“Decision-making Biases in a Second Language: Testing the Foreign Language Effect on an Exceptional Group”

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# DEcision-Making Biases in a Second Language

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0.0 Abstract
Recent research has revealed a Foreign Language Effect, which highlights differences in the way people think in their first or second language in the realms of framing effects and gamble decisions (Keysar, Hayakawa, & An, 2012). This study explored the extent of these effects on a highly-proficient group of Dutch university students studying English. A two-part questionnaire posing problems related to risk attitudes and loss aversion was distributed to participants: half completed the questionnaire in their native language (Dutch), while the other half completed it in a foreign language (English). Results of the first part revealed the opposite effect observed in previous studies. While no effect of frame was found in Dutch, a significant effect was found on one problem in English, while a present but not significant effect was found on the other. No significant effects were found in the second part, assessing loss aversion, but small effects supported previous research suggesting increased willingness to accept bets in a foreign language. The results qualify previous research on the FLE and suggest that in highly proficient speakers of related language pairs, effects may be reduced or reversed.

Keywords: The Foreign Language Effect, framing effects, risk aversion, loss aversion
1.0 Introduction

More than half of the world’s 7.6 billion individuals are multilingual to some extent, and millions of us use more than one language in our daily lives. From higher education, to multinational corporations, to world-wide travel, the need to use a foreign language is only increasing as society advances to bring the world closer together. But with this increased use comes many questions and concerns about the effect foreign languages have on the way we think and act. It has been suggested, and fiercely debated, that using a foreign language can influence perceptions and potentially change the way we think (Pullum & Thierry, 2013). Could this influence also affect the way we make decisions? While it is clear that humans are not perfect rational thinkers and are susceptible to a wide range of decision-making biases, including the way a problem is presented and its emotional impact, it may be less intuitive to consider that something as ostensibly irrelevant as the language being used may cause someone to make an altogether different decision than they otherwise would. A series of recent studies have examined the extent to which decision making is affected when a problem is presented in a foreign language (L2) versus a native language (L1) (Costa, Foucart, Hayakawa, et al., 2014; Costa, Foucart, Arnon, Aparici, & Apesteguia, 2014; Geipel, Hadjichristidis, & Surian, 2015; Hayakawa, Lau, Holtzmann, Costa, & Keysar, 2018; Keysar et al., 2012; Winskel, Ratitamkul, Brambley, Nagarachinda, & Tiencharoen, 2016).

The results of these studies have shown that using a foreign language may indeed have profound impacts on the daily decisions a person makes, from becoming more inclined to take risks, to being less affected by external influences including how a problem is framed or social taboos. This has been termed the Foreign Language Effect (FLE) (Keysar et al., 2012), and has been attributed to the emotional and cognitive distance observed in L2 usage in speakers who acquired a foreign language in a traditional language acquisition setting (i.e. classroom vs naturalistic environment). It is important to draw a distinction here between the conventional terms for “second” and “foreign” languages. While a second language refers to a non-native language used in the environment of the speaker (e.g. immigrants to another country), a foreign language is learned in a context where it is not the native language used in the environment (e.g. learned in a classroom). For the purposes of this paper, L2 will refer to a foreign language learned through classroom or other non-immersive methods and will not include second languages acquired through immersion or individuals using multiple languages from birth (balanced bilinguals).

The current research will explore the Foreign Language Effect, specifically in regards to framing effects on risk attitudes, and loss and risk aversion in decision-making scenarios. A
series of problems collected from previous research were used to test these measures on a population of Dutch (L1) speakers of English (L2) to determine whether differences persist in the way decisions are made in a native or a foreign language when the proficiency of the L2 user approaches complete fluency. By using gain and loss frames in questions of varying emotionality, this research will investigate whether highly proficient L2 speakers are affected by framing in ways similar to L1 speakers, contrary to what previous FLE research has demonstrated. A second part of the experiment examines loss and risk aversion in gambling scenarios to assess whether a difference in willingness to take a series of bets differs in foreign and native language conditions.

Can simply using a foreign language give someone the ability to change the way they think and create more rational, objective individuals unaffected by aversion to risk or loss? This paper aims to explore the limits of the FLE under different conditions and move closer to answering the question of whether a multilingual individual can ever ‘think like a native,’ or if the language we speak will be another factor on the list of unconscious biases invariably influencing the way we act and think. This research further hopes to ascertain whether the emotionality and cognitive fluency achieved with high proficiency in an L2, combined with examining a closely-related language pair such as Dutch and English, eliminates the Foreign Language Effect observed in previous studies or if it will persist in these language conditions.

2.0 Theoretical Background and Literature Review

2.1 Decision-making Biases

Factors that influence our decision-making processes are known as heuristics. While heuristics can aid in making these processes run more smoothly, they can also lead to cognitive biases (Kahneman, 2011). Cognitive biases occur when intuitive, or automatic, processes unconsciously influence our choices. Kahneman (2011) helps to elucidate these mechanisms by imagining the brain as consisting of two cooperative systems which work in conjunction with each other to operate different thought processes. These systems have been termed System 1 and System 2. System 1 refers to all automatic processes encompassing intuition and systematic responses, while System 2 involves deliberate and controlled processes needed to make complex calculations and assessments. It has been hypothesized that due to the emotional and cognitive distance present when speaking a foreign language, the mental system responsible for making certain decisions may shift from System 1 (more automatic and intuitive), to System 2 (more reasoned and logical), because the use of the L2 requires more effort which engages these controlled processes. The concept of the two systems of thought extends to the field of Second
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Language Acquisition (SLA) by relating to explicit and implicit knowledge (Paradis, 2004). Implicit knowledge can be related to System 1, and explicit knowledge can be related to System 2. Because foreign languages are generally learned explicitly through classroom instruction, this knowledge can be associated with the activation of System 2 in individuals who learned an L2 through this type of instruction. It should however be noted that the idea of Systems 1 and 2 functions more as a metaphor for cognitive functioning, rather than an accurate representation of how the brain works (Kahneman, 2011).

In previous research on the FLE, studies have shown that in areas related to framing effects and risk and loss aversion, decision making in an L2 may be different to that in an L1 (Costa, Foucart, Arnon, et al., 2014; Hayakawa et al., 2018; Keysar et al., 2012; Winskel et al., 2016)

2.1.1 Framing Effects

One facet of decision making which has been shown to be affected by foreign language use is in the realm of framing effects. Framing effects refer to the tendency of people to choose a given option based on the way it is presented: the frame. This is evidenced by psychological accounting, or processes by which economic decisions are calculated. People tend to calculate outcomes differently based on the frame, and display a tendency toward aversion to unknown ambiguity in the realm of gains, but are conversely drawn to risks in the realm of loss (Costa, Foucart, Arnon, et al., 2014; Kahneman, 2011). In other words, when a problem is framed positively, or as a gain (e.g. lives or money saved), people prefer a sure option, whereas if the same problem is framed negatively, or as a loss (e.g. lives or money lost), people are more willing to take a risk. These framing effects have shown to be diminished when a foreign language is used, implying that the bias of frame that typically influences the choice of one option over another is eliminated when a foreign language is used. This can be considered evidence of a Foreign Language Effect that is present when decisions are made in another tongue due to psychological distance when speaking an L2 (Keysar et al., 2012).

2.1.2 Risk and Loss Aversion

In addition to the possible elimination of framing effects, studies have shown a reduction in risk and loss aversion when problems are addressed in an L2 versus an L1. In general, people are risk-averse, and tend to choose sure options over gambles when the outcomes are equal or similar (Holt & Laury, 2012; Kahneman, 2011). The phenomenon known as myopic loss aversion demonstrates the tendency of people to generally assign losses twice the weight of gains, meaning that a chance of winning 20 euros is only attractive if the loss is less than or equal to 10 euros. However, through the use of gambling scenarios offering varying possibilities of returns,
several studies have shown that this aversion to loss can be partially diminished when a second language is used (Costa, Foucart, Arnon, et al., 2014, Keysar et al., 2012).

2.2 The Foreign Language Effect

The term Foreign Language Effect (FLE) was first coined by Keysar et al. (2012) to describe the reduction of decision-making biases found when a foreign language is used. Since its conception, the FLE has been tested in the areas outlined above, as well as in moral judgements and strategic risk-taking to somewhat mixed results (Cipolletti, McFarlane, & Weissglass, 2016; Costa, Foucart, Hayakawa, et al., 2014; Geipel et al., 2015; Hayakawa et al., 2018). Several conclusions can be drawn from these results in relation to how using a second language can affect decision making processes, but the basis for the effect relies largely on two assumptions: (1) that the increased emotionality associated with the L1 creates an emotional distance in the L2 that allows the speaker to make different decisions, and (2) that the use of a foreign language reduces cognitive fluency and therefore leads to a reduction of intuitive response from the speaker. The next sections will examine both of these assumptions in greater detail followed by an overview of related studies and the results obtained therein.

2.2.1 Emotionality in a Foreign Language

A number of studies have shown that multilingual individuals tend to maintain an increased emotional connection to their L1 over their L2 (e.g. Caldwell-Harris, Kronrod, & Yang, 2012; Caldwell-Harris, Tong, Lung, & Poo, 2011; Dewaele, 2017). In his research on the use of swearwords in an L2, Dewaele (2004; 2017) found that swearwords are used less frequently in a foreign language, and when used, carry less emotional force to the speaker than words from the native language. Other studies have shown an increased physiological response to emotionally-charged language (both positive and negative) in the L1 compared to the L2, as measured by skin conductance response (SCR) (Caldwell-Harris et al., 2011; Harris, 2004). It is theorized that this may be due to the simultaneous development of a first language and the emotional system so that these utterances are inextricably tied to a person’s affective processes (Caldwell-Harris et al., 2011). Further research suggests that by inhibiting the L1, these affective processes are also somewhat inhibited, leading to more systematic decisions and a reduction in the reliance on intuitive processes (Hayakawa et al., 2018; Keysar et al., 2012). This effect, however, would logically be inapplicable to balanced bilinguals who have used more than one language since birth or a young age, as these speakers have developed both languages along with emotional development (Harris, 2004).

There is also evidence that emotional reactions may have a cultural basis and that the contextuality of a language may also affect the willingness of L1 speakers to express emotion.
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For example, Caldwell-Harris and colleagues (2012) found that individuals in high-context cultures (e.g. China) were more reluctant to express strong emotion in their L1 due to its disproportionate weight in their culture. This may increase the FLE in multilinguals whose language pairs also cross lines of cultural contextuality. L1 speakers of Chinese as well as several other East-Asian languages have also reported more comfort in using English (L2) to express emotions because of the prevalence of American-made media which commonly displays expressions of emotion (Caldwell-Harris et al., 2012). Exposure to English-speaking media could therefore work to position emotionality in English as particularly distinct from other foreign languages, especially in individuals coming from high-context cultures. By extension, in cultures which are not as culturally distinct from English-speaking countries (e.g. The Netherlands), there is a possibility that this may also lead to a diminished Foreign Language Effect.

The impact of emotionality on decision making in a foreign language is especially evident in the realm of moral dilemmas, as reduced emotionality seems to lead directly to more utilitarian choices and more relaxed moral judgements (Costa, Foucart, Hayakawa, et al., 2014). This supports the theory that the FLE could be in large part based on the reduced impact of emotion in an L2 leading to reduced intuitive biases.

If the FLE is primarily due to the reduced emotionality associated with the L2, decisions which are less emotional, such as the weighing of gains and losses in terms of numerical value, may be less affected. However, such effects have been found, leading to another possible underlying cause which has to do with the cognitive processes in play when a foreign language is in use. For this reason, it will be interesting to examine questions with varying degrees of emotionality to gauge any differences in responses in the L2 compared to the L1.

2.2.2 Cognitive Ease

The second factor which could account for the Foreign Language Effect has to do with the cognitive ease with which a person is operating. It is useful here to again consider Systems 1 and 2 as metaphors for automatic and intentional brain processes respectively. According to Kahneman (2011), any reduction in cognitive fluency prompts the controlled processes of System 2, and therefore reduces reliance on the intuitive processes of System 1. Cognitive fluency refers to an individual’s subjective experience of ease in completing a task. Even for competent L2 users, it is generally more cognitively exhausting to operate in the L2, as the more automatic L1 responses must be constantly inhibited (de Bot, 2004). It is therefore more likely, depending on the proficiency and frequency of use by the speaker, that System 2 is activated while an L2 is in use, resulting in fewer automatic, and by extension more thoughtful, decisions.
to be made (Costa, Foucart, Arnon, et al., 2014). This theory then posits that in addition to emotional distance created by L2 use, cognitive distance may also be a contributing factor to the FLE.

The idea of cognitive distance promoting a more reasoned approach to decision making in a foreign language can lead to two contradictory outcomes. As outlined above, if we accept Kahneman’s (2011) assertion that reduced cognitive fluency reduces reliance on automatic processes, it logically follows that L2 use would decrease these intuitive processes by activating controlled, System 2 processes. However, according to studies on cognitive use in decision making (e.g. Whitney, Rinehart, & Hinson, 2008), an increase in cognitive load creates a greater reliance on automatic processes due to increased working memory load (Volk, Köhler, & Pudelko, 2014). Volk et al. (2014) created a theoretical model to illustrate the possible effects of foreign language processing on decision making and self-regulation (p. 865), attributing an increased reliance on heuristic biases (System 1 processes) to exacerbated working memory resources. Expressly, controlled processes (System 2) require working memory resources, and the more processes needed, the more limited these resources become. Successful L2 use is generally associated with higher levels of working memory (Bot, Lowie, & Verspoor, 2005), thereby reducing the resources available for the completion of other cognitive tasks, such as careful decision making. However, Volk et al. (2014) importantly noted the intervening impact of L2 proficiency on these effects by commenting that with increased proficiency comes increased automaticity and therefore the working memory load is lessened.

Volk et al.’s (2014) account has also been challenged and qualified in a response by Hadjichristidis, Geipel and Surian (2017) that highlights studies which show improved (more logical or beneficial) decision making in a foreign language. These studies include research on the use of foreign languages and decision making (e.g. Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012), suggesting that although the use of a L2 may reduce cognitive fluency, it is not akin to a simple increase in cognitive load, such as adding working memory tasks, used in Whitney et al.’s (2008) study. This research also highlights the importance of L2 proficiency in accounting for cognitive ease and working memory load in decision-making tasks. The combination of emotional and cognitive distance is a likely explanation for the various results previous studies on the Foreign Language Effect have found.

2.3 Related Research on the Foreign Language Effect

2.3.1 Framing Effects

As described above, the Foreign Language Effect refers to changes in decision-making behavior that have been observed when a foreign language is used. This has been attributed to
increased psychological distance (stemming from emotional and cognitive distance) which may promote deliberation or increase analytical thinking (use of System 2). Several studies have examined these effects in an attempt to pinpoint the nature of the FLE. Keysar et al.’s (2012) study provided the groundwork for the current research by examining the FLE in a series of experiments. The first of these examined framing effects in terms of risk attitudes. Studies in general psychology have shown that individuals tend to be risk-averse in the realm of gains, and risk-seeking in the realm of losses (Tversky & Kahneman, 1981; 1991). Even if the outcome of a situation is the same, people are more likely to choose a sure option if it is framed positively, and a gamble if it is framed negatively. Keysar and his colleagues (2012) used an adaptation of Tversky and Kahneman’s (1981) “Asian Disease Problem,” which the current study also uses, to test this theory on foreign language speakers. The set-up of the problem is as follows:

Recently, a dangerous new disease has been going around. Without medicine, 600,000 people will die from it. In order to save these people, two types of medicine are being made.

Participants are then presented with one of two possible frames, positive or negative:

**Positive (gain) frame:**

*If you choose Medicine A, 200,000 people will be saved.*

*If you choose Medicine B, there is a 33.3% chance that 600,000 people will be saved and a 66.6% chance that no one will be saved.*

**Negative (loss) frame:**

*If you choose Medicine A, 400,000 people will die.*

*If you choose Medicine B, there is a 33.3% chance that no one will die and a 66.6% chance 600,000 people will die.*

In both scenarios the number of lives lost or saved does not differ, only the way in which it is presented does (i.e. the frame). As in Tversky and Kahneman’s (1981) original study, Keysar et al. (2012) found that in L1 conditions (both in English and Korean), subjects were more likely to choose a sure option in a gain-frame scenario (medicine A). However, when asked the same question in their L2 (Japanese, French or English), there was no significant difference in choice found, apparently eliminating framing effects. These results suggest that in a second language, due to increased psychological distance, one might be able to make decisions which are less impacted by the frame and more accurately represent the person’s personal choice, with less of an impact of decision bias.
This same design and problem was examined and expanded upon in a study by Costa and colleagues (2014a) which revealed somewhat similar findings. This study looked at framing effects in the Asian Disease Problem on three different language pairs: Spanish/English, English/Spanish and Arabic/Hebrew (L1/L2 respectively). Similar to Keysar et al.’s (2012) findings, a clear framing effect was found in the L1, as subjects strongly preferred the sure option (option A) in a gain frame, while a risk was preferred (option B) in a loss frame. The outcome of L2 results was less clear. Participants showed a slight, but not significant, preference for the sure option in a gain frame, however there was no difference in preference found in a loss frame. This suggests that when using a foreign language, the frame may still have an effect on decisions, particularly in a gain scenario, but that this effect is much weaker than when the decision is made in an L1.

Costa et al. (2014a) expanded upon these findings by adding an additional question: The “Financial Crisis Problem.” The concept of this problem remains the same as in the Asian Disease Problem, however, instead of dealing in lives lost or saved, the question pertains to financial losses. The reasoning behind this, according to the researchers, was to test the impact of emotion with regard to framing effects. If the FLE can be attributed to reduced emotional connection to an L2, then perhaps a less-emotional situation, saving money rather than human lives, would also reduce this effect. This was, however, not found to be the case, as results of the Financial Crisis Problem largely mirrored those of the Asian Disease Problem. There was a clear effect of frame found in the L1 with participants preferring the sure option in a gain frame. The same outcome was true for L2 conditions, though to a lesser extent. In both language conditions the safe option was still preferred in a loss frame, though the difference was slight. With these findings, Costa and colleagues (2014a) confirmed the results of Keysar et al. (2012) that the use of a foreign language can reduce framing effects, with the contribution that these results extend to less-emotional contexts such as financial decisions.

Framing effects were also examined in a third study by Winksel, Ratitamkul, Brambley, Nagarachinda and Tiencharoen (2016), which tested both the Asian Disease and Financial Crisis problems on a group of Thai (L1) learners of English (L2). The results of this study again confirmed previous findings as framing effects were clearly demonstrated in the L1 and minimized in the L2. Participants were more likely to choose a sure option in a gain frame in both languages, though this difference was significantly greater in L1. In three out of four loss-frame conditions, participants were more likely to choose a risky option, the exception being the English (L2) version of the Financial Crisis Problem, in which more participants chose the sure option in either frame. These results support the previous findings and help to build a solid case
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for the existence of the FLE in terms of framing effects and attitudes toward risk. A further contribution made by Winskel et al.’s (2016) is in qualifying framing effects to language-rich conditions.

Winskel et al.’s (2016) study also included a second part to further examine framing effects and risk-taking decisions using a financial decision-making task devised by De Martino et al. (2006). In this task, participants are presented a series of trials in which an amount of money is displayed (e.g. 50 euros). Following this, two options are given: a sure option and a gamble. In half of the trials the sure option is presented as a gain (e.g. keep 30 euros), while in the other half this option is presented as a loss (lose 20 euros). In both options the outcome is the same, however the tendency is to choose the sure option in a gain frame, and to prefer a gamble in a loss frame.

Participants in this experiment completed the task in both Thai (L1) and English (L2) in a series of gain and loss-frame trials. Results showed effects of frame, however no difference in these effects was observed between the L1 and L2, suggesting that in this type of task, framing effects can still manifest similarly regardless of language condition (Winskel et al., 2016, p. 433). The researchers theorized that the reason for this may be due to the language environment of the task. In the Asian Disease and Financial Crisis problems, the language component is richer and more detailed, and requires careful consideration of the problem in the target language. By contrast, in a task which requires less language use, such as the financial decision-making task, the impact of using a foreign language may be lessened, and the reliance in intuitive response (System 1) may be triggered (p. 434).

This observation concerning language-richness of a task is further supported by a recent study by Hayakawa et al. (2018). This study also examined the reliability of the Foreign Language Effect in a series of gambling paradigms and found the results inconclusive (p. 7). This led the researchers to conclude that the language-richness of an experiment may influence the extent to which the FLE is present, and that if the language environment is poor, effects may be mitigated by this factor. For this reason, the current study presented language-rich information such as experiment description as well as the demographic survey prior to the test questions to ensure adequate exposure to the target language of the experiment before subjects answered the decision-making questions.

2.3.2 Loss Aversion and Risk taking

Another area of interest in finding Foreign Language Effects has been demonstrated in risk and loss aversion. Keysar et al.’s (2012) study examined this by testing participants’ willingness to accept a series of positive-expected-value bets. People are generally averse to
losses and tend to weigh losses more than equivalent gains (Kahneman & Tversky, 1979). This loss aversion is typically observed as a 2:1 weight of losses to gains. This means that in order for a gamble to be worthwhile, the possible winnings should be double the losses, or, the attractiveness ratio should be 1:2 (loss-to-gain ratio). For example, a potential gain of 150 euros or a loss of 75 euros. Any bet with a higher attractiveness ratio is expected to be more likely taken, while a lower attractiveness ratio is less likely to be taken. Keysar et al.’s (2012) study tested native Korean speakers with L2 English on their acceptance rate of 18 bets, half high stakes and half low stakes. In line with previous research on loss aversion (Harinck, Van Dijk, Van Beest, & Mensmann, 2007), the subjects were not as affected in low stakes bets, so the high stakes bets are highlighted. In the case of high stakes bets (with winnings ranging from 100,000 to 190,000 won, or roughly 75 to 150 euros), participants in Keysar et al.’s (2012) study took more bets in their second language than in their native tongue at all levels of attractiveness and were 10 percent more likely to take bets overall in their L2 (p. 665). These results suggest that in terms of positive-expected-value, high stakes bets, use of a foreign language leads to a reduction in loss-aversion and an increased willingness to accept risk. Because all of the bets proposed had positive expected values, these can also be described as “good” bets in that the possible winnings always outweighed the losses (although the ratios varied). Five out of nine of these bets also exceed the generally accepted 1:2 loss-to-gain ratio and would therefore be logically beneficial to take. This leads to the question of whether L2 users are indiscriminantly more likely to accept bets in a foreign language, pointing to general reduction in loss aversion, or if there is a strategic element to the FLE in the realm of loss aversion, leading individuals using L2 to accept more bets at more beneficial levels of attractiveness.

The question of strategic risk in L2 was further examined in a study by Hayakawa, Lau, Holtzmann, Costa and Keysar (2018). This experiment was conducted on native Polish speakers of English (L2). Instead of only receiving positive-expected-value bets (“good” bets), participants in this experiment also received negative-expected-value bets (“bad” bets), or bets where the possible losses outweigh the possible gains. In this scenario, contrary to previous results, subjects in L2 conditions took fewer bets overall than those in L1. However, when controlling for type of bet, “good” or “bad,” results found that participants using an L2 took “good” bets at 15 percentage points more than “bad,” whereas in L1 conditions the difference was only 2 percentage points. This suggests that the FLE in loss aversion is not indiscriminant. Use of a foreign language may not simply cause one to be averse to losses, or risk seeking, rather it could encourage strategic risk taking. This could be supported by the theory of cognitive ease,
implying that the increase in cognitive stress reduces intuitive, or automatic, processes and increases reasoned and more logical thought (an increased reliance on System 2).

2.3.3 Decision Making in Moral Dilemmas

Related findings of the Foreign Language Effect also include those of the effect on making moral judgements in a foreign language (Costa, Foucart, Hayakawa, et al., 2014; Geipel et al., 2015). Costa and colleagues (2014b) used the well-known “trolley problem” to test any difference found in decision making regarding a moral dilemma when using a native or foreign language. The trolley problem poses that a run-away trolley is heading down a track on which five people are tied, who will be killed by the trolley if it is not stopped. There are two versions of this problem which were used by the researchers: the “switch version” and the more emotional “footbridge version.” In the switch version, a switch may be pulled to divert the trolley onto another track, on which one person is tied. In the footbridge version, the onlooker is standing on a footbridge above the track as the trolley moves toward the five people. However, by pushing a heavy man off the footbridge in front of the trolley, it will stop the trolley and save the people, but the man will be killed. It is considered the utilitarian option (for the greater good) to sacrifice one life in order to save five, while abstaining from any action is the deontological option (moral obligation).

Costa and colleagues’ (2014b) study tested the FLE on 725 participants with a variety of L1/L2 language backgrounds including English/Spanish, Korean/English, English/French, and Spanish or English/Hebrew (p. 2). Results for each version of the trolley problem were examined separately. In the switch version, the weighted average of the utilitarian choice increased by 13 percentage points when the problem was posed in a foreign language. In the footbridge version the results were even more pronounced, with a 26-percentage point increase in the utilitarian option in a foreign language. These results are consistent with the emotionality justification of the FLE because the effects become more pronounced in the more emotional footbridge version of the problem.

Geipel, Hadjichristidis and Surian (2015) explored the FLE on moral judgements further by testing decision making on a series of moral dilemmas, requiring the subjects to judge the objective wrongness of several taboo scenarios (e.g. cheating on an exam). The study found that in each scenario, actions were judged less harshly in a foreign language than in a native language. The authors attributed this not only to the increased emotionality associated with an L1, but also to the fact that in the case of individuals who learn their L2 past childhood, all moral and social rules are learned through the L1 and therefore more closely tied to interactions in this language setting.
Geipel et al.’s (2015) study also noted that with increased proficiency came harsher (or more native-like) judgements, suggesting that as proficiency increases, so too can emotionality, therefore reducing the FLE. Similar findings were echoed by Costa et al. (2014b), who noted that the higher participants rated their L2-proficiency, the more native-like their choices became. If this is the case, the Foreign Language Effect may be tied to proficiency and could diminish over time as one’s proficiency, and thereby emotional capacity and cognitive fluency, in an L2 increases.

2.4 Possible Affecting Factors

To expand on some of the additional factors mentioned in the previous sections, it will be useful to categorically examine some particular factors which are likely to have an effect on the existence or magnitude of the Foreign Language Effect in the research designs used in the current experiment.

2.4.1 Proficiency and Emotionality in the L2

The first and perhaps most interesting factor to examine will be L2 proficiency. As suggested by several researchers already (Costa, Foucart, Hayakawa, et al., 2014; Geipel et al., 2015), there is evidence that as proficiency in an L2 increases, the FLE may become diminished. If the psychological distance provided by reduced cognitive ease and emotional connection in an L2 is indeed responsible for the FLE, it follows logically that as one becomes more proficient, this gap will disappear over time. In most of the previous research on the FLE, proficiency was not examined as a unique variable, and participants generally reported intermediate proficiency (M=4.3 [out of 7], derived from relevant studies: Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012; Winskel et al., 2016). Given these predictions, along with the respectively lower L2 proficiency of subjects examined in previous studies, it will be especially interesting to examine what Foreign Language Effects, if any, manifest in subjects with very high proficiency in L2.

In a similar vein, increased proficiency and exposure can also lead to increased emotionality in an L2, as has been demonstrated by previous studies (e.g. Caldwell-Harris et al., 2011). Though it is difficult to measure emotional connection to a language without physiological measures such as SCRs, determining in which language one prefers to express emotion could indicate how emotionally connected an individual is. If part of the foundation of the FLE is emotional distance from an L2, then it could likewise be minimized by increased emotional connection to the L2.

2.4.2 Relationship Between Dutch and English

One of the most interesting aspects about the existing research into the FLE is that the effect has been evident across a variety of language pairs with varying degrees of linguistic and
cultural similarities, from relatively close pairs such as Arabic/Hebrew (Costa, Foucart, Arnon, et al., 2014) to more distinct pairs like English/Japanese and Korean/English (Keysar et al., 2012). However, much attention has not been paid to the degree to which this may affect the outcome of the experiment, or the overall impact it could have on the limits of the FLE. It would therefore be interesting to look at subjects whose L1 and L2 are more closely related, in order to contextualize this factor in the context of existing research. The current study examines Dutch (L1) and English (L2) as a language pair, which are both linguistically and culturally related, and exist in a context of increasing influence of English in the Netherlands (Nortier, 2011). The linguistic similarities paired with the saturation of English within Dutch culture could both contribute to higher L2 proficiency and ease or amount of use, all of which weaken the FLE.

2.4.3 Language Environment of Design

As mentioned earlier in reference to possible methodological pitfalls uncovered by previous studies (Hayakawa et al., 2018; Winskel et al., 2016), the language richness of a design seems to influence whether the FLE will be present. When an experiment contains reduced or simple language, such as in a repetitive gamble paradigm, the use of a foreign language may fail to have any effect on the decision-making processes of the subject, whose intuitive (System 1) processes are free to take over. It is therefore worth investigating whether stronger effects do in fact emerge in more language-rich designs, while remaining subdued or non-existent in language-poor designs.

Along these lines, the method of response can also play a part in constructing an overall language environment of a design. Thus far, existing studies (the current study included) have predominantly supplied information and recorded responses in a visual context (questions are read, and answers are written). Although there have been verbal aspects included to check comprehension (Keysar et al., 2012), the eventual response input is written. It should not be ignored that the added processing time available to read and respond visually could affect the outcome, which may differ if a problem were presented auditorily, or if verbal responses were required. This additional processing time may also increase the use of System 2 in logically reasoning out a problem regardless of language. Current on-going research also supports this theory as the FLE appears to be stronger when decisions are made in an auditory than in a visual context (Brouwer, in press).

All of the factors listed above must be kept in mind when analyzing the Foreign Language Effect, as its results may be dependent upon a variety of interacting variables, creating a dynamic process which leads to ultimate choices in decision-making tasks. The goal of this
paper is to provide a glimpse into how these factors may interact or present effects in a particular setting.

2.5 Statement of purpose

To follow up on and expand the previous research on the Foreign Language Effect, this paper proposes an examination of highly proficient Dutch speakers of (L2) English. The FLE has been shown in several different areas across a variety of language pairs, and previous research has suggested that effects may be lessened in highly proficient speakers who have developed more emotionality in their L2 (Costa, Foucart, Hayakawa, et al., 2014; Geipel et al., 2015). The subjects investigated in the current research differ from those in previous studies in that they are highly proficient L2 speakers of a closely-related language pair, who are completing a bachelor’s degree in their L2 at a prestigious institution. This research will test the FLE in several different areas to gauge whether the effects will be maintained on a more proficient population. In order to assess this, the following research questions will be posed: (1a) Do framing effects differ between an L1 and L2 when gains and losses are weighed? (1b) Does the emotionality of a problem affect the framing effect in an L1 or L2? (2a) Does willingness to accept bets differ between an L1 and L2? And, (2b) does attractiveness of a bet affect willingness to accept in an L1 or L2? This research will also investigate any relationship between self-rated proficiency levels and emotionality in an L2 with the above effects and contextualize these results within the previous research.

These questions will be examined through survey data obtained by replicating the materials used in previous studies (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012) and testing the effects on a different, more proficient and culturally connected, population. Two questions will be used to test framing effects, using a gain and loss frame in two different scenarios of varying emotionality. Loss and risk aversion will be assessed by nine gamble options of varying attractiveness.

With the results of previous research in mind on the FLE and its assumed origins, the expected results of this study are that there will not be statistically significant differences found in the specified areas between the L1 and L2. While slight differences may be observed, these should be less than in previous studies given that the participants are highly proficient and therefore more emotionally connected with the L2 and less affected by cognitive distance due to prevalence of L2 use in their daily lives. With regard to the research questions outlined above, the following hypotheses are proposed:
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1a. Framing effects will have less of an effect in L2 than in L1, however in both conditions subjects will be more likely to choose the safe option (option A) in a gain frame and the gamble in a loss frame (option B).
1b. Framing effects will be reduced in both L1 and L2 in a less emotional problem.
2a. Slightly more bets will be taken in L2 than L1 overall.
2b. The more attractive a bet is, the more likely it will be taken. This difference will be stronger in L2.

The answers to these questions will help to reveal the extent to which speakers may be affected by the FLE in their daily lives and could provide insights into the implications of using a foreign language in a variety of settings, including universities, political arenas and the sharing of information. If the FLE is found in highly proficient speakers, this could indicate that when operating in a foreign language, people may be less affected by how problems are presented, focusing instead on how they might approach an issue objectively. In terms of the second two questions and subsequent hypotheses, focusing on loss and risk aversion, the presence of the FLE could indicate that individuals are less affected by the prospect of losses and take more statistically beneficial risks. This research will provide important insights into the nature and pervasiveness of the Foreign Language Effect and lay a foundation for future research to further explore this phenomenon in an increasingly multilingual and globalized world.

3.0 Method

The experiment used in this study consisted of two major sections combined into one construction to test the research questions outlined above. The first part dealt with framing effects in relation to risk attitudes. This was examined through two hypothetical problems each with two versions where the frame is changed to be either positive or negative. The objective here was to test the effect of frame and language on the subjects’ answers to each question. The second part of the experiment dealt with loss aversion in terms of bet acceptance. Here, the effect of language and bet attractiveness on the subjects’ choice to accept or refuse a bet was tested. These measures were largely in line with previous studies to ensure consistency of results.

3.1 Participants

A relatively homogenous group of 67 (21 males) Dutch (L1) university students studying English (L2) were selected to participate in this experiment. All subjects were first or second-year undergraduate students at the University of Groningen in the Netherlands. The mean age of participants was 22 years old \( (sd = 2.59) \).
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The subjects primarily acquired English in a classroom setting, accompanied by the large cultural influence of English present in the Netherlands (e.g. through English television and books). A full break-down of methods of acquisition can be seen in Figure 1. The mean age of onset was 9 years old ($sd = 2.51$).

![Method of L2 Acquisition](image)

*Figure 1: Chart of L2 (English) acquisition methods by percentage (multiple options possible).*

At the time of the experiment, the subjects were all taking part in an English for Academic Purposes (EAP) course in either the first or second year of their bachelor studies in English Language and Culture. Based on the requirements and rigor of the program, it was assumed that the level of proficiency was largely consistent across participants. This was confirmed through self-ratings of proficiency. Subjects were asked to rate their English proficiency in four areas: reading, writing, listening and speaking. Ratings were given on a scale of 1 to 7 ($7 = $fully fluent$)$. Further explanation of what is meant by “fully fluent” was not provided, however students were also asked to rate their Dutch (L1) proficiency which could be used as an anchor. Scores in all four areas were then averaged for an overall self-rated proficiency (SRP) score. The mean English-SRP score for all participants was 6.1 ($sd=.68$), while the mean Dutch-SRP score was 6.5 ($sd=.37$), indicating not only a high level of perceived English proficiency, but also that the subjects consider their English proficiency as approaching the level of their native tongue. The English proficiency score was further supported by the expected requirements of the University to follow this course of study (C1 on CEFR scale).

Subjects were also asked to provide information about their preferred language of emotional expression (PLEE). This was an open question and more than one answer was
possible. Answers resulted in the formation of three categories: English (L2), Dutch (L1) or both. Twenty-six percent of subjects preferred to express emotions in Dutch, while 37 percent preferred English and 37 percent preferred both. These results are visualized in Figure 2, below.

![Preferred Language of Emotional Expression](image)

*Figure 2: representation of percentage of subject who prefer to express emotions in Dutch (26%), English (37%) or both (37%).*

Following the inclusion criteria of Keysar et al. (2012), participants whose native language was not Dutch and participants with one or more English-speaking parents were excluded. Participants who reported that they did not understand the materials were also excluded.

The subjects who met the requirements of the experiment were further divided into two groups: L1 (Dutch), consisting of 34 subjects and L2 (English), consisting of 33 subjects. For randomness and convenience of distribution, subjects were divided into one of the four conditions according to their course groups, making the design semi-experimental. Subjects were informed that participation in the study was optional and would have no impact on their grades.

### 3.2 Materials and Procedure

Because the current study aims to replicate and expand upon the findings of Keysar et al. (2012), the original materials of this study were obtained and adapted to suit the current study. Changes were made to accommodate a different language pair (Dutch/English), and materials were consolidated to be used in one experiment rather than several. Materials were received in English and translated into Dutch by two native-Dutch bilingual speakers. In order to check the validity and comprehensibility of the questionnaire, as well as to eliminate any technical
malfucions from the use of a remote, internet-based survey, a pilot study was conducted prior to the experiment. The pilot consisted of 20 participants, 14 of whom were native-Dutch speakers, and 4 of whom were native-English speakers. The remaining 2 had varying language backgrounds, but were available and willing to participate, and completed the English version. The native speakers of Dutch and English who participated in the pilot study were also asked to check the materials for clarity, and slight adjustments were made based on these recommendations. Both versions were checked a final time by two native-Dutch bilingual speakers for consistency. Based on the varied language backgrounds of the pilot participants, no meaningful results could be derived from the pilot study, however it was necessary to ensure functionality and comprehensibility of the survey mechanism.

Once the pilot was completed and all adjustments were made, a final digital questionnaire was created using Qualtrics software (Qualtrics, Provo, UT). This allowed for consolidated collection and export of data. In total, four versions of the questionnaire were created: English with gain and loss-frame, and Dutch with gain and loss-frame. The four possible options were distributed randomly to students based on course groups and took roughly 10-15 minutes to complete. Surveys could be completed electronically using a computer or mobile device (see Appendices A and B for text versions of questionnaires).

Each questionnaire contained ten demographic and language proficiency/use questions, followed by eleven test questions. The test questions aimed at exploring two areas of decision making bias: framing effects and risk attitudes (part 1), and risk taking and loss aversion (part 2). Each of these parts is explained in greater detail below and included in full in Appendices A and B.

3.2.1 Part 1: Framing Effects and Risk Attitudes

Part 1 of this experiment was designed to examine the effect of language on the existence of framing effects on two risk-assessment problems which have been used in previous studies (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012; Winskel et al., 2016). The purpose of this design was to assess whether framing effects will be eliminated on a highly-proficient group of L2 speakers with a closely related language pair (Dutch/English), as demonstrated in previous studies across different language pairs and proficiency levels. The first problem utilized was the “Asian Disease Problem” (adapted as the simplified “Disease Problem”) outlined above (Keysar et al., 2012; Kahneman & Tversky, 1979).

Half of the subjects were presented with the positive frame, while the other half were presented with the negative frame. They were then asked to select between the two options:

*Positive (gain) frame:*
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If you choose Medicine A, 200,000 people will be saved.

If you choose Medicine B, there is a 33.3% chance that 600,000 people will be saved and a 66.6% chance that no one will be saved.

Which medicine do you choose?

Negative (loss) frame:

If you choose Medicine A, 400,000 people will die.

If you choose Medicine B, there is a 33.3% chance that no one will die and a 66.6% chance 600,000 people will die.

Which medicine do you choose?

Although in both scenarios medicine A (the sure option) results in the same outcome: 200,000 people live while 400,000 people die, people are more likely to select this option when framed positively, and more likely to take medicine B (the risky option) when framed negatively. Previous studies have shown that this difference disappears when the task is performed in L2.

In order to further test this phenomenon in terms of emotionality, Costa and colleagues (2014a) changed the problem from dealing in terms of lives lost to money lost, to see if the emotional impact of human life was an influencing factor. In their version of this experiment, named the “Financial Crisis Problem,” Costa et al. (2014a) kept the numbers in the problem identical, only changing the wording to refer to financial loss instead of lives. Because the same subjects responded to both problems in the current study, the numbers, in terms of euros, have been altered, but the concept remains the same. The adapted version of the “Financial Problem” used in this study is as follows:

A serious financial crisis has started. Without any action, the company you manage will lose 1,000,000 euros. In order to save this money, two types of actions are possible.

As in the Disease Problem, half of the subjects were presented with either the positive or negative frame, and asked to select between two options:

Positive (gain) frame:

If you choose Action A, 250,000 euros will be saved.

If you choose Action B, there is a 25% chance that 1,000,000 euros will be saved and a 75% chance that no money will be saved.

Which action do you choose?

Negative (loss) frame:
If you choose Action A, 750,000 euros will be lost.

If you choose Action B, there is a 25% chance that no money will be lost and a 75% chance that 1,000,000 euros will be lost.

Which action do you choose?

Subjects who were presented with the positive frame of the Disease Problem were also presented with the positive frame of the Financial Problem while the other half were presented with the negative frame in both scenarios. This was done in order to maintain frame consistency while only changing the level of emotionality associated with saving lives as opposed to saving money. This way, any priming or noticing effects of the different frames would be avoided, maintaining the integrity of responses. Previous studies conducted the experiments on multiple sample populations, eliminating the need for this consideration; the current study was accordingly adapted to apply to the available sample population.

3.2.2 Part 2: Loss Aversion in Accepting Bets

The second part of the questionnaire used in this study asked participants to decide whether to accept or reject a hypothetical cash bet. This section was designed to examine loss aversion in an L1 versus an L2. Previous psychological research (e.g. Kahneman and Tversky, 1979) has shown that people tend to weigh losses at roughly two times the amount of gains. Despite this, evidence suggests that when operating in a second language, individuals are more likely to accept bets with less attractive loss-to-gain ratios, therefore displaying less loss aversion and a more global view of expected return (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012).

In Keysar et al.’s (2012) original study, participants were given 18 equal-odds bets with positive expected value that ranged in attractiveness from a loss-to-gain ratio of 1:10 (highly attractive) to 9:10 (highly unattractive). The bets were further divided in terms of high- and low-stakes. The results showed that only high-stakes bets produced any meaningful result, and therefore the current study has only utilized the high-stakes options. The original study was carried out using Korean won, so the materials have been altered to display amounts in terms of euros. The bets appeared one at a time in random order on the questionnaire, and participants were asked to select whether to accept or reject the bet. An example of this construction is as follows:

You have the choice to accept or reject the following bets based on a standard coin toss (50% chance of winning or losing). Please decide whether or not you will accept the bet by choosing “yes” (accept) or “no” (reject).
1. Lose 11 euros or win 110 euros?  
Yes or no?

The above example displays a highly attractive loss-to-gain ratio of 1/10. The following eight choices ranged randomly between 2/10 and 9/10 in attractiveness. A full table of the bets and the attractiveness ratios can be found in appendix C.

3.3 Design and Analysis

As outlined in the description of materials and procedures, design and analysis of this experiment was also separated into two parts based on the two areas of interest. Accordingly, separate analyses have been determined to test each section. Data were collected via Qualtrics and exported using Microsoft Excel (2016). All statistics were carried out according to conventional measures, using R (R Core Team, 2013). All alpha levels were set at \( \alpha < 0.05 \) as is the accepted standard in linguistic research.

3.3.1 Part 1: Framing Effects and Risk Attitudes

Data were collected in all four experimental conditions for a chi-squared analysis of answers to each of the two problems presented to assess framing effects in L1 and L2. Responses were recorded as a frequency distribution, while frame and language both acted as independent between-subject variables with two levels each, resulting in four possible constructions: Dutch-gain, Dutch-loss, English-gain, English-loss. This analysis tested the effect of frame on frequency counts of answers given in both language conditions. Based on this construction, the following statistical hypotheses were formed:

\[ H_0: \text{There is no effect of frame on answer to the [Disease or Financial] problem in [L1 or L2].} \]

\[ H_a: \text{There is an effect of frame on answer to the [Disease or Financial] problem in [L1 or L2].} \]

In addition to the frequency analysis, a mixed-effects model was created to predict the likelihood of choosing the safe option in the combined results of both problems. Mixed effects were used because of the ability to test main independent variables as well as random, subject-related variables (Sonbul & Schmitt, 2013), and to follow the example provided in a similar study carried out by Hayakawa et al. (2018). Models were tested using analysis of variance (ANOVA).

3.3.2 Part 2: Loss aversion in accepting bets

For the second half of the experiment, data were initially analyzed in terms of overall percentage of bets accepted for each participant for means-comparison analysis. However, non-parametric measures were used instead after the data for the Dutch-language condition showed
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an abnormal distribution. Specifically, this subgroup displayed slight positive skewness, indicating a higher concentration of subjects who accepted fewer bets, as well as negative kurtosis, indicating a more even distribution than is typical. Initial analysis tested the between-subject factor of language for its effect on percentage of bets accepted, forming the following statistical hypotheses:

\( H_0 \): There is no effect of language on percent of bets accepted.
\( H_a \): There is an effect of language on percent of bets accepted.

A subsequent analysis added the within-subject factor of attractiveness of each bet, expressed as loss-to-gain ratio. This analysis tested the effect of loss-to-gain ratio on percent of bets accepted, forming the following statistical hypotheses:

\( H_{01} \): There is no effect of loss-to-gain ratio on percent of bets accepted
\( H_{a1/2} \): There is a [positive/negative] effect of loss-to-gain ratio on percent of bets accepted.

\( H_{02} \): There is no interaction between language and loss-to-gain ratio on percentage of bets accepted.
\( H_{02.1/2} \): There is an interaction between language and loss-to-gain ratio such that [more/fewer] bets are taken in [Dutch/English] at [higher/lower] levels of attractiveness.

A mixed-effects model was constructed to predict the acceptance of bets based on loss-to-gain ratio and language, as well as participant-related effects such as SRP and PLEE. This was analyzed using ANOVA.

4.0 Results
4.1 Part 1: Framing effects and risk attitudes

The results of the Disease Problem (DP) and the Financial Problem (FP) are presented as separate and combined analyses. The combined analysis looks only at overall framing effects to gain power (see also Costa, Foucart, Arnon, et al., 2014; Winskel et al., 2016), and includes a mixed-effects analysis of intervening effects to determine the extent to which other factors can be used to predict the results. These included language of the experiment (Dutch or English), frame (gain or loss), self-rated English proficiency (scale of 1-7) and preferred language of emotional expression (Dutch, English or both).

4.1.1 The Disease Problem

Figure 3 displays the percentage of participants who chose the sure option (medicine A) in the DP in four conditions (Dutch gain-frame, Dutch loss-frame, English gain-frame, English loss-frame).
In L1 (Dutch) conditions, 53 percent of participants chose the sure option (medicine A) when presented with a gain frame, while 59 percent chose this option when presented with a loss frame, $\chi^2(1, N = 34) = 0.12, p = 0.73, \phi = 0.06$. These results showed no significant effect of frame on preference of a safe option in L1. By contrast, an effect of frame was found in L2 (English) conditions, as 85 percent of participants chose the sure option when presented with a gain-frame, while 40 percent chose this option with a loss-frame, $\chi^2(1, N = 33) = 6.42, p < .02, \phi = .44$.

4.1.2 The Financial Problem

The results of the Financial Problem are displayed in Figure 4, below:
As evidenced by Figure 4, there were no significant framing effects found in the Financial Problem in either L1 or L2 conditions. In L1 (Dutch) conditions, 71 percent of participants chose the sure option (action A) when presented with a gain frame, while 76 percent chose this option with a loss frame, χ²(1, N = 34) = 0.15, p = 0.70, φ = 0.07. When answering this question in L2 (English) conditions, 62 percent chose the sure option when presented with a gain frame, and 60 percent chose this option when given a loss frame, χ²(1, N = 33) = 0.01, p = 0.93, φ = 0.02.

### 4.1.3 Combined analysis of Disease and Financial Problems

In order to gain power, the results from both the Disease and Financial problems were combined for further analysis. A full description of sure responses (option A) to both problems can be found in Table 1. The results of the combined analysis are displayed in Figure 5.

**Table 1**: Number and percentage of sure responses (option A) in Disease and Financial problems for native (Dutch, N = 34) and foreign (English, N = 33) conditions.

<table>
<thead>
<tr>
<th></th>
<th>DUTCH (L1)</th>
<th></th>
<th>ENGLISH (L2)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gain (%)</td>
<td>Loss (%)</td>
<td>G-L(%)</td>
<td>Gain (%)</td>
<td>Loss (%)</td>
<td>G-L(%)</td>
<td></td>
</tr>
<tr>
<td>DP</td>
<td>9</td>
<td>10</td>
<td>59%</td>
<td>11</td>
<td>8</td>
<td>40%</td>
<td>45%</td>
</tr>
<tr>
<td>FP</td>
<td>12</td>
<td>13</td>
<td>76%</td>
<td>8</td>
<td>12</td>
<td>60%</td>
<td>2%</td>
</tr>
<tr>
<td>MEAN</td>
<td>62%</td>
<td>67.5%</td>
<td>-5.5%</td>
<td>73.5%</td>
<td>50%</td>
<td>23.5%</td>
<td></td>
</tr>
</tbody>
</table>
A combined analysis revealed no significant effect of frame on decision in either L1 or L2. In L1 conditions, 62 percent of participants chose a sure option in both problems when presented a gain frame, while 68 percent chose this option in a loss frame, $\chi^2(1, N = 68) = 0.26$, $p = 0.61$, $\phi = 0.06$. In L2 conditions, 73 percent of participants chose the sure option in a gain frame, while 50 percent chose this option in a loss frame, $\chi^2(1, N = 66) = 3.47$, $p = .06$, $\phi = 0.22$.

To further investigate intervening effects of other variables on answers to the two problems, a generalized linear mixed-effects model was constructed on the combined results. Answer to the question (option A or B) was entered as the response variable. Language, frame, SRP and PLEE were added as fixed effects, and subject and problem (DP or FP) were added as random effects. There were no significant main effects found of either language ($X^2(1, N = 67) = 0.44; \beta = 0.24, \ SE = 0.36$), or frame ($X^2(1, N = 67) = 1.02; \beta = 0.37, \ SE = 0.36$), on probability of selecting a sure option. The model did not improve significantly when intervening within-subject variables SRP and PLEE were added. No additional interaction effects were found.

4.2 Part 2: Loss aversion in accepting bets

The results of willingness to accept or reject positive-expected-value bets of varying ratios of attractiveness (loss-to-gain ratios from 1:10 to 9:10) were analyzed both in overall
willingness to accept bets as well as with attractiveness as a function of percentage of bets accepted.

Figure 6: Boxplot displaying percentage of bets taken in Dutch (L1, left) and English (L2, right).

Figure 6 shows the overall percentages of bets taken in Dutch and English regardless of attractiveness. A Mann-Whitney test indicated that while the number of bets taken was higher in L2 (English) conditions ($Mdn = 0.44$), than in L1 (Dutch) ($Mdn = 0.33$), this difference was not significant, $U=439.5$, $Z=-0.58$ $p=0.57$, $r=0.07$.

Further analysis was done to display the percentage of participants who accepted bets at varying levels of attractiveness, from 9:10 (highly unattractive) to 1:10 (highly attractive). The results of this analysis are illustrated in Figure 7.
A generalized linear mixed-effects model was created to predict the likelihood of accepting a bet in either L1 or L2 at varying levels of attractiveness. The response variable was whether each of the nine bets were taken or not. Language, attractiveness of each bet, SRP and PLEE were added as fixed effects. Participant and bet (1-9) were added as random effects. There was no significant effect of language ($X^2(1, N = 62) = 0.26; \beta = 0.50, SE = 0.97$) or SRP ($X^2(1, N = 62) = 0.90; \beta = -0.66, SE = 0.70$). However, a significant effect of bet attractiveness was found ($X^2(1, N = 62) = 43.56, p < .001; \beta = -24.66, SE = 3.74; \text{marginal } R^2 = 0.06$). The model was also improved significantly by the addition of PLEE such that participants who preferred to use both English and Dutch to express emotions were less likely to take bets overall ($X^2(1, N = 62) = 5.81, p < .05; \beta = -2.75, SE = 1.23; \text{marginal } R^2 = 0.06$). This effect is visualized in Figure 8, below. There were no significant interaction effects found among fixed effects.
5.0 Discussion

This experiment sought to examine the impact of using a foreign language on a range of decision-making biases, focusing specifically on the areas of risk and loss aversion as related to framing effects and willingness to accept a range of positive-expected-value bets. It was expected that framing effects would be evident in the L1, resulting in an increased likelihood to choose a sure option in a gain-frame and a risky option in a loss-frame, while this distinction would be reduced in the L2. The results, however, showed the opposite effect in the first problem, the Disease Problem, with significant framing effects present in L2 conditions but absent in L1. The second problem was less conclusive as there was no apparent effect of frame in either the L1 or L2. Contrary to previous studies, subjects in an L1 context were more likely to choose a sure option in a loss frame than in a gain frame in both problems.

The second part of the experiment tested overall willingness of participants to accept a series of bets with the expectation that (1) more bets would be taken in the L2, and (2) this distinction would increase at higher levels of attractiveness. The results showed a slight, but not significant, increase in willingness to accept bets in L2 conditions, however there was no evidence that this increased at higher levels of attractiveness. This result coincides somewhat with the mixed findings of other studies.

5.1 Results in context
Previous research into this topic has yielded intriguing results, suggesting that the use of a foreign language can influence the way a person thinks and cause different decisions to be made, most notably the elimination of framing effects (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012; Winskel et al., 2016). In previous studies, framing effects typically manifested strongly in the L1, while being either reduced or eliminated in the L2. This has been demonstrated across a range of language pairs including English/Japanese, Spanish/English, Korean/English, Thai/English and others (L1/L2 respectively). However, in the current study, no framing effects were found in the L1, while an effect was found in the L2, but only in one of the two questions presented.

Previous research has also shown mixed results in terms of myopic loss aversion in the realm of accepting bets. In general, participants have been more willing to accept bets when using an L2, particularly when bets involved large amounts, and were considered beneficial (Hayakawa et al., 2018; Keysar et al., 2012). These results were somewhat supported in the current study; however, a significant effect was not observed.

5.1.1 Framing effects and risk attitudes

The results of the Disease Problem run contrary to those observed in previous studies (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012; Winskel et al., 2016). Not only were framing effects not observed in L1, but there was a slight preference for the sure option in a loss-frame scenario over a gain-frame (59% vs 53%), indicating that subjects were not affected by the framing of the problem, and further, that they responded differently than has come to be expected. Clear framing effects were, however, observed in the L2 as 85 percent of participants preferred a sure option in a gain frame, and only 40 percent preferred this option in a loss frame. This indicates that the use of a second language made the participants more susceptible to the frame of a problem than the use of their first language.

This result is interesting because it suggests that contrary to previous studies, the subjects were in fact more affected by the framing of a problem in their L2 than in their L1. It was initially theorized that a positively-framed question would more often result in choosing a safe option over a gamble, while a negatively-framed question would produce the opposite result (Kahneman, 2011). Previous studies have shown that this theory holds true in L1, but not in L2, possibly due to increased cognitive distance in L2 which promotes deliberate thought processes (System 2) over automatic processes (System 1). The idea is that we are subconsciously influenced by the frame of a question into choosing a sure option over a gamble, but that this bias can be mitigated through the cognitive distance achieved by using a foreign language. However, in the case of this experiment, the opposite result was observed. In the L2, clear
framing effects were found, while in L1, subjects were slightly more likely to choose the sure option in a loss-frame. These results suggest that the use of a foreign language alone is not responsible for the elimination of framing effects, and that under certain conditions, perhaps related to higher proficiency or emotionality (see Figure 2), or cultural contexts, L2 use may actually increase framing effects.

These results become even more interesting when considered alongside the next question analyzed for framing effects in this study, the Financial Problem (FP). The FP was used in addition to the DP to test if the results differ when the question is less emotional, concerning loss of money instead of loss of life, and therefore more likely to promote reasoned deliberation instead of automatic or intuitive response. Reduced emotionality did seem to weaken this response as there was no significant effect of frame found in either the L1 or L2. Subjects in all four conditions were more likely to choose the sure option over the gamble regardless of frame or language used. This was slightly higher in the L1 with 71 and 76 percent of subjects choosing this option in the gain- and loss-frame respectively. By contrast, 62 and 60 percent of subjects chose the safe option (gain- and loss-frame, respectively) in the L2, implying a slight increase in willingness to take a risk in L2 conditions, regardless of frame. However, as in the DP, subjects in L1 conditions were more likely to choose the sure option in a loss frame than a gain, exhibiting a difference of five percentage points.

Analysis of this result also revealed no effects of the intervening variables of self-rated English proficiency (SRP) or preferred language of emotional expression (PLEE). The fact that proficiency revealed no effect is not surprising as the participants were relatively homogenous in this aspect. PLEE was a more promising distinction as it may have illuminated the impact of emotional connection to an L2 on decision making. However, it did not prove to be a significant predictor in the results of this problem. While these results may not be applicable to a wider population with more varied proficiency, they certainly suggest that framing effects can still have a strong impact on some subjects in a foreign language, perhaps even more than in a native language.

Accordingly, it can be tentatively concluded that in a less-emotional context, such as a financial decision, subjects are more careful and not as affected by external factors such as language or frame. It should also be mentioned that the Financial Problem may have been more personal as it concerned the subjects’ own hypothetical business and could also be considered more realistic: it is more likely that a person will have to make financial decisions than be responsible for choosing the fate of hundreds of thousands of people. These factors could
contribute to more deliberate thinking when confronted with the FP, which would then result in less of an effect of frame or language context.

The combined analysis of both problems helps create a broader picture of these results (see Figure 5), showing not only elimination of framing effects, but a slight reversal of previously-observed trends. While no statistically significant results were found, the outcome in L2 conditions did approach significance with a relatively low $p$-value less than .10 and an effect size of .22. This suggests that there may have been some overall effect of frame in the L2, while there is no apparent effect present in the L1, although a larger sample size may be needed to make the effects visible. The combined analysis also reveals the somewhat surprising result of an increased preference for a sure option in a loss frame over a gain frame apparent in L1 conditions. Though the difference is slight at 6 percentage points, it reveals a pattern that thus far has not been observed in previous studies and calls into question the reliability of framing effects in an L1. It does not appear, however, that these subjects are immune to these effects due to other factors, because framing effects did manifest to an extent in the L2. This points to language as the differentiating factor, though in the reversed direction to what has been previously observed. The reason behind this reversal could lie in the cognitive closeness achieved by high levels of proficiency, though that would not fully account for the lack of effect in the L1.

5.1.2 Loss aversion and accepting bets

With regard to the second research question examined in this study, loss aversion to the risks associated with gamble decisions, was examined. Results of the participants’ willingness to accept nine positive-expected-value bets at varying levels of attractiveness were analyzed in terms of overall acceptance and acceptance as a function of loss-to-gain ratio. In terms of overall acceptance, participants were on average slightly more willing to accept bets in L2 than in L1 conditions, as has been observed in previous studies (Hayakawa et al., 2018; Keysar et al., 2012), although the difference did not reach statistical significance (see Figure 6). This result suggests that subjects were slightly more open to accepting bets in an L2, perhaps due to the increased-systematicity account, whereby cognitive distance promotes analytical reasoning (Keysar et al., 2012). The fact that the difference is not significant also suggests that the FLE is minimized by various other factors including high L2 proficiency and emotionality. This becomes more interesting when considering the acceptance rate of bets at each level of attractiveness.

In general, subjects were predictably more likely to accept bets with a higher attractiveness ratio (e.g. 1:10), than a low ratio (e.g. 9:10) across all nine bets in both L1 and L2 conditions (see Figure 7). Similar to Keysar et al.’s (2012) study, subjects were also more likely
to accept bets in the L2 at most levels of attractiveness. In five out of nine bets, subjects were more likely to accept the bet in the L2 than in L1, while in two bets acceptance rates were equal. The remaining two exceptions to this appeared at the least attractive bet (loss-to-gain ratio of 9:10) and the second most attractive bet (loss-to-gain ratio of 2:10) which were accepted more often in the L1 than in L2. These results are interesting because although the differences are slight, a trend still seems to exist of increased likelihood of accepting “good” bets in an L2 at a higher rate than in an L1. Because of the positive-expected-value results of all nine bets, they can all be considered “good,” or beneficial, bets. However, as myopic loss-aversion reveals, people tend to outweigh losses over gains at a ratio of 2:1, meaning that bets with a loss-to-gain ratio of 1:2 or higher are above the generally accepted threshold. Five of the nine bets presented in this experiment met this requirement (see Appendix C), and would therefore be considered the most beneficial bets, and most likely to be taken in an L2. Despite this, there was no significant increase in acceptance in L2 conditions of more attractive bets, with three out of the five being slightly higher in L2, while the two most attractive bets were slightly lower or equal to L1. This result suggests that the use of a foreign language may lead to an overall increase in acceptance of “good” bets, but this effect does not increase in terms of bets that are progressively beneficial.

Addition of one predictor variable also yielded significant results in this experiment (see Figure 8). When Preferred Language of Emotional Expression (PLEE) was added to the model, results showed that subjects who preferred to use both English and Dutch to express emotions (37% of participants, see Figure 2) were less likely to take bets overall. This supports the notion that increased emotionality in a language could impact the Foreign Language Effect, and that individuals who are equally emotional in multiple languages may be less affected by using one language over the other in decision-making contexts.

5.2 Potential effects of affecting factors
5.2.1 Proficiency and emotionality in L2

The results of both parts of this experiment suggest that the FLE may be mitigated by a host of intervening factors, not least of which concerning the individual’s proficiency in L2. Because the FLE is largely attributed to emotional and cognitive distance created by the use of a foreign language, it stands to reason that when this distance is bridged through increased proficiency and use, this effect may also diminish (Costa, Foucart, Hayakawa, et al., 2014; Geipel et al., 2015). The results of this study seem to support this hypothesis as no significant differences were found in the decisions made based on L1 or L2 use in this group of high-proficiency L2 users, suggesting they are not as affected by cognitive distance in their L2 as less-proficient individuals may be. By extension, these subjects were also largely emotionally
connected to L2 which could play a role in reducing the emotional distance experienced by many L2 users, thereby increasing reliance on and use of automatic or intuitive mental functions (System 1).

5.2.2 Relationship between Dutch and English

The cognitive and emotional fluency present in these participants’ L2 may also be connected to the L1/L2 relationship both linguistically and culturally present between Dutch and English. Not only are Dutch and English part of the same Germanic ancestry as languages, but English also plays an enormous influencing role in Dutch culture through the media and everyday lives of Dutch people, particularly university students. This is evidenced by the high number of participants, 55 percent, who included some form of media (books, TV, video games, etc.) as part of their English-learning process. These participants also likely represent a more exceptional group than average, demonstrated by the fact that they are all pursuing a university degree in English. This elevated interest in English, combined with the cultural influence and closeness between Dutch and English, may also play a part in diminishing the distance observed between other language pairs examined in previous studies.

5.2.3 Language environment

Another important factor in examining potential Foreign Language Effects is the language environment of the experiment, both in terms of language-richness and method of reception and delivery. It has been noted that language-poor test environments, where questions or instructions are brief and/or repetitive, fail to produce as strong results as those with a richer language environment, where descriptions are longer or more detailed (Hayakawa et al., 2018). In terms of the current study, the language environment of the first part can be considered rich, especially because the participants completed a background questionnaire in the target language prior to beginning, and the language of the first two questions, the Disease Problem and the Financial Problem, is thorough. This is necessarily diminished in the bet proposals, which are presented in brief succession, repeating the same simple language each time. It is possible that these short, simple prompts may not be as reliable as more thorough questions (such as the DP and FP) due to the relatively low richness of language, thus reducing the impact of the FLE.

The issue of language richness also relates to the mode in which the problem is presented, which has been predominantly visual to this point. The processes of responding to a written question are necessarily different than those needed to respond in an auditory/verbal setting, and therefore Foreign Language Effects may differ in these contexts (Brouwer, in press).
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The time and processing allowed for answering written questions may lead to a diminished effect than other contexts of communication.

5.3 Limitations

This experiment provided important insights into the extent of the FLE on a homogenous group of highly proficient L2 users. However, the scope was unavoidably narrow given the confines of the research. The access to a group of students studying English allowed for a thorough examination of the characteristics of this group, however the risk that these subjects are not representative of a more general population does exist. Specifically, these university students have a higher interest and proficiency in their L2 than the average L2 learner might, as evidenced by the high percentage of subjects who prefer English to express some or all emotions (74%). This issue is echoed in other similar experiments as well, which have primarily utilized university students studying the respective L2 (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012; Winskel et al., 2016). Accordingly, the results obtained by this and similar studies may be limited to subjects with a higher interest in languages or in the target L2 and may differ from a more diverse population of L2 users. The effect of this is that subjects with a greater interest in an L2 could potentially develop a greater emotional connection to this language, therefore potentially limiting the Foreign Language Effect. In order to account for this, additional measures of gauging emotional connection, possibly including SCRs, could be used in future studies.

In addition to the increased emotionality of these particular subjects, there is also the question of proficiency, and whether it can account for the reduced FLE found in this study. In the earlier stages of this research, an additional experiment was run on a separate group of university students with different areas of study, with the expectation that these students would have lower L2 proficiency than the primary subjects who were studying English. However, this was not found to be the case as the self-rated proficiency of non-English major students did not differ in any meaningful way from the English majors, although it must be mentioned that the subjective nature of self-assessment regarding proficiency may pose a hindrance in obtaining accurate measures. Though perhaps not wholly objective, the available measures suggest that in the case of Dutch university students, a significant contrast in L2-English proficiency may be impossible to find given the educational and cultural exposure to English. In order to find and properly test this contrast among native Dutch speakers, it may be necessary to expand the search to include individuals from a variety of backgrounds and ages who are more likely to have varying levels of proficiency, which was not possible in the current study.

5.4 Future research
In view of the current study, a number of interesting questions for future research have been raised, the most interesting of which may be the question of proficiency as a determining variable for the strength of the FLE. As other studies have hypothesized, and as the current study also suggests, it is possible that as proficiency increases, the Foreign Language Effect could diminish (Costa, Foucart, Hayakawa, et al., 2014). This also seems to follow logically as the theorized reasons for the FLE include emotional and cognitive distance from L2, both of which have been demonstrated to decrease as proficiency increases (Caldwell-Harris et al., 2011). A fitting next step would then be to construct a design which specifically contrasts groups of L2 learners with significantly different proficiency levels. This could also aid in eliminating the possibility that another factor, such as cultural or linguistic similarities, account for this variance.

Another path illuminated by the results of the current study is the possibility that different L1/L2 language pairs produce different Foreign Language Effects on decision making. While a variety of language pairs have already been examined, it would be interesting to specifically contrast linguistically similar pairs (e.g. Dutch and English) with more far-removed pairs (e.g. Chinese and English) while controlling for other variables, such as proficiency, as much as possible.

A final area of particular interest in future studies involves the delivery mode of the experiment. While most studies thus far have tested non-verbal reactions, it would be interesting to see if the results remain consistent when tests are performed verbally. Speaking and listening necessarily require a different level of processing than reading and writing and could also impact decision-making processes. The processes involved in speaking may differ enough to affect cognitive distance and functioning (System 1 or System 2), that the results from written experiments could change based on output method. It would therefore be a logical extension of the current research to expand these findings to verbal testing conditions and determine any differences found.

5.5 Final remarks

The results of this experiment have challenged current notions about the effect of using a foreign language on decision-making processes. Though previous research has shown an elimination of framing effects in an L2 and an increased willingness to accept beneficial gambles, the results of this experiment were not as clear. In a more emotionally-charged decision regarding saving the lives of many people such as the Disease Problem, the frame only affected responses in the L2, whereas it seemed to have no effect on the decision in the L1. In a less emotional decision regarding personal finances, such as the Financial Problem, no effect of
frame was found in the L1 or L2, suggesting that the emotionality of the problem may impact the influence of the frame, with a stronger presence in more emotional contexts. Because the subjects in this experience were influenced by the frame in the L2 rather than the L1 in the Disease Problem, contrary to previous studies, high proficiency and investment in an L2 may lead to decision-making processes which are more similar to typical L1 processes observed in other studies.

In terms of loss aversion and betting, these results support to a slight degree the prior findings, suggesting an increased willingness to accept bets presented in an L2, and therefore a reduced aversion to loss and risk, especially in regards to beneficial gambles. However, the diminished or null difference found in this study compared to others puts forth the notion that it is possible to overcome the influence of speaking a foreign language and in essence “think like a native.” Whether or not this outcome is desirable, however, is another question.

6.0 Conclusion

Until now, research into the Foreign Language Effect has demonstrated a difference in how decisions are made based on the language used to make them, positing the elimination of framing effects, and the reduction of loss-aversion in scenarios involving risk. There is sufficient evidence to suggest that emotional connections remain stronger in a first language, aiding to the ease with which we can rely on the automatic and intuitive mechanisms that make up the imagined “System 1” of mental processing. It is promising to imagine, then, that mitigating this connection through the use of a second language, may alter decision-making processes and lead to the analytical and rational methods governed by “System 2.”

The current research, however, has revealed that in exceptional cases, such as a group of highly-proficient L2 speakers with a large cultural influence from L1, previous findings may not only be absent, but reversed. Though the current findings may seem to negate conclusions drawn by previous research, this result adds to the current understanding of the FLE by highlighting circumstances in which it may be inhibited or overcome. If the nature of the FLE can be further pin-pointed, it will be easier for researchers and language learners to understand how and when it can come into effect. This could also deepen understanding of second language development for L2 learners and educators, by illuminating differences between first and second language processing at different levels of acquisition.

Using a second language may not permanently alter the way a person confronts problems or the decisions they make, however, being aware of the effects of speaking a second
language on cognitive processes could bring more attention to the biases that affect decision making regardless of the language in which they are encountered.
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https://doi.org/10.1515/ip-2013-0002
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Appendices

Appendix A: Questionnaire in English with gain and loss frames

You are invited to participate in a web-based online survey as part of a research project being conducted by Allison Crawford, a master’s student at the University of Groningen. It should take approximately 15 minutes to complete.

Your participation in this survey is voluntary and anonymous. You may refuse to take part in the research or exit the survey at any time. Your responses will be used for research purposes only and no identifiable information will be recorded.

Clicking on the “Agree” button indicates that you have read the above information and you voluntarily agree to participate. Please select your choice below.

__Agree
__Disagree

Background Information

Below are questions about your education and language use. Please answer these questions as completely as possible.

Your Native Language ____________________                Sex:     M              F         Other
Year of Birth                      ________________ Country of Origin ____________

1. How have you acquired English? Check all that apply.

__In a classroom from a native-speaker instructor
__In a classroom from a nonnative-speaker instructor
__By studying abroad for a quarter or semester
__By living abroad for a total of six months or longer
__From native English-speaking friends
__Other
__Other

2. How old were you when you started learning English? ________

3. Was English spoken in your home while you were growing up?    Yes    No
Proficiency Ratings
Rate your English and Dutch proficiency using the scale (1 = not proficient at all, 7 = fully fluent)

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5. In which language do you prefer to express emotion? You can specify a certain language for certain emotions, if you wish.

**Part 1 (Gain-frame version)**

Please consider the following situations and choose an answer.

1. Recently, a dangerous new disease has been going around. Without medicine, 600,000 people will die from it. In order to save these people, two types of medicine are being made.
   - If you choose Medicine A, 200,000 people will be saved.
   - If you choose Medicine B, there is a 33.3% chance that 600,000 people will be saved and a 66.6% chance that no one will be saved.

Which medicine do you choose?

2. A serious financial crisis has started. Without any action, the company you manage will lose 1,000,000 euros. In order to save this money, two types of actions are possible.
   - If you choose Action A, 750,000 euros will be lost.
   - If you choose Action B, there is a 25% chance that no money will be lost and a 75% chance that 1,000,000 euros will be lost.
Which action do you choose?

Part 1 (Loss-frame version)

Please consider the following situations and choose an answer.

1. Recently, a dangerous new disease has been going around. Without medicine, 600,000 people will die from it. In order to save these people, two types of medicine are being made.

   If you choose Medicine A, 400,000 people will die.

   If you choose Medicine B, there is a 33.3% chance that no one will die and a 66.6% chance 600,000 people will die.

Which medicine do you choose?

2. A serious financial crisis has started. Without any action, the company you manage will lose 1,000,000 euros. In order to save this money, two types of actions are possible.

   If you choose Action A, 250,000 euros will be saved.

   If you choose Action B, there is a 25% chance that 1,000,000 euros will be saved and a 75% chance that no money will be saved.

Which action do you choose?

Part 2

For this part, you will make 9 gamble decisions: to gamble or not to gamble.
For all gambles, you have a 50% chance of winning money and a 50% chance of losing money. The amounts will be different for each question.

1. The Bet:
   50% chance to win 150 euros
   50% chance to lose 75 euros
Will you take this bet?
   ___ Yes
   ___ No

2. The Bet:
   50% chance to win 140 euros
   50% chance to lose 56 euros
Will you take this bet?
   ___ Yes
   ___ No

3. The Bet:
   50% chance to win 190 euros
   50% chance to lose 171 euros
Will you take this bet?
   ___ Yes
   ___ No

4. The Bet:
   50% chance to win 160 euros
   50% chance to lose 96 euros
Will you take this bet?
   ___ Yes
   ___ No
5. The Bet:
   50% chance to win 110 euros
   50% chance to lose 11 euros
Will you take this bet?
   __ Yes
   __ No

6. The Bet:
   50% chance to win 170 euros
   50% chance to lose 119 euros
Will you take this bet?
   __ Yes
   __ No

7. The Bet:
   50% chance to win 180 euros
   50% chance to lose 144 euros
Will you take this bet?
   __ Yes
   __ No

8. The Bet:
   50% chance to win 120 euros
   50% chance to lose 24 euros
Will you take this bet?
   __ Yes
   __ No

9. The Bet:
   50% chance to win 130 euros
   50% chance to lose 39 euros
Will you take this bet?
   __ Yes
   __ No

Please rate your ability to understand the questions asked in this survey.
   __ Did not understand
   __ Understood somewhat
   __ Understood completely
Appendix B: Questionnaire in Dutch with gain and loss frames

Je bent uitgenodigd om mee te doen aan een online enquête, als onderdeel van een onderzoek dat wordt afgenomen door Allison Crawford, Masterstudente aan de RUG (Rijksuniversiteit Groningen). Het zal ongeveer 15 minuten van je tijd in beslag nemen.

Je medewerking aan dit onderzoek is vrijwillig en geheel anoniem. Je hoeft niet mee te doen als je dat niet wilt en je mag op ieder moment stoppen met de enquête. Je antwoorden zullen alleen gebruikt worden voor onderzoeksdoeleinden en er wordt geen identificeerbare informatie vastgelegd of opgeslagen.

Door “Akkoord” te selecteren geef je aan bovenstaande informatie te hebben gelezen en bied je aan vrijwillig mee te werken aan het onderzoek. Selecteer hieronder je keuze.

__Akkoord
__Niet Akkoord

Achtergrondinformatie
Hieronder staan vragen over je taalgeschiedenis en taalgebruik. Vul de antwoorden alsjeblieft zo volledig mogelijk in.

Moedertaal ____________________ Geslacht: M V Anders
Geboortejaar ___________________ Land van herkomst ____________

   __In een klaslokaal van een leraar/lerares die Engels als moedertaal sprak
   __In een klaslokaal van een leraar/lerares die Engels niet als moedertaal sprak
   __Door een blok of semester in het buitenland te studeren
   __Door zes maanden of langer in het buitenland te verblijven
   __Van vrienden die Engels als moedertaal spraken
   __Anders, namelijk:
       __________________________________________________________________________

2. Hoe oud was je toen je Engels begon te leren? ________

3. Werd er bij jou thuis vroeger Engels gesproken? Ja Nee
DECISION-MAKING BIASES IN A SECOND LANGUAGE

**Taalvaardigheidsscores**

Scoor je Engelse en Nederlandse taalvaardigheid op een schaal van 1 tot 7 (1 = dit kan ik helemaal niet, 7 = hierin ben ik volledig vloeiend)

**ENGELS**

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**NEDERLANDS**

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<thead>
<tr>
<th>Taalvaardigheid</th>
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**Deel 1 (Gain-frame version)**

Lees onderstaande scenario’s en kies een antwoord.

1. Recentelijk gaat er een nieuwe, gevaarlijke ziekte rond. Zonder medicijnen zullen er 600.000 mensen aan dood gaan. Om deze mensen te redden worden twee typen medicijnen gemaakt.

   Als je medicijn A kiest worden 200.000 mensen gered.

   Als je medicijn B kiest is er een 33,3% procent kans dat 600.000 mensen gered worden en is er een 66,6% kans dat niemand gered wordt.

Welk medicijn kies je?

2. Een serieuze financiële crisis is begonnen. Zonder enige actie zal het bedrijf wat jij leidt 1.000.000 Euro verliezen. Om dit geld te redden zijn er twee acties mogelijk.

   Als je actie A kiest raakt er 750.000 Euro verloren.

   Als je actie B kiest is er een 25% kans dat er geen geld verloren raakt en een 75% kans dat 1.000.000 Euro verloren raakt.

Welke actie kiest je?
Deel 1 (Loss-frame version)

Lees onderstaande scenario’s en kies een antwoord.

1. Recentelijk gaat er een nieuwe, gevaarlijke ziekte rond. Zonder medicijnen zullen er 600.000 mensen aan dood gaan. Om deze mensen te redden worden twee typen medicijnen gemaakt.

   Als je medicijn A kiest gaan 400.000 mensen dood.

   Als je medicijn B kiest is er een 33,3% procent kans dat niemand dood gaat en een 66,6% kans dat 600.000 mensen dood gaan.

Welk medicijn kies je?

2. Een serieuze financiële crisis is begonnen. Zonder enige actie zal het bedrijf wat jij leidt 1.000.000 Euro verliezen. Om dit geld te redden zijn er twee acties mogelijk.

   Als je actie A kiest wordt 250.000 Euro gered.

   Als je actie B kiest is er een 25% kans dat 1.000.000 Euro wordt gered en een 75% kans dat er geen geld wordt gered.

Welke actie kies je?

Deel 2

Bij dit onderdeel maak je negen keer een beslissing: gokken of niet gokken. Voor alle weddenschappen geldt dat er 50% kans op zowel winst als verlies is. De bedragen zullen per vraag verschillen.

1. De weddenschap:
   50% kans om 150 euro te winnen
   50% kans om 75 euro te verliezen

   Neem je deze weddenschap aan?
   ___ Ja
   ___ Nee

2. De weddenschap:
   50% kans om 140 euro te winnen
   50% kans om 56 euro te verliezen

   Neem je deze weddenschap aan?
   ___ Ja
   ___ Nee

3. De weddenschap:
   50% kans om 190 euro te winnen
   50% kans om 171 euro te verliezen

   Neem je deze weddenschap aan?
   ___ Ja
   ___ Nee

4. De weddenschap:
   50% kans om 160 euro te winnen
   50% kans om 96 euro te verliezen

   Neem je deze weddenschap aan?
   ___ Ja
5. De weddenschap:
   50% kans om 110 euro te winnen
   50% kans om 11 euro te verliezen
   Neem je deze weddenschap aan?
     __ Ja
     __ Nee

6. De weddenschap:
   50% kans om 170 euro te winnen
   50% kans om 119 euro te verliezen
   Neem je deze weddenschap aan?
     __ Ja
     __ Nee

7. De weddenschap:
   50% kans om 180 euro te winnen
   50% kans om 144 euro te verliezen
   Neem je deze weddenschap aan?
     __ Ja
     __ Nee

8. De weddenschap:
   50% kans om 120 euro te winnen
   50% kans om 24 euro te verliezen
   Neem je deze weddenschap aan?
     __ Ja
     __ Nee

9. De weddenschap:
   50% kans om 130 euro te winnen
   50% kans om 39 euro te verliezen
   Neem je deze weddenschap aan?
     __ Ja
     __ Nee

Geef hieronder aan in hoeverre je de vragen in het onderzoek begrepen hebt.

    __ Niet begrepen
    __ Een beetje begrepen
    __ helemaal begrepen
## Appendix C: Table of bets with loss-to-gain ratios

<table>
<thead>
<tr>
<th>Bet</th>
<th>Order presented</th>
<th>Loss vs. gain</th>
<th>Loss-to-gain ratio</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>€11 vs. €110</td>
<td>1:10</td>
</tr>
<tr>
<td>2</td>
<td>8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>€24 vs. €120</td>
<td>1:5 (2:10)</td>
</tr>
<tr>
<td>3</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>€39 vs. €130</td>
<td>3:10</td>
</tr>
<tr>
<td>4</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>€56 vs. €140</td>
<td>2:5 (4:10)</td>
</tr>
<tr>
<td>5</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>€75 vs. €150</td>
<td>1:2 (5:10)</td>
</tr>
<tr>
<td>6</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>€96 vs. €160</td>
<td>3:5 (6:10)</td>
</tr>
<tr>
<td>7</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>€119 vs. €170</td>
<td>7:10</td>
</tr>
<tr>
<td>8</td>
<td>7&lt;sup&gt;th&lt;/sup&gt;</td>
<td>€144 vs. €180</td>
<td>4:5 (8:10)</td>
</tr>
<tr>
<td>9</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>€171 vs. €190</td>
<td>9:10</td>
</tr>
</tbody>
</table>