consists of a lot of interactive material, it is more difficult to understand than information presented with a low level of interactivity. Information has a low level of interactivity when it is presented without a relation to other information. An example of the former (high level interactivity) is grammar and syntax; an example of low level is learning new words (acquiring new vocabulary). Whether people find something difficult to study also depends on the nature of the information.

Scientists do not agree on the fact that intrinsic load can be altered by an instructional approach. However one may design some techniques which can control the intrinsic load (de Jong, 2009).

**Extraneous cognitive load.** The extraneous cognitive load does not influence the learning process itself but it is related to the instructional material and it can be changed by giving instructions. Some scientists suggest that new material should be given in an “integrated way” (Cerpa, et al., 1996) in order to avoid the “split attention effect”, which occurs when one is required to split one’s attention between multiple sources of information (Ayres & Sweller, 2005). It is really important to remove all superfluous elements from the learning material because the learner’s attention should be drawn to the learning processes which really matter (de Jong, 2009). It can be really difficult to find out what material adds extra load.

**Germane cognitive load.** The germane cognitive load arises with the construction and automation of schemas. Processes like classifying, differentiating, interpreting, organizing, *etc.* come with the construction of these schemas (de Jong, 2009). One should examine if germane load (which is usually seen as good) is not too high because one may put too much strain on the working memory.

### **2.3.1 Cognitive load and non-native language**

Reading comprehension is cognitively much more difficult in a foreign language than in the mother tongue because there is less working memory available. When one is reading in a foreign language, more cognitive resources are needed to be able to process the lexical information, because of the word decoding and understanding the syntax (Diao & Sweller, 2007).

**Redundancy effect.** If information is presented both in written and spoken way at the same time, this will have a negative influence because even more cognitive capacities are

needed. It is better to eliminate one of these sources, to get some working memory free. This is called the redundancy effect (Sweller & Chandler, 1994). However, there is a difference between low-ability learners of a language and high-ability learners. Low-ability learners will have more difficulties to get visual and verbal information at the same time because their cognitive resources are not sufficient to process all this information at the same time (Plass, et al., 2003).

**Bilinguals.** People who are bilingual read much slower in their second language than in their first language, even when their reading comprehension in both languages is the same. Favreau and Segalowitz researched this, and they came to the conclusion that bilinguals who read both texts at the same reading rate mastered some automatic processing of new vocabulary, whereas the others (reading the text in another language much slower) did not do this (Favreau & Segalowitz, 1983).

### **2.3.2 Cognitive load and decision making**

**First possibility.** In 2013, Guillemette et al. did research on loss aversion under cognitive load (Guillemette, et al., 2013). Thirty-two participants took part in an experiment, made on a computer.

The researchers simulated the cognitive load by asking the participants to memorize digits. The low cognitive load test was simulated by a two digit number sequence. The high cognitive load task was simulated by a seven digit number sequence. They used this method to simulate the cognitive load, based on the literature (Gilbert, et al., 1995; Trope & Alfieri, 1997).

To test the impact on decision making, each participant received \$30. The participants then had the chance to gamble with this money. They could chose between a certain amount of money and an uncertain choice. The gamble had two possibilities, with each a

50% probability. After the gambling part, the participants had to recall the number sequence.

In their conclusion, Guillemette, James and Larsen could not find significant evidence that risk aversion was influenced by circumstances with a high cognitive load. They could only conclude that the simulation with high cognitive load reduced the psychological responses to the losses (Guillemette, et al., 2013). In our study people are under increased cognitive load due to thinking in a foreign language. However the above researchers argue that this should not impact the decisions of these people. Under this theory, people will be equally risk averse/seeking in both languages.

**Second possibility.** Shiv and Fedorikhin studied how intuitive and cognitive aspects are important parts in decision making (Shiv & Fedorikhin, 1999).

They had two experiments and came to the conclusion that spontaneous reactions have a far greater influence on decision making than the cognitive aspect. The consumer makes a decision intuitively, rather than based on cognitive thinking. These findings are true if the “processing resources are limited”. When these resources are high cognition, they have a far greater influence on decision-making (Shiv & Fedorikhin, 1999).

**Experiment.** People can only process and absorb a limited amount of information (Malhotra, 1982). If they get too much information, they cannot process it adequately and they will make bad decisions. Overload (too much information) appeared when the consumer could choose between ten or more possibilities or when they had information on fifteen or more objects at the same time. It was discovered that a consumer could only handle a choice between six possibilities. If he had to compare alternatives it is impossible to do this when there are more than ten possibilities.

We also note that people who are “cognitively simple individuals” have a greater possibility to have an information overload than the ones who are “cognitively complex” (Malhotra, 1982).

**Conclusion.** According to Shiv and Fedorikhin we could expect people to be more vulnerable to decision biases when they are thinking in a foreign language. Due to the increased cognitive load, it will be harder to make rational decisions. This means that the framing of a question will have a bigger impact on their decisions. In the part below we will discuss how the framing of a choice can impact the decision someone makes.

## 2.4 PROSPECT THEORY

**Introduction.** In the final part of our literature review we will discuss the prospect theory. The prospect theory is a model that tries to describe judgment and decision making under risk. This model, created by Kahneman and Tversky, is an alternative to the expected utility model. We will start with having a closer look at what the prospect theory really is. Then we will conclude the discussion with explaining why we prefer the prospect theory over the expected utility theory.

### 2.4.1 Prospect theory

**Prospect theory.** The prospect theory is a descriptive model that unlike the expected utility looks to gains and losses instead of looking at the absolute wealth of an agent (Kahneman & Tversky, 1979). The interesting part of the prospect theory is that losses and gains are not perceived as the same by a person but that losses have a bigger impact. This is called loss aversion.

**Loss aversion.** Loss aversion is the inclination to be risk seeking for losses and risk averse for gains. This is because people experience losses more strongly than gains. They

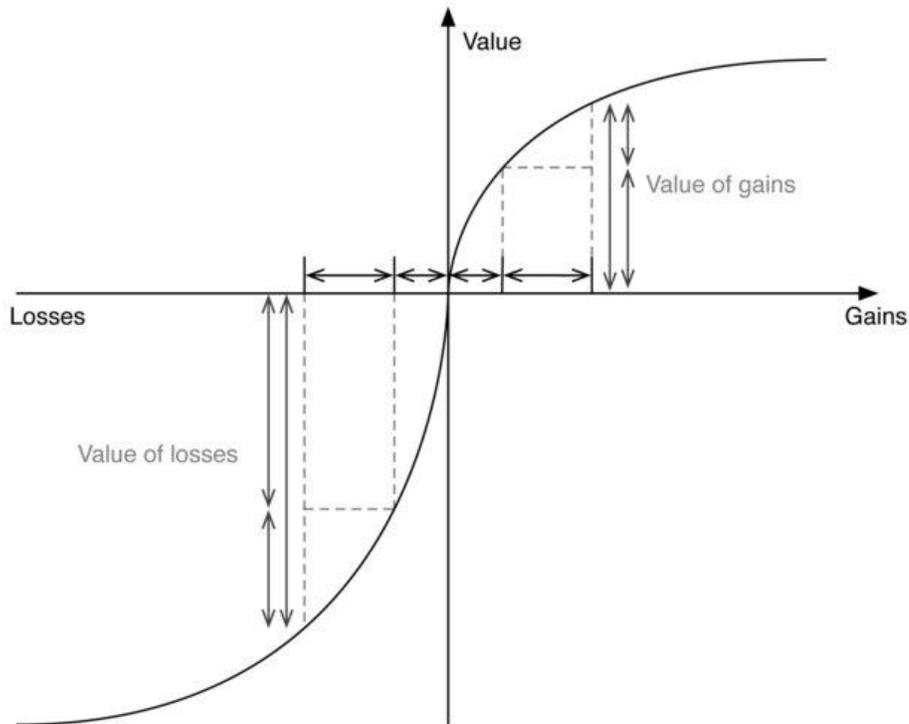
are averse for these losses. Fox and See (2003) define risk aversion as “a preference for a sure outcome over a chance prospect with equal or greater expected value”. They define risk seeking as “a preference for a chance prospect over a sure outcome of equal or greater expected value”. This means that when people are facing losses they will be inclined to prefer a gamble over a sure outcome when the expected value of the gamble is the same. When the person would be facing gains his preference would go to the sure outcome.

**Example.** This can be illustrated by the following example, of which we will be using a variant in our own study. When a person is asked to choose between receiving 50 euro with certainty or make a gamble that gives the participant 50/50 odds of either receiving nothing or receiving 100 euro, the participant will be tempted towards the sure 50 euro, even when the expected value of the gamble is 50 euro too. When the same scenario would present itself with losses, the preferences would be different. Most people would rather go for the gamble giving them 50/50 odds of either losing 100 euro or losing nothing instead of the sure outcome of losing 50 euro.

**Figure 1.** In order to provide the reader with a better view of the prospect theory and loss aversion we included Figure 1 (Anon., 2013). The figure shows us the value function of a person in decision making. This function is defined on deviations from the reference point (Kahneman & Tversky, 1979). On the Y-axis we can find the value someone assigns to certain gains and losses represented by the X-axis. Thus higher gains or losses result in higher or lower values respectively.

**Reference point.** It should also be noted that the prospect theory works with a reference point. The expected utility theory considers the total wealth but the prospect theory looks at the gains and losses. This is consistent with people’s perception in life about brightness, loudness, temperature, *etc.* They experience these in relative terms rather than in absolute terms (Thaler, 1993). If we work with gains and losses, we also need a reference point from where you make the gain or loss.

**Figure 1: Loss aversion (Anon., 2013)**



Imagine a person has ten million euro in the beginning of the year but loses five million euro during the year and only has five million euro left at the end of the year. We will also consider a second person who has 100 euro at the beginning of the year and also ends the year with 5 million euro. A complete rational person would value the 5 million euro at the end of the year of both persons the same as it is the same total wealth. However, the prospect theory shows us that the first person will value this negatively as a loss while the second person perceives it as a gain. This is because the reference point from person one will be 10 million euro and the reference point of person two is only 100 euro.

**Concave and convex.** Further we should also note that the function for the gains is concave and the function for the losses is convex. This indicates that the value assigned to a 100 euro gain is more than half of the value assigned to a 200 gain.

Finally we can also see loss aversion in the figure, illustrated by a steeper loss function. The negative value of a 50 euro loss will be bigger than the positive value of a 50 euro gain.

#### **2.4.2 Models for Judgment and decision making**

If we want to examine how one's judgment or behavior can be affected by thinking in a foreign language, it is important to take a look at how far the current literature stands at modeling the judgment and decision making process.

Many of the current models trying to explain the behavior of investors are based on the expected utility framework created by von Neumann and Morgenstern (Thaler, 1993). As we already mentioned above, this theory (using an expected utility function) explains how the preferences of a decision maker are based upon the probability of the outcomes and their expected utility.

**Why not the expected utility theory.** One of the reasons that we prefer the prospect theory as the framework for our study rather than the expected utility theory is because the latter is a theory of rational choice. This means that the model does not consider any psychological factors such as desires or motivations (Vriend, 1996). This also means that if we would work within the frame of the expected utility, that a foreign language can have no effect on one's decision. This is because all of our possible factors that could cause a difference (*e.g.*, emotions, ambiguity, *etc.*) would be left out of the equation. However people violate the expected utility model all the time, suggesting that emotions and desires can affect someone's decision (Thaler, 1993).

Another reason why we prefer the prospect theory over the expected utility theory is because the former can explain some risk attitudes that cannot be explained by the expected utility theory. Matthew Rabin (2000) illustrated this by showing that anything but risk neutrality over modest stakes would imply unrealistic risk aversion over large stakes (Rabin, 2000).

**Why not another alternative model.** Soon after the shortcomings of the expected utility model, that had been the norm for over 200 years, were exposed, many alternative models were proposed alongside the prospect theory. We believe it is better to use the prospect theory as other alternatives are usually generalized versions of the expected utility theory that take into account different anomalies. They try to do this by weakening the norms of the original model. This makes the prospect theory the most successful model to capture experimental results with (Thaler, 1993).

### **2.4.3 Conclusions**

**Conclusion.** Loss aversion, which was proposed by Kahneman and Tversky (1979), has been confirmed by numerous researchers over the years (Rabin, 2000; Gal, 2006; Yechiam & Hochman, 2013). Loss aversion shows that decisions are guided by more than only rational thought and numbers but that other psychological factors play a role too (Kahneman & Tversky, 1979). If thinking in a second language influences ones ambiguity or emotions, it could also impact the persons loss aversion. In our study we will discuss this topic further.

## 3. MATERIALS AND METHODS

### 3.1 DATA COLLECTION AND SAMPLING

**Use of primary data.** To conduct our study, we collected our own primary data instead of using a secondary source. This is due to the unavailability of the necessary reliable data that we could have collected from secondary sources. For our research, it was important to have data that took into account both factors of decision making and foreign languages. As this is a very new domain with limited studies, we were not able to use external data. This gave us the opportunity to collect the data ourselves, guaranteeing the quality of the information that we needed. Gathering our own data also allowed us to use a sample with Flemish people, which we find particularly interesting as we belong to this group ourselves.

**Collecting data.** We gathered our data during a lecture of Professor Jonckheere in February 2014. This lecture was a first year psychology course that is mandatory for all students in commercial sciences. One of our goals was to eliminate as many external factors as possible and get a very homogenous group of respondents. This gives us the opportunity to isolate the effects we are looking for. For this reason we decided to use one class of students. For our sample, we distributed 424 questionnaires<sup>3</sup> in total. These were divided over three languages. We handed out 136 surveys in English, 150 in Dutch and 138 surveys in French. It was our goal to distribute an equal number of surveys for each language but due to empty seats in the auditorium and not wanting to interrupt the lecture longer than necessary, we deviated from this goal slightly.

**Filtering data.** In our study we only look at how someone who has Dutch as a native language is affected by the foreign language effect. For this reason we included a question

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<sup>3</sup> Empty copies of the questionnaires can be found in the appendix.

in our questionnaire asking the respondents whether Dutch was their native language or not. When this was not the case we removed these surveys from the sample.

To ensure the quality of our study, we also had a question that allowed us to find mistakes. This question in particular asked the students to go through different stages and skip certain stages based on previous answers. As some students never skipped any stages, they clearly did not read the questions and were not committed to the survey. We removed their answers from our sample as well as they clearly picked answers without reading them and would skew our results.

After removing the surveys containing information that we could not use for our research, we had 344 surveys remaining that could be used for further analysis in our study. Below in Table 1 we have added the breakdown of every language. The breakdown contains the number of surveys distributed and how many we could eventually use for our study. We have also summarized the gender breakdown in table 2.

**Table 1: Sample breakdown**

<i>Language</i>	<i>Distributed</i>	<i>Surveys after filtering</i>	<i>Ratio</i>
English	136	122	90%
Dutch	150	142	95%
French	138	80	58%

**Table 2: Gender breakdown**

<i>Language</i>	<i>Male</i>	<i>Female</i>	<i>Ratio M/F</i>
English	65	57	53%/47%
Dutch	63	79	44%/56%
French	26	54	33%/67%

**French ratio-explanation.** We note that the usability ratio of the French questionnaires is far below the others. A possible explanation for this disappointing finding could be the decline of use of French in Flanders, which causes the proficiency level to fall drastically. In a study at the University of Antwerp, where they give standardized French tests to all first year students literature French, researchers have registered this decrease in proficiency officially. The researchers found that the level of French of the average starter was 59.3 in 1988. This dropped over the years and was only 36.3 in 2012 (Vanneste, 2012). We note that this has also impacted the Male/Female ratio. The majority of the French surveys that we filtered out were filled in by male respondents. This could be explained by women performing better on language tests than men (Burman, et al., 2009).

**Age.** With almost all of the first year students being 18-19 years old, we still decided to include a control question for age in our survey to make sure all of the respondents belonged to the same age group. The possible answers for this question were as follows: 0-17, 18-26, 26+. The reason we decided to include this question was because several researchers have found a difference in risk aversion between young adults and older adults (Sinha, 1992; Albert & Duffy, 2012). This suggests that including people of other

age groups in our experiment would have impacted the results. The age we use for our sample is the 18-26 year old group.

## 3.2 SURVEY AND PRE-TESTING

### 3.2.1 Survey

**Printed survey.** To obtain our data, we used a printed survey. Because we had a small and local sample group, using a printed survey was opportune. We believe that using an online survey would not have been ideal for our purposes. With online surveys having bigger geographical ranges of respondents (Saunders, et al., 2011), our sample would have been too heterogenic. Even if we would have used the network that the University of Ghent offered us, we would still have reached a big magnitude of students of the different departments. Having students from different faculties could have impacted our results in an undesirable way.

**Example undesirable impact.** A good example to illustrate this undesirable impact is with literature students. In our survey we asked the respondents to evaluate their proficiency in English or French. As we discussed above, people are inclined to use a reference point (Kahneman & Tversky, 1979). An average student who studies literature English at the university will use his environment which will be his fellow students as a reference point. This student gives oneself a score of 7-8 on a scale of 10. However an average student in statistics who is likely less proficient in English than the English literature student will give himself a 7-8 on a scale of 10 too. This is because their reference point would be their peers in statistics instead of the literature peers of the first student.

**Different language versions of the survey.** To compare risk aversion we created three versions of our survey, in Dutch, English and French. These three versions are

translations of each other. To create the translated versions, we used the mixed method<sup>4</sup> of Usunier. For this method we used different people to help with the translations and back translations. For the French version, we had help of Stany Van Besien, a perfect bilingual, who was raised in both French and Dutch. Further, Manon Buysse also supported us. She is currently doing her PhD in French. For the English translations, we had an English teacher to help us. Using the mixed method, we can also be confident up to a certain point that our lexical,<sup>5</sup> idiomatic<sup>6</sup> and empirical<sup>7</sup> meanings are robust (Usunier, 1998).

### **3.2.2 Pre-testing**

In order to obtain a good questionnaire for our study, we did several tests on our direct environment of family and friends. Our pre-testing group consisted out of 15 to 20 persons. In the pre-testing phase, we could learn whether the translations were successful and everyone interpreted everything correctly. This phase was also very valuable to learn whether our questions triggered different responses. With measuring risk aversion, we had the risk of making certain options too attractive and if everyone would choose the same, we would not have been able to retrieve significant information from our sample.

Finally, this phase was also used to learn how much time a respondent needed to fill in the different versions. Using this data, we could make accurate estimates of how much time we needed to borrow from the lecture of Professor Jonckheere. We also learned that the Dutch version could be filled in faster than the French version. We could use this information to distribute the French version first so that the respondents filling in the

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<sup>4</sup> The mixed method of translating is a method that works with back translations

<sup>5</sup> The lexical meaning = the exact meaning of individual words (Usunier 1998)

<sup>6</sup> The idiomatic meaning = the meaning of a group of words that is clear for a native speaker but that cannot be derived from the individual words (Usunier 1998)

<sup>7</sup> Empirical meaning = the meaning of sentences and words in an everyday context (Usunier 1998).

French version could finish at the same time as the respondents that received the Dutch version later. In this way we ensured that everyone had the chance to take the time and focus on completing the survey without being disturbed or being in a hurry by seeing friends finishing earlier.

### **3.2.3 Language proficiency**

**Dutch as native language.** With languages being the theme of our study, we started our survey with two language-based questions. First, we asked the respondents whether their native language was Dutch or not. As we have already mentioned above, we used this to filter out surveys. In our research, we want to study how someone with Dutch as a native language is affected by the foreign language effect, particularly by English and French. For this, it is important to have a sample of exclusively native Dutch speakers.

**Proficiency of foreign language.** The students that received an English or French questionnaire had an extra question asking them for their proficiency in the given language. This was measured with an interval-scale going from 1-10 where we indicated that 1 was “very bad” and a 10 was “very good”. For practical reasons, we chose to work with a self-reporting measure of proficiency as we did not have the resources to conduct official language tests on 400+ students.

Having the proficiency level of the respondents, allows us to investigate if someone who possesses better knowledge of a second language is affected more or less by the foreign language effect.

**Triggering foreign thought.** In order to get the respondents of our French and English surveys to think in these languages specifically, we introduced all our questions with small introductory texts. With the students reading these texts, we aimed to trigger their English/French mindset so they would be thinking in a foreign language and its

culture by the time they had to make an assessment of risk. We wanted to avoid that reading a ‘one question’ sentence was not enough for people to think in this language.<sup>8</sup>

### 3.3 DATA ANALYSIS

**Tests.** The data was analyzed using the statistical software program IBM SPSS 20. We used a five percent significance level on all our tests. Where necessary we checked for normality using the Shapiro-Wilk test, QQ plots and histograms. However we did not use the Kolmogorov-Smirnov test as the literature suggests that this test can be unreliable (Steinskog, et al., 2007). We also used Levene’s test to check for homogeneity of the variances.

For comparing categorical variables we used the non parametric Pearson’s chi-square test (gamble yes/no, gender, language). Next we used the Kruskal-Wallis test to analyze the results of our high stake experiment which will be discussed below. Finally we also used binary logistic regression models for further analysis of the differences in our results.

**Descriptive statistics.** We used descriptive such as mean values and frequency distributions to describe the different characteristics of our sample such as gender, language proficiency, gamble preference, *etc.*

### 3.4 LIMITATIONS

**Self-assessment.** Kruger and Dunning (2009) illustrate that people have difficulties recognizing their own incompetence and usually inflate their answers on self-assessment

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<sup>8</sup> It should be noted that the Dutch version also contained these small introductory texts.

tests. As we used a self-assessment test to measure the language proficiency of our respondents we may be susceptible to this problem (Kruger & Dunning, 2009).

**Homogenous.** We chose to work with a very homogenous group which means that our results are only an early exploratory step in a relatively new field. The goal is to confirm the presence of the foreign language effect in native Dutch (Flemish) speakers. However our results will not be representative for larger geographical areas nor will it be for different age groups or for people with different native languages.

**Hypothetical money.** A final limitation of our study is that we decided to work with hypothetical money. This was mainly for practical reasons. As students we have limited resources and if we had to set up real gambling scenarios we would have had legal restrictions as well. This is the reason we decided to use hypothetical gambles in our experiments. We note that a hypothetical bias could be present as suggested by the literature (Harrison & Rutström, 1999; Murphy, et al., 2003). This hypothetical bias could imply more or less risk aversion than there would be in a real life scenario.

## 3.5 EXPERIMENTS

**Introduction.** To conduct our study, we used three different experiments to measure the risk attitudes of our respondents. The first and second experiment are gambles with relatively low amounts of money (50-100 euro), while the third experiment was designed to look at the risk taking behavior with bigger amounts of money (1000-2000 euro).

### 3.3.1 Experiment 1

**Experiment one.** In our first experiment, we presented the students with two options. They can either choose to receive 50 euro with 100% certainty or they can take a gamble that gives them 50/50 odds to either win 100 euro or receive nothing. We note that they

cannot lose any money in this experiment. If they lose the gamble they receive nothing but they do not have to pay anything. This gamble was clearly framed as a gain where the respondents could win money but could only lose potential gains. The question of this experiment was as follows:

*Suppose that you win a contest and the representative of the contest gives you two options. You can either choose a certain 50 euro prize or you can flip a coin giving you 50% chance to win and 50% chance to lose. If you win, you double the prize and get 100 euro, but if you lose you get nothing. Which of the two options do you prefer?*

We note that both options have the same expected value of 50 euro ( $100\% * 50 = 50 = 50\% * 100$ ).

Based on the prospect theory described above, we assumed that people would be risk averse in this situation and thus prefer the sure 50 euro over the gamble. If we look back at the literature in our thesis, the experiment will result in one of the following scenarios:

- 1) Increased ambiguity and cognitive load of thinking in a foreign language will increase risk aversion. This will result in a higher preference for the certain 50 euro;
- 2) People will rely on more distant emotional processing while making a decision in a foreign language, which will make them less vulnerable to be risk averse. This will make the person indifferent over the gamble. If this is the case, 50% of these respondents would prefer the gamble and 50% would go for the 50 euro;
- 3) Thinking in a foreign language will make the person feel associated with the culture of this language and will make the person act accordingly. Under this hypothesis people will gamble more in one language than in another.

- 4) Finally it is also possible that the results will be the same in the three language groups. In this case, we could make the assumption that thinking in a foreign language does not affect one's decision making.

### **3.3.2 Experiment 2**

**Experiment two.** Our second experiment is very similar to the first experiment. As in the previous test, the respondent can either opt for the 50 euro with certainty or decide to take a gamble with 50/50 odds. However, the big difference in this experiment is the framing. We framed the gamble as a loss instead of a gain. The student has to decide whether he wants to lose 50 euro with certainty, or take a gamble giving him the chance to either end with a clean slate or double his debt (100 euro) with 50/50 odds. The question of this experiment was as follows:

*Suppose that you've lost a bet of 50 euro to your best friend and he/she offers you a rematch. If you win, you don't have to pay the 50 euro from the first bet anymore. However, if you lose you have to pay the 50 euro from the first bet AND 50 euro from the second bet, giving you a 100 euro total loss. The odds to win the second bet are 50/50.*

*Will you accept the second bet or not?*

According to Kahneman and Tversky (1979), one should be loss averse in the above situation. This means that people will be risk seeking and will prefer the gamble over the sure loss. We note that the expected value of the second experiment is -50 euro.

The possible scenarios for this experiment are analogous to the ones we discussed in experiment 1. We note that in the first scenario people will be more risk averse due to ambiguity and thus be less risk seeking.

### **3.3.3 Relation between experiment 1 and 2**

**Reversal of risk preferences.** Working with these two experiments that are only different in their framing allows us to compare the reversal of risk preferences. This occurs when people are risk averse when a risk is framed in one way and become risk seeking when the same risk is framed differently. The literature of Kahneman and Tversky (1979) suggests that we should be able to observe a reversal of risk preferences among our two experiments. This is because people are risk averse in the first experiment and will be risk seeking in the second experiment. We hope to see a difference in the magnitude of this reversal by making a comparison among three different languages.

This idea is based on the work of Keysar et al. (2012). They found that the answers of both experiments lie closer together for respondents making the decisions in a foreign language compared to those doing the tests in their native language. They argue that this means that people are more likely to follow the economic theory and be less vulnerable to the framing of a decision when it is in a non-native language. This makes them conclude that increased cognitive load and ambiguity does not affect the decision of the respondents in a foreign language (Keysar, et al., 2012).

**Both experiments in one questionnaire.** In contrast to Keysar et al., we decided to put both frames in the same survey. This gives us the opportunity to measure the effect in the same population and avoid the risk of having two samples with different risk patterns. The challenge was to disguise this from the participants as we did not want them to realize they were answering the same question twice. To achieve this we placed the first experiment at the very beginning of the survey even before the scale asking for their proficiency. The second experiment was located at the end of the survey as the last question.

**Framing differences.** Even though we used the same amounts of money and the same odds, we framed the story slightly different. In the first experiment it is framed as

winning through flipping a coin while in the second test we tell the students they already lost a 50 euro bet from their friend and we asked them whether they would do another 50 euro gamble to have chance to win their money. With different stories we hoped to deceive the respondents so they thought they were answering this question for the first time.

### **3.3.4 Experiment 3**

The third experiment is based on the work of Hanna and Lindamood (Hanna & Lindamood, 2004). This experiment works with different stages. In every stage we presented the students with two options. Like in the previous experiments they could choose between receiving a certain amount of money and taking a gamble. However the difference in this experiment is that they had to go to a next stage based on their choice. If they preferred the gamble they would be redirected to a stage that offered them an even riskier gamble. If they opted for the certain amount of money they would be redirected to a stage offering them a more attractive gamble.

The goal of this experiment was to segmentate the students in 6 different groups based on their level of risk tolerance. We could determine in which group a student belonged by looking to their answers in the final 'stages' of the experiment. By acquiring the different risk profiles of the students, we hoped to compare these between the different languages to determine in which languages people are willing to take more risk.

Another big difference between this experiment and the two experiments above is the amount of money that was at stake. We chose to work with higher amounts of money in this test. Instead of using 50-100 euro, the amounts varied between 1,000 and 2,000 euro. This could give us an insight on how magnitude of the decision can impact a possible foreign language effect.

The experiment was presented as follows:

The first stage:

**Question 6.1:**

*Suppose that there is a lottery, in which you can win a nice amount of money. You can choose out of 2 lottery tickets. Each of these 2 tickets gives you a possibility to win a certain amount of money.*

*Ticket A gives you a 100% chance to win 1000 euro.*

*Ticket B gives you a 50% chance to win 2000 euro, and a 50% chance to get 800 euro. Which lottery ticket would you choose?*

- I choose ticket A. Go to question 6.2*
- I choose ticket B. Go to question 6.5*

One of the further stages:

**Question 6.2:**

*Suppose that ticket A still gives you a 100% chance to win 1000 euro, but ticket B now gives you a 50% chance to win 2000 euro, and a 50% chance to get 900 euro.*

*Which lottery ticket would you choose?*

- I choose ticket A. Go to question 6.3*
- I choose ticket B. Go to question 7*

## 4. RESULTS AND DISCUSSION

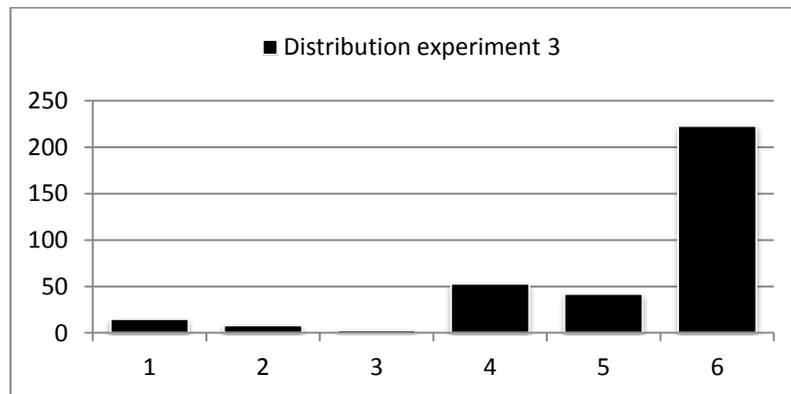
### 4.1 INSIGNIFICANT DATA

**Unusable data.** Before discussing the findings of our research, we note that we could not use all of our data. We could not use the following data: (1) data of our third experiment (the gamble with higher amounts of money). (2) Our language-proficiency scale showed some irregularities as well. (3) Finally, we could only use our French data for the general data with men and women combined. When we looked at the gender groups specifically (men/women), we could only compare the English results with the Dutch results.

#### 4.1.1 Experiment 3 (high amount gamble)

To investigate how a foreign language can affect risk aversion when the stakes of the decision are high, we used an experiment that made it possible to divide our respondents into seven different risk groups. Figure 2 illustrates the distribution of the chosen results. With a negative skewness of -1.913 the results are clearly skewed to the left. We note that the X-axis displays the risk aversion with 0 = high risk aversion and 6 = very risk seeking. The Y-axis shows the frequency.

**Figure 2: Distribution experiment 3**



**Non-parametric test.** Having data with a skewed distribution, we had to opt for a non-parametric test. Considering that our language variable is categorical and our variable with the experiment data is continuous we decided to work with a Kruskal-Wallis test. This test does not require a normal distribution but it does require the distributions to be similar between our different groups. This is the case with all our distributions being skewed to the left with skewness around -2.

**Kruskal-Wallis test.** Conducting the Kruskal-Wallis test, we were not able to reject the null hypothesis,  $\chi^2 (2, N= 344) = 0.229, p > 0.8$ . By accepting the null hypothesis we must conclude that there are no differences between our language groups for the results of experiment 3. A *post hoc* analysis confirmed these results between the separate language groups as well. Between Dutch and English we found,  $\chi^2 (1, N= 264) = 0.150, p > 0.6$ . The groups of Dutch and French,  $\chi^2 (1, N= 222) = 0.170, p > 0.6$  and finally for English and French we found,  $\chi^2 (1, N= 202) = 0.003, p > 0.9$ .

**Table 3: Test statistics Kruskal-Wallis test experiment 3**

	<i>Chi-square</i>	<i>Degrees of freedom</i>	<i>Significance</i>
All three langauges	0.229	2	0.892
Dutch and English	0.150	1	0.698
Dutch and French	0.170	1	0.680
English and French	0.003	1	0.958

**Explanation for bad data.** Our results clearly show how the most risk seeking option dominates the other choices. Even those who were very risk averse in the other two gambles often opted for the risk seeking choice in this experiment. This is because the most risk seeking option was too attractive. A possible explanation that this did not show up in our pre-testing phase can be due to having family in our pre-testing group. As older people are more risk averse than students (Sinha, 1992; Albert & Duffy, 2012), having parents in our testing-group could have impacted the results in our pre-testing round.

The reason Hanna and Lindamood (2004) did not have any problems with a similar experiment is possibly due to the stakes. As they worked with pensions, the stake was 1,000/2,000 euro a month for several years which is a lot bigger than our one time stake of 1,000/2,000 euro. Finally we note that our testing group of 15-20 persons is also too small to be statistical significant which can also explain why the results of this group had a more normal distribution.

#### **4.1.2 Proficiency scale**

**Binary logistic regression.** Using a binary logistic regression model, we discovered that the data of our scale was of very low quality. It was not only insignificant ( $p > 0.4$ ) but it also deregulated the other variables in the model. Gender and Language became insignificant on a 95% significance level as well. For this reason we decided to leave out the scale variable and to continue only with our categorical Gender and Language variables. If we leave out the scale variable we obtain significant values for all our variables in both experiment one<sup>9</sup> and experiment two.<sup>10</sup>

A possible explanation for our weak scale-data is that men usually tend to boast about their skills while women tend to underreport it (Reuben, et al., 2012). This could have

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<sup>9</sup> Experiment 1 = the gamble that is framed as a gain.

<sup>10</sup> Experiment 2 = the gamble that is framed as a loss.

resulted in men giving themselves higher scores for language proficiency than women. If we look at the correlation matrix in table 4, we can see a negative correlation between gender and proficiency. These correlations indicate that women are 21.3% less proficient in French and English than their male peers ( $p < 0.002$ ). However the literature suggests that these results are very unlikely to reflect reality with women usually performing better on language tasks than their male counterparts (Burman, et al., 2009).

Finally we must note that we measured the explanatory power of our last model using Nagelkerke R Square (0.053) and Cox & Snell R Square (0.038). This low explanatory power means that gender and language have a low impact on the decision.

**Table 4: Binary logistic regression output**

	<i>Model with scale</i>		<i>Model without scale</i>	
	Experiment 1	Experiment 2	Experiment 1	Experiment 2
	Significance	Significance	Significance	Significance
Gender	0.053	0.051	0.015*	0.042*
Langauge	0.094	0.019*	0.050*	0.007**
Scale	0.524	0.416	No scale	No scale

\* Significant at the 0.05 level

\*\* Significant at the 0.01 level

**Table 5: Correlation matrix**

	<i>Language</i>	<i>Gender</i>	<i>Scale</i>
Language	1	0.156**	-0.277**
Gender	0.156**	1	-0.213**
Scale	-0.277**	-0.213**	1

\*\* Significant at the 0.01 level

#### 4.2 Gamble framed as gain (Experiment 1)

##### 4.2.1 Results

**Results.** With descriptive statistics we found that an average of 73% of the respondents preferred the sure 50 euro over the gamble with an expected value of 50 euro. However for the males this was 66% while 79% of the females opted for the sure gain. We also found differences between the languages. Of the students that received the questionnaire in Dutch, 80% preferred the certain 50 euro. This has a high contrast with English where only 63% of the respondents chose for certainty. The French results lie closer to the Dutch with a certainty preference of 76%. We demonstrate these results in figures 3 and 4 below.

**Significance.** Using the Chi square test, we found that the different language groups have different results for the first experiment. These differences cannot be contributed to chance,  $\chi^2(2, N= 344) = 9.586, p < 0.01$ . This indicates that there are at least two languages with different results. To learn between which languages the results are

statistically different, we conducted a *post hoc* analysis. *Post hoc*, we could not find the English results to be significantly different from the French,  $\chi^2(1, N= 202) = 3.851, p > 0.05$ . Further, we also established that the English results vary from the Dutch results,  $\chi^2(1, N= 264) = 8.816, p < 0.01$ . However, we cannot reject the null hypothesis that the French and Dutch results are the same,  $\chi^2(1, N= 222) = 0.334, p > 0.6$ . We also found that women are more risk averse than men in a gamble that is framed as a gain,  $\chi^2(1, N= 344) = 7.700, p < 0.01$ . A summary of these results can be found in table 6 below.

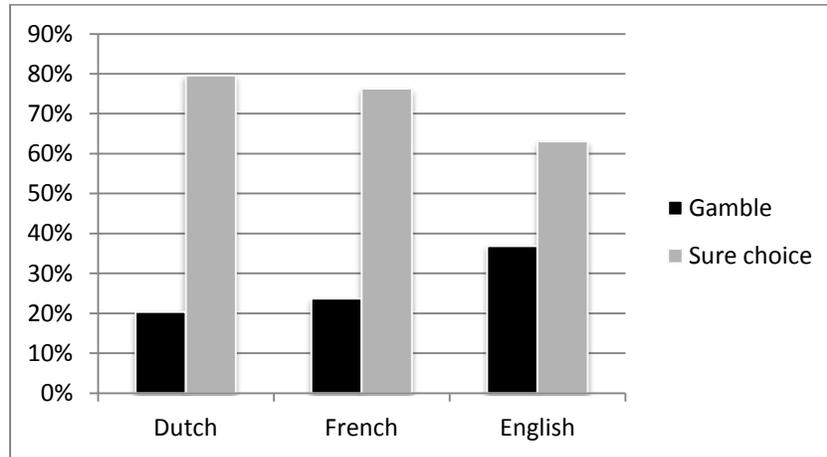
**Table 6: Chi square experiment 1**

	<i>Chi-square</i>	<i>Degrees of freedom</i>	<i>Significance</i>
All three langauges	9.586	2	0.008**
Dutch and English	8.816	1	0.004**
Dutch and French	0.334	1	0.612
English and French	3.851	1	0.063
Male and Female	7.700	1	0.007**

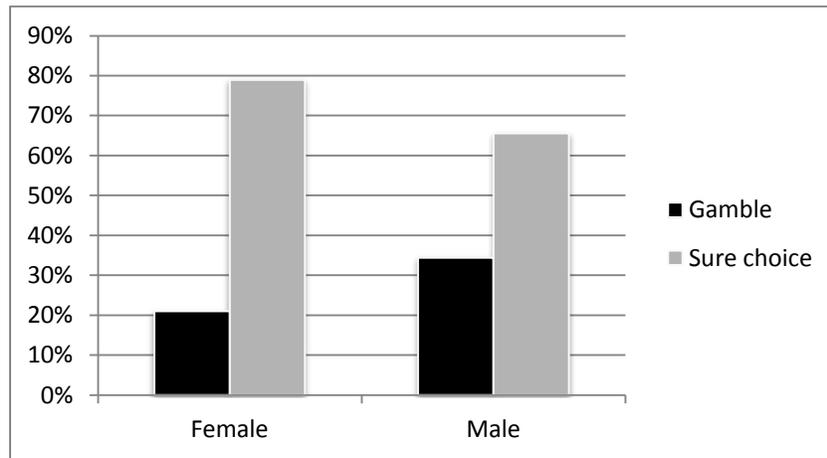
\* Significant at the 0.05 level (two-tailed)

\*\* Significant at the 0.01 level (two-tailed)

**Figure 3: Language comparison experiment 1**



**Figure 4: Gender comparison experiment 1**



#### 4.2.2 Discussion

**Figure 3.** In figure 3, we can see the presence of the foreign language effect in the English results. The Flemish respondents are clearly less risk averse in English than they are in Dutch. However, we cannot make this claim for foreign languages in general. With the French results not being statistically different from the Dutch results, it is possible that the foreign language effect does not exist in every foreign language.

**Figure 4.** In figure 4, we see that women show a lot more risk aversion than men. This could be a possible explanation for the French result. The majority of the respondents of the French questionnaire are female. In table 2, we can see that 67% of the French survey respondents are women. It could be possible that this high ratio of women countered the foreign language effect for the French results.

#### 4.3 GAMBLE FRAMED AS LOSS (EXPERIMENT 2)

**Results.** With our second experiment, which was framed as a loss, we have obtained results that are slightly more risk seeking as in the first experiment. In experiment 2, 65% of the students opted for the sure loss of 50 euro. This is a decrease in risk aversion compared to the 73% of the students that preferred the sure gain in the first experiment. We can also find these results when looking at the risk aversion of the different genders. In the second test, 58% of the men and 71% of the women preferred the sure 50 euro loss compared to 66% and 79% in the first experiment.

This trend of more risk seeking behavior in experiment 2 persists for the different language categories as well. 70% of the students who received the survey in their native language (Dutch) chose to take the sure loss over the gamble. This was 80% in the previous experiment. The respondents of the English survey become more risk seeking as well. They approach indifference with only 53% of the students that have a preference for the sure 50 euro loss. This was 63% in experiment 1. Finally we note that 72% of the students with a French survey would rather take the sure 50 euro loss over the gamble. This is a decrease as well from 76% in experiment 1.

**Significance.** As in our first experiment, we are using the Chi square test again to confirm that the differences between our groups are not a coincidence. We found the English results to be different from the French and Dutch results,  $\chi^2(1, N=202) = 7.496$ ,

$p < 0.01$  and,  $\chi^2(1, N = 264) = 8.229$ ,  $p < 0.01$ . As in our first experiment, we also found the French results not to be significantly different from the Dutch results,  $\chi^2(1, N = 222) = 0.108$ ,  $p > 0.7$ . The men and women still significantly differ in the second experiment,  $\chi^2(1, N = 344) = 6.049$ ,  $p < 0.01$ .

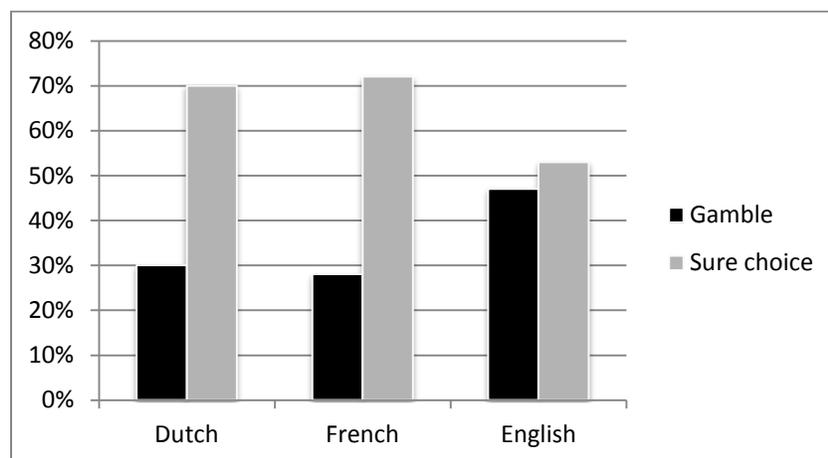
**Table 7: Chi square experiment 2**

	<i>Chi-square</i>	<i>Degrees of freedom</i>	<i>Significance</i>
All three languages	11.151	2	0.004**
Dutch and English	8.229	1	0.005**
Dutch and French	0.108	1	0.760
English and French	7.496	1	0.008**
Male and Female	6.049	1	0.017*

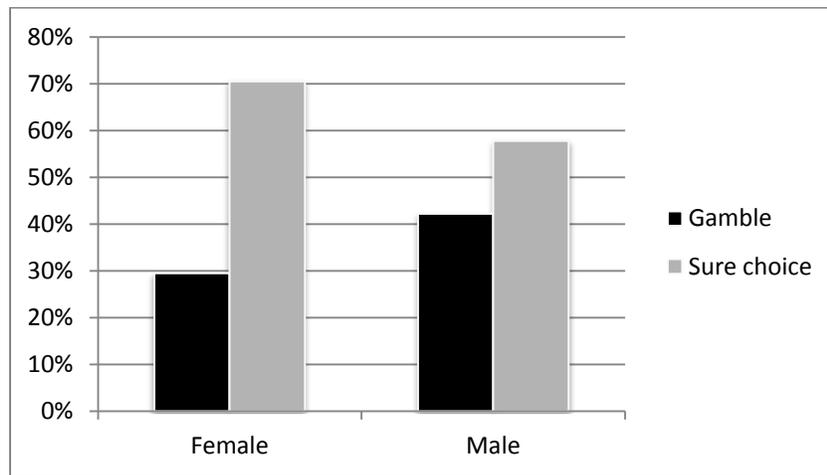
\* Significant at the 0.05 level (two-tailed)

\*\* Significant at the 0.01 level (two-tailed)

**Figure 5: Language comparison experiment 2**



**Figure 6: Gender comparison experiment 2**



#### **4.3.2 Discussion**

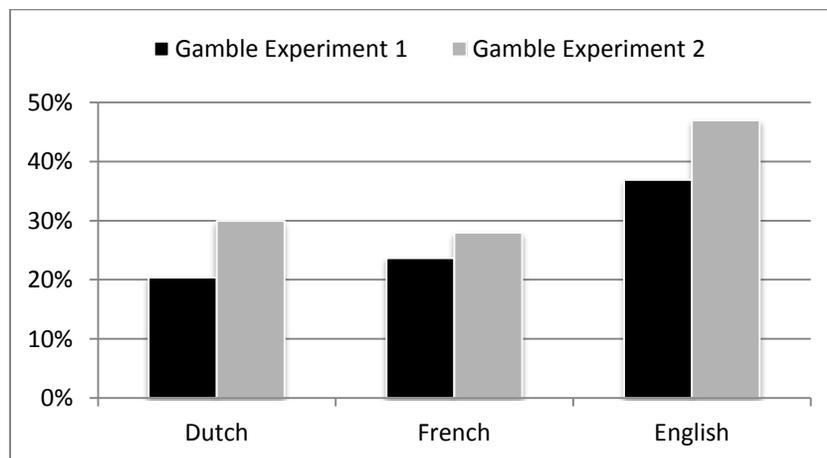
**Experiment 2.** In figure 5 and 6, we have illustrated the gambling preferences for the respondents of our second experiment. Again, we can clearly see less risk aversion for the English surveys. The French results on the other hand remain very close to the Dutch results. People who got the French questionnaire showed even more risk aversion than the other two languages. However, a part of this could be explained by figure 6. This figure shows us again how men take more risk than women. Nevertheless, there could be other factors at play as well. We can see how 29% of the women prefer to gamble while only 28% of the French survey respondents take the gamble. Finally we also note that the results of the English questionnaire are significantly different from the French outcome. With these results one could argue that the foreign language effect exists but that it is different for every language.

## 4.4 RELATION BETWEEN EXPERIMENT 1 AND EXPERIMENT 2

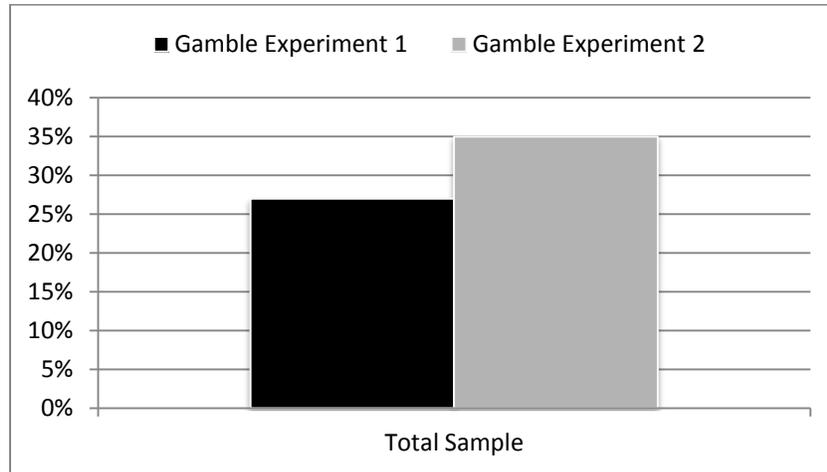
### 4.4.1 Results

**Results.** When comparing the results of both experiments, we find that only the difference between the English results is statistically significant,  $\chi^2(1, N=122) = 8.997$ ,  $p < 0.01$ . For the Dutch survey, we cannot exclude the possibility of the more risk seeking behavior we see in experiment 2 to be a result of chance. For the Dutch survey we see more risk seeking behavior as well but we must consider the possibility that this is caused by chance,  $\chi^2(1, N=142) = 0.421$ ,  $p > 0.3$ . The same can be said for the French questionnaire,  $\chi^2(1, N=80) = 0.208$ ,  $p > 0.4$ . The differences between the all the experiment results combined are statistically significant as well,  $\chi^2(1, N=344) = 9.758$ ,  $p < 0.01$

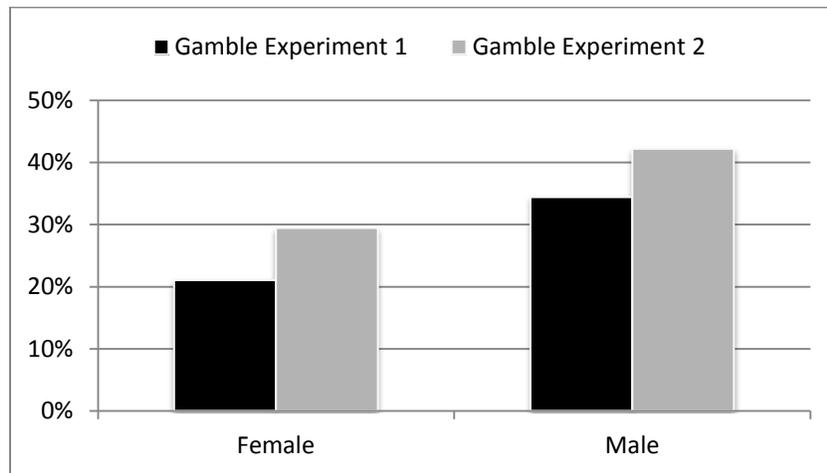
**Figure 7: Language comparison between both experiments**



**Figure 8: Comparison experiment 1 and 2 (Total sample)**



**Figure 9: Comparison experiment 1 and 2 (On gender)**



#### 4.4.2 Discussion

**Discussion.** If we look at figure 7, we can clearly see that the concept of reversal of risk preferences is present in our results. In the first experiment, where the gamble was framed as a gain, people were more risk averse than in the second experiment where the same gamble was framed as a loss. This theory holds for all language groups. We cannot rule out statistical chance as an explanation for the differences in the French and Dutch

surveys. However holding the literature of Kahneman and Tversky (1979) under consideration we can assume that these results reflect reality.

Further we cannot confirm our hypothesis that the effect of loss aversion is weaker in a foreign language. We expected to see a smaller difference in the results between experiment 1 and 2 for our foreign languages. More specifically the English results differ more than expected. Finally, we can also see a reversal in risk preferences for the total sample in figure 8 and for the genders specifically in figure 9.

#### 4.5 COMPARING GENDERS

**Comparing genders.** To conclude our research, we also studied the results when we split our sample over gender. As we have established above, there are differences in risk aversion between men and women. To make sure that the differences between our language groups are not caused by the gender ratio's in our sample, we conducted the first experiment with men only and then with women only. For this part of our research, we only worked with the Dutch and English data. When we split our sample on gender, the results of our French surveys are insignificant for both experiments and for both genders. These results can be found in table 8. We have already demonstrated above that the reversal of risk preferences is present, in English as a foreign language and for both sexes. For this reason we will limit our comparison to the first experiment which was framed as a gain.

##### 4.5.1 Results

**One-tail Chi-Square.** Contrary to earlier in our study we decided to work with a one-tail significance in our Chi-Square test. This is because our hypothesis earlier was whether a foreign language influences risk aversion or not. This could go in both directions. Now our hypothesis is to learn whether or not the decrease of risk aversion

still holds when the sample has the same gender. For this we only need to look at one side and we deem it fit to work with a one-sided significance. The difference between the English surveys and the Dutch are significant for both men,  $\chi^2(1, N=128) = 3.634, p < 0.05$ , and women,  $\chi^2(1, N=136) = 4.227, p < 0.05$ .

**Descriptive statistics.** We found that 43% of the male respondents preferred to gamble when they had an English questionnaire. This is a lot higher than their fellow men who were asked the question. In the Dutch survey only 27% of the men chose for the risky gamble. For the women we can establish the same behavior. When the survey was in English 30% took the gamble over the sure gain. In the Dutch questionnaire only 15% preferred the risky bet. These results are illustrated in figure 10.

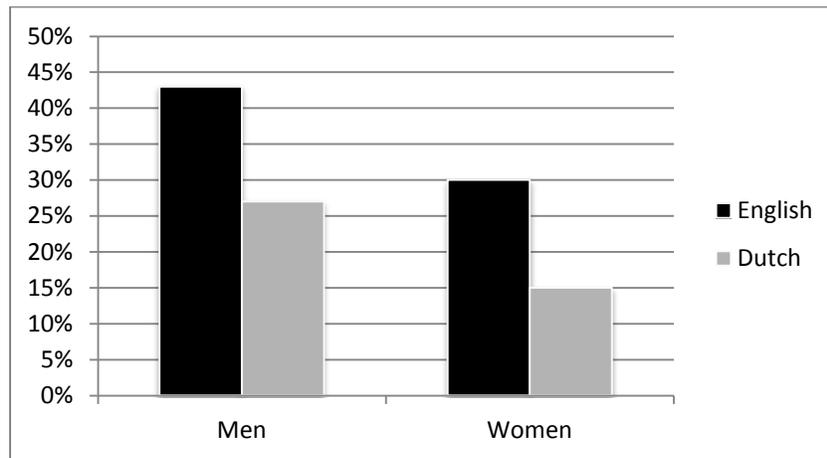
**Binary logistic regression.** Finally we also used a binary logistic regression model to determine which gender is more sensitive to the foreign language effect. The outcome for the men is not significant ( $p=0.058$ ), but only just so. The results for the women are significant ( $p=0.043$ ). If we compare the betas of the results we can see that women ( $B=-0.864$ ) react stronger to a change in language than men ( $B=-0.717$ ). The negative beta indicates that the students show are more risk averse in their native language (Dutch), than in their second language (English).

**Table 8: Chi square experiment 1 split for Men/Women**

<i>Men</i>	<i>Chi-square</i>	<i>Degrees of freedom</i>	<i>Significance</i>
Dutch and English	3.634	1	0.042*
Dutch and French	0.131	1	0.453
<i>Women</i>			
Dutch and English	4.227	1	0.033*
Dutch and French	0.602	1	0.292

\* Significant at the 0.05 level (one-tailed)

**Figure 10: Language comparison experiment 1**



#### 4.2.2 Discussion

Splitting the sample based on gender resulted in some very interesting results for our first experiment. We can see that the decreased risk aversion, which we established earlier for the English surveys, is linked to a change in the language and is not caused by the men/women ratio of the sample. Figure 10 also clearly illustrates that men are more risk

seeking than women. However both males and females are less risk averse when they make the decision in English. Using a logistic regression we also found that women are more sensible to the foreign language effect than men. However with this increased effect, on average they still remain more risk averse than their male counterparts.

## 5. CONCLUSION AND RECOMMENDATIONS

**General conclusion.** In this study, we explored the impact of foreign languages on judgment and decision making. We found that people who have to make a decision in another language approach this differently than they would in their native language.

Flemish students showed to be less risk averse when they had to make decisions in English. However, we did not see this behavior when the same choices and gambles were presented in French. A possible explanation for this could be found in the language proficiency of the students that completed the French sample. When the students were asked to rate their knowledge of French and English, we saw that the average student says he/she is more proficient in English than in French. Even after establishing that our proficiency scales are not accurate, this difference in perception could explain the difference between French and English.

**Students feel more proficient in English than in French.** This difference in perception could impact risk aversion greatly. When students feel that they have more knowledge in English than in French, it is less likely for them to be impacted by feelings of uncertainty when making a decision in English. This could impact the difference in risk aversion greatly. The factor of ambiguity that should increase risk aversion in a foreign language is less prominent in English than it is in French. This means that more weight can be attributed to factors that can possibly decrease risk aversion such as fewer emotions. The people with a French survey on the other hand perceive their proficiency to be lower. This induces more uncertainty and more weight will be allocated to the ambiguity factor that a foreign language can bring. This ambiguity factor increases risk aversion and works as a stronger opposite force to the possible decrease of risk aversion that more methodical processing brings. An increased cognitive load could reduce the effect as well. Finally, we also add that making a decision in English may reduce risk

aversion but some degree of risk aversion is still present. This means that Kahneman and Tversky's theory of loss aversion holds for foreign languages as well. There is still a reversal of risk preferences present in foreign languages.

**Difference between men and women.** When comparing men and women, we found that women are more risk averse than men in their native language as well as in a foreign language. We also found that women are more sensitive to the effect that language has on decision making.

**Future research.** People approach decisions differently when their own real money is at stake or when the amounts are higher. Future studies could explore these variations and different populations to get more perspective on how a foreign language can affect the judgment and decision making process.

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# APPENDIX

## *Attachment 1: Dutch survey*

### **Vraag 1:**

Geslacht:

- Man
- Vrouw

### **Vraag 2:**

Hoe oud bent u?

- 0 - 17
- 18 - 26
- 26+

### **Vraag 3:**

Is Nederlands uw moedertaal?

- Ja
- Neen

### **Vraag 4:**

Stel dat je een wedstrijd wint en de voorzitter van de wedstrijd komt naar je toe met twee mogelijkheden. Je kan ofwel voor een zeker geldbedrag van 50 euro kiezen of hij kan een eerlijke munt opgooien waarbij je 50% kans hebt om te winnen en 50% kans hebt dat je verliest. Als je wint krijg je 100 euro. Als je verliest krijg je niets. Als u kon kiezen uit de volgende twee mogelijkheden, naar welke gaat jouw voorkeur?

- Met 100% zekerheid 50 euro ontvangen.
- Het muntstuk met 50% kans op 100 euro en 50% kans op niets.

### **Vraag 5.1:**

Veronderstel dat je met deze enquête via een loterij een mooi bedrag kan winnen. Je hebt de keuze uit 2 loterijbiljetten. Elk van deze biljetten geeft je een kans om een bepaald bedrag te winnen.

Biljet A geeft je een 100% zekere kans om een bedrag van 1000 euro te winnen.

Biljet B geeft je 50% kans om 2000 euro te winnen, en 50% kans om 800 euro te winnen. Welk loterijbiljet zou je kiezen?

- Ik kies biljet A. Ga dan naar vraag 5.2
- Ik kies biljet B. Ga naar vraag 5.5

### **Vraag 5.2:**

Veronderstel dat biljet A je nog steeds een 100% zekere kans geeft om een bedrag van 1000 euro te winnen, maar biljet B geeft je nu 50% kans om 2000 euro te winnen, en 50% kans om 900 euro te winnen.

Welk loterijbiljet zou je kiezen?

- Ik kies biljet A. Ga dan naar vraag 5.3
- Ik kies biljet B. Ga dan naar vraag 6

### **Vraag 5.3:**

Veronderstel dat biljet A je nog steeds een 100% zekere kans geeft om een bedrag van 1000 euro te winnen, maar biljet B geeft je nu 50% kans om 2000 euro te winnen, en 50% kans om 920 euro te winnen.

Welk loterijbiljet zou je kiezen?

- Ik kies biljet A. Ga dan naar vraag 5.4
- Ik kies biljet B. Ga dan naar vraag 6

### **Vraag 5.4:**

Veronderstel dat biljet A je nog steeds een 100% zekere kans geeft om een bedrag van 1000 euro te winnen, maar biljet B geeft je nu 50% kans om 2000 euro te winnen, en 50% kans om 950 euro te winnen.

Welk loterijbiljet zou je kiezen?

- Ik kies biljet A. Ga dan naar vraag 6
- Ik kies biljet B. Ga dan naar vraag 6

### **Vraag 5.5:**

Veronderstel dat biljet A je nog steeds een 100% zekere kans geeft om een bedrag van 1000 euro te winnen, maar biljet B geeft je nu 50% kans om 2000 euro te winnen, en 50% kans om 700 euro te winnen.

Welk loterijbiljet zou je kiezen?

- Ik kies biljet A. Ga dan naar vraag 6
- Ik kies biljet B. Ga dan naar vraag 6

### **Vraag 6:**

Stel dat je een weddenschap van 50 euro verloren hebt van je beste vriend(in) en hij/zij stelt je voor om een nieuwe weddenschap aan te gaan. Als je deze nieuwe weddenschap wint wordt de 50 euro kwijtgescholden. Als je echter opnieuw verliest, moet je 50 euro extra betalen aan je vriend(in) en moet je hem/haar 100 euro geven in plaats van 50 euro. Je hebt 50% kans om de tweede weddenschap te winnen en 50% kans om hem te verliezen.

Zal je deze tweede weddenschap aangaan of niet?

- Neen, ik ga geen tweede weddenschap aan en betaal mijn vriend(in) de 50 euro die ik met de eerste weddenschap verloren heb.
- Ja, ik ga de tweede weddenschap aan waarbij ik 50% kans maak om mijn verlies van de eerste weddenschap terug te winnen en 50% kans maak om weer te verliezen en 100 euro schuld te hebben in plaats van 50.

Heel erg bedankt voor uw medewerking!

*Attachment 2: French survey*

### **Question 1:**

Sexe:

- Masculin
- Féminin

**Question 2:**

Quel âge avez-vous?

- 0-17
- 18-26
- 26+

**Question 3:**

Le néerlandais est-il votre langue maternelle?

- Oui
- Non

**Question 4:**

Supposez que vous gagnez un concours et le représentant du concours vous donne deux options. Vous pouvez soit choisir un certain prix de 50 euros ou vous pouvez lancer une pièce de monnaie qui vous donne 50% de chances de gagner et 50% de chances de perdre. Si vous gagnez, vous doublez le prix et vous obtenez 100 euros, mais si vous perdez, vous n'obtenez rien.

Laquelle des deux options préférez-vous?

- Recevoir 50 euros avec 100% de certitude.
- Lancer la pièce avec 50 % des chances pour obtenir 100 euros et 50% des chances de perdre tout.

**Question 5:**

Sur une échelle de 1 à 10, quelle est la qualité de votre français?

1 = très mauvais 10 = excellent

### Question 6.1:

Supposez que cette enquête comporte une loterie dans laquelle vous pouvez gagner une belle somme d'argent. Vous devez choisir entre deux billets de loterie.

Billet A vous donne une chance de 100% de gagner 1000 euros.

Billet B vous donne une chance de 50% de gagner 2000 euros, et une chance de 50% de gagner 800 euros.

Quel billet choisiriez vous?

- Je choisis le billet A. Procédez à la question 6.2
- Je choisis le billet B. Procédez à la question 6.5

### Question 6.2:

Supposez que le billet A vous donne encore une chance de 100% de gagner 1000 euros, mais le Billet B vous donne maintenant une chance de 50% de gagner 2000 euros, et une chance de 50% de gagner 900 euros.

Quel billet choisiriez vous?

- Je choisis billet A. Procédez à la question 6.3
- Je choisis billet B. Procédez à la question 7

### Question 6.3:

Supposez que le billet A vous donne encore une chance de 100% de gagner 1000 euros, mais le Billet B vous donne maintenant une chance de 50% de gagner 2000 euros, et une chance de 50% de gagner 920 euros.

Quel billet choisiriez vous?

- Je choisis billet A. Procédez à la question 6.4
- Je choisis billet B. Procédez à la question 7

### Question 6.4:

Supposez que le billet A vous donne encore une chance de 100% de gagner 1000 euros, mais le Billet B vous donne maintenant une chance de 50% de gagner 2000 euros, et une chance de 50% de gagner 950 euros.

Quel billet choisiriez vous?

- Je choisis billet A. Procédez à la question 7
- Je choisis billet B. Procédez à la question 7

**Question 6.5:**

Supposez que le billet A vous donne encore une chance de 100% de gagner 1000 euros, mais le Billet B vous donne maintenant une chance de 50% de gagner 2000 euros, et une chance de 50% de gagner 700 euros.

Quel billet choisiriez vous?

- Je choisis billet A. Procédez à la question 7
- Je choisis billet B. Procédez à la question 7

**Question 7:**

Supposez que vous avez perdu un pari de 50 euros à votre meilleur(e) ami(e). Il / Elle vous offre une revanche. Les chances de gagner le deuxième pari est de 50/50. Si vous gagnez, il ne faut plus payer les 50 euros du premier pari. Toutefois, si vous perdez, vous devez payer 100 euros.

Voulez-vous accepter le deuxième pari?

- Non, je n'accepte pas le deuxième pari et je paie les 50 euros que j'ai perdus avec le premier pari.
- Oui, j'accepte le deuxième pari qui me donne 50% de chance d'éliminer ma perte et 50% de doubler ma perte.

Merci pour votre coopération!

*Attachment 3: English survey*

**Question 1:**

Sex:

- Male
- Female

**Question 2:**

How old are you?

- 0 - 17
- 18 - 26
- 26+

**Question 3:**

Is Dutch your native language?

- Yes
- No

**Question 4:**

Suppose that you win a contest and the representative of the contest gives you two options. You can either choose a certain 50 euro prize or you can flip a coin giving you 50% chance to win and 50% chance to lose. If you win, you double the prize and get 100 euro, but if you lose you get nothing. Which of the two options do you prefer?

- Receive 50 euro with 100% certainty.
- Flip the coin and have 50% to get 100 euro and 50% to end up with nothing.

**Question 5:**

On a scale of 1 to 10, how good is your English?

1 = very bad 10 = very good

**Question 6.1:**

Suppose that there is a lottery, in which you can win a nice amount of money. You can choose out of 2 lottery tickets. Each of these 2 tickets gives you a possibility to win a certain amount of money.

Ticket A gives you a 100% chance to win 1000 euro.

Ticket B gives you a 50% chance to win 2000 euro, and a 50% chance to get 800 euro. Which lottery ticket would you choose?

- I choose ticket A. Go to question 6.2
- I choose ticket B. Go to question 6.5

**Question 6.2:**

Suppose that ticket A still gives you a 100% chance to win 1000 euro, but ticket B now gives you a 50% chance to win 2000 euro, and a 50% chance to get 900 euro. Which lottery ticket would you choose?

- I choose ticket A. Go to question 6.3
- I choose ticket B. Go to question 7

**Question 6.3:**

Suppose that ticket A still gives you a 100% chance to win 1000 euro, but ticket B now gives you a 50% chance to win 2000 euro, and a 50% chance to get 920 euro. Which lottery ticket would you choose?

- I choose ticket A. Go to question 6.4
- I choose ticket B. Go to question 7

**Question 6.4:**

Suppose that ticket A still gives you a 100% chance to win 1000 euro, but ticket B now gives you a 50% chance to win 2000 euro, and a 50% chance to get 950 euro. Which lottery ticket would you choose?

- I choose ticket A. Go to question 7
- I choose ticket B. Go to question 7

**Question 6.5:**

Suppose that ticket A still gives you a 100% chance to win 1000 euro, but ticket B now gives you a 50% chance to win 2000 euro, and a 50% chance to get 700 euro. Which lottery ticket would you choose?

- I choose ticket A. Go to question 7
- I choose ticket B. Go to question 7

**Question 7:**

Suppose that you've lost a bet of 50 euro to your best friend and he/she offers you a rematch. If you win, you don't have to pay the 50 euro from the first bet anymore. However, if you lose you have to pay the 50 euro from the first bet AND 50 euro from the second bet, giving you a 100 euro total loss. The odds to win the second bet are 50/50.

Will you accept the second bet or not?

- No, I will not accept the second bet and will just pay the 50 euro that I've lost with the first bet.
- Yes, I will accept the second bet giving me 50% to clear my debt and 50% to double it.

Thank you very much for your support!