(Not so) Lost in Translation: How Foreign Language Use Affects Decision-Making
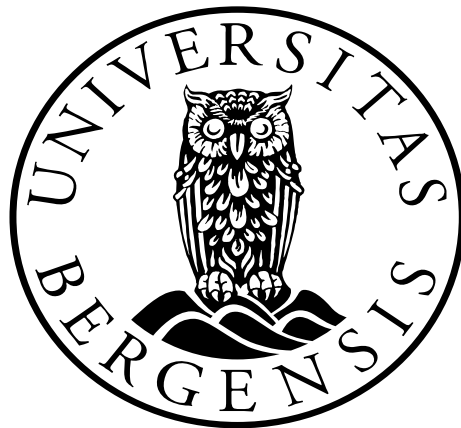
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Abstract

Using a foreign language in decision-making under uncertainty has been found to influence the choices people make. This *foreign language effect* has been studied for a very restricted selection of cognitive phenomena including framing effects. Therefore, my study aimed to extend the range of cognitive phenomena to the availability and the anchoring heuristic, but also replicate previous studies concerning framing for a new sample as a baseline for comparisons. The foreign language effect was assessed using a questionnaire which was randomly administered to Norwegian students (N=204) in either Norwegian or English. Framing was assessed using the Asian disease task, the availability heuristic was assessed using a probability estimation task, and anchoring was assessed using a frequency estimation task. The participants' responses in the two language conditions did not differ significantly, which indicates that the FLE did not emerge in the current study. Possible explanations are discussed.

Keywords: foreign language effect, decision-making, framing, availability, anchoring, affect

Sammendrag

Å bruke et fremmedspråk i beslutningstaking under usikkerhet har blitt vist å påvirke folks beslutninger. Denne *fremmedspråkeffekten* har blitt undersøkt for et svært begrenset utvalg av kognitive fenomen, inkludert rammeeffekter. Derfor er studiens formål å utvide omfanget av kognitive fenomen til tilgjengelighets- og ankerheuristikken, men også replisere tidligere studier angående rammeeffekten for et nytt utvalg som en basislinje for sammenlikninger. Fremmedspråkeffekten ble målt gjennom et spørreskjema som ble tilfeldig administrert til norske studenter (N=204) på enten norsk eller engelsk. Rammeeffekten ble målt med den asiatisk sykdom-oppgaven, tilgjengelighetsheuristikken ble mål med en sannsynlighetsestimeringsoppgave, og forankringsheuristikken ble målt med en frekvensestimeringsoppgave. Deltakernes svar i de to språkbetingelsene var ikke signifikant forskjellig fra hverandre, som indikerer at fremmedsspråkeffekten ikke oppstod i den aktuelle studien. Mulige forklaringer blir diskutert.

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International organizations, multicultural workplaces, travel and communication across borders have all become common as a result of globalization. They require people to navigate foreign-language contexts, where one has to use a language other than one's mother tongue, in order to communicate and correctly understand important information (Geipel, Hadjichristidis, & Surian, 2016; Hadjichristidis, Geipel, & Surian, 2017). Many international businesses for example, use a lingua franca which is foreign to part of their employees, in order to effectively communicate between both the multicultural workforce and foreign business partners (Vives, Aparici, & Costa, 2018; Volk, Kohler, & Pudelko, 2014).

The intuitive assumption in relation to foreign language use is that, aside from misunderstandings, it should be irrelevant for the choices people make. Studies have however found that the informational contents of a given situation are not the only factors to affect an individual's decisions. The language in which the information is presented appears to influence that judgement as well. More precisely, a *foreign language effect* (henceforth FLE) has been found to exist, which refers to the discovery that foreign language use changes people's decisions in moral dilemmas and risky situations (Bereby-Meyer et al., 2018; Costa, Foucart, Arnon, Aparici, & Apesteguia, 2014; Hadjichristidis, Geipel, & Savadori, 2015; Keysar, Hayakawa, & An, 2012). While a series of empirical findings indicate that foreign language use has beneficial effects on decision-making (Bereby-Meyer et al., 2018; Gao, Zika, Rogers, & Thierry, 2015; Keysar et al., 2012), others have pointed out that there are some detrimental consequences as well (Volk et al., 2014). In either case, the fact that the linguistic context one interacts within can influence the decisions one makes has implications for society as a whole, both at the individual and at the governmental level (Bereby-Meyer et al., 2018; Geipel, Hadjichristidis, & Surian, 2015a; Pavlenko, 2017). Deepening our understanding of the FLE and its boundaries is therefore essential. Hence, the aim of this study will be to replicate earlier findings for a new language and deepen our insight in the phenomenon's boundaries by

expanding the scope of tasks. More precisely I wish to investigate whether the FLE can be found in a Norwegian context for a classical *framing* task, as well as exploring two related cognitive heuristics: the *availability heuristic* and the *anchoring heuristic*.

In the following sections I will first review the theoretical framework and empirical findings concerning the FLE, framing, availability and anchoring, before summarizing the thesis' aims and hypotheses. In the main section the methods used for the study, as well as the results will be explained, followed by a thorough discussion on the findings, before ending with a brief conclusion.

Theoretical Framework

The FLE is a growing topic in current psychology, and it is usually interpreted within the context of the theoretical frameworks of the different phenomena the FLE has been found to influence. In most of the empirical contributions to the FLE research, a small subset of cognitive phenomena appear to be somewhat overrepresented, as most of the research to date focuses on framing effects on decision-making and moral judgements (Pavlenko, 2012, 2017). As a consequence, a lot of the theoretical groundwork on the effect is linked to judgements and decision-making (Pavlenko, 2012, 2017). A bigger part of the empirical contributions use established theories like the dual process theory to explain the effect (Cipolletti, McFarlane, & Weissglass, 2016; Costa, Vives, & Corey, 2017; Geipel et al., 2016; Hayakawa, Tannenbaum, Costa, Corey, & Keysar, 2017), and the traditional topic for these studies are heuristics and biases (Pavlenko, 2012, 2017). This constraint is one of the main motivations for exploring related, yet new cognitive phenomena in the context of the FLE.

In relation to this, the following section will focus on multilingualism, the FLE, as well as heuristics and biases. The aim of this section will be to thoroughly explain the study's

theoretical foundation and purpose, as well as highlighting the different factors which had to be considered for the subject pool, choice of tasks, general design and hypotheses.

Multilingualism

The psychological implications of multilingualism is still a fairly new research topic, though there are some empirical contributions that date back to the 1960s (Bialystok, Craik, & Luk, 2012). Ever since, the ability to speak more than one language has been shown to affect people's cognitions and behaviours in mostly beneficial ways (for a review, see Bialystok et al., 2012). The ongoing exploration of these effects through research faces an important challenge, however. The participant population is difficult to unify in one category of "multilingual", and as a consequence findings from one group of multilinguals can be difficult to generalize to other multilinguals (Bialystok et al., 2012). For example, the number of languages spoken and whether the individual has a special talent for learning languages might influence the results of the tests used in research, which in turn can make it difficult to pinpoint the exact underlying causes for the performance differences between monolinguals and multilingual peers (Bialystok et al., 2012). Moreover, Pavlenko (2012) has identified several factors which can differ from individual to individual, and which need to be considered when interpreting study results. For example, they can differ in relation to their age of acquisition, context of acquisition, their language dominance, as well as their language proficiency.

Age of acquisition indicates the age at which an individual started learning a new language, while *context of acquisition* refers to the environment or the circumstances under which this learning experience took place (Pavlenko, 2012). Depending on the age of acquisition of an individual he/she can be categorized as an *early* or *late* learner (Pavlenko, 2012). In most cases an early learner is defined as an individual with an acquisition age of 3 years and under (Wong & Ng, 2018), but there are instances where an early learner is defined as someone who learned the language before the age of 12 (Pavlenko, 2012). Frequently, the

age of acquisition is directly related to the context of acquisition. For example, if a child learns a second language at home from their parents, this usually happens earlier than learning the language in an obligatory class in 4th grade (Dylman & Champoux-Larsson, 2020; Hayakawa, Costa, Foucart, & Keysar, 2016; Pavlenko, 2012).

The context of acquisition plays an important role in how people's lexical vocabulary develops, and which experiences and emotions are being connected to specific phrases and words in a given language (Caldwell-Harris, 2014). Caldwell-Harris (2014) proposed that the context-dependent manner in which experiences are saved in our memory will lead to the language gaining an emotional resonance when it's frequently used in emotional context. In relation to both the age and the context of acquisition, Pavlenko (2012) distinguished between *second language (L2) learners* and *foreign language (FL) learners*. The distinction indicates whether a language was learned in the native environment where most of its users live, or outside of that environment, and has implications for the type of experiences and emotions that are naturally associated with the use of a given language.

Language dominance refers to the relative activation between the language, as well as the associated impression of fluency, lexical retrieval and syntactic processing for either language (Pavlenko, 2012). This can be differentiated from language *proficiency*, which mainly aims at the "overall level of language achievement" and consists of the vocabulary, pronunciation, grammar and other related abilities (Pavlenko, 2012, p. 407). Together, these two represent how well and how frequently a language is used in relation to other languages.

In sum it becomes clear that there are plenty of factors that can influence and characterize language use, which in turn can make it challenging to unify all multilinguals into one category (Bialystok et al., 2012; Wong & Ng, 2018). Therefore, it is vital to take all of these factors into consideration, and to aim to replicate findings in more than one language context and across different groups of multilinguals.

The Foreign Language Effect

Keysar et al. (2012) discovered that using a foreign language while solving Tversky and Kahneman's (1981) classical *Asian disease task* changed people's decision-making tendencies. The task first describes a recent outbreak of a new type of disease and presents two possible cures between which the decision-maker has to choose. One cure has a certain outcome of saving 200 of the 600 infected, while the remaining 400 will die. The other cure has a 1/3 chance of saving everybody and a 2/3 chance of saving nobody (Tversky & Kahneman, 1981). The cures and their outcomes though, are framed in two different ways. One highlights the lives saved by each cure, also called the gain frame, while the other highlights the lives lost, called the loss frame. What Tversky and Kahneman (1981) found in their original study was that most people chose the sure option in the gain frame, while their participants were much more inclined to choose the chance option in the loss frame. The scenario has since been re-worded to fit different contexts by for example increasing the number of infected individuals to 600,000, or by representing the chances in percentages (33.3%). The loss-gain asymmetry in the results has nevertheless stayed the same; people prefer the sure option when the frame focuses on the lives saved, while tending more toward the chance option when the frame emphasises the lives lost (Druckman & McDermott, 2008; Kühberger, 1998; Kühberger, Schulte-Mecklenbeck, & Perner, 1999).

Surprisingly, in their study Keysar et al. (2012) found that the loss-gain asymmetry, although still prevalent in the native language condition, disappeared in a foreign language context. More specifically, the participants using a foreign language did not show a clear preference for the sure option or the chance option for the gain and loss frames respectively. Rather their responses were almost evenly distributed between the two options for either frame. The effect was however not limited to the framing task, as their participants also accepted more high stakes bets in a gambling task while using a foreign language (Keysar et al., 2012).

The crucial findings indicating that language use can change people's choices has since been replicated for both framing tasks (Cipolletti et al., 2016; Langensee & Mårtensson, 2019), as well as other well-known psychological phenomena (Bowers & Pleydell-Pearce, 2011; Hadjichristidis et al., 2015; Hsu, Jacobs, & Conrad, 2015). A study by Costa, Foucart, Hayakawa, et al. (2014) for instance, explored whether the FLE could be generalized to moral dilemmas like the trolley/footbridge task. The task consists of two scenarios. The first is an impersonal one, in the sense that the action in question does not directly cause harm to someone. The other scenario in contrast, is personal in the sense that it leads to serious harm done onto a particular person if the decision-maker were to choose the action in question (Chan, Gu, Ng, & Tse, 2016). Similar to Keysar et al. (2012) the participants in Costa, Foucart, Hayakawa and collegues' (2014) study showed different response patterns for the different language conditions. In the impersonal trolley scenario, those who answered in their native language indicated that they would be willing to push a switch and divert an oncoming trolley, in order to save five people on a train track. By doing so, the train would be diverted to a different track, on which only one person would be struck and killed by the oncoming train. In the more personal footbridge scenario however, most of the participants refused to push an innocent bystander onto the tracks in order to save the others, even if the end-result remained the same. Five people would be saved, and one person would die. Similar to the Asian disease task, the response asymmetry between the two scenarios disappeared in the foreign language condition, indicating that the FLE leads to more utilitarian reasoning in moral dilemmas (Costa, Foucart, Hayakawa, et al., 2014). Utilitarian in this case refers to the participants tendency to choose options which favour the greater good, rather than the essential rights of an individual, which would be a deontological approach to the problem (Costa, Foucart, Hayakawa, et al., 2014). As a result, utilitarian reasoning leads the individual to favour the option which leads to

most people surviving, while the deontological reasoning leads them to favour the option in which they cause less harm directly onto someone else (Chan et al., 2016).

In the following sub-sections, I will first focus on different theoretical accounts of the FLE, with an emphasis on dual process theories, as well as the possible impact of cognitive resources, emotion, learned associations, and social and moral norms on the FLE. Following that will be a sub-section highlighting possible boundaries of the FLE, and finally a short summary of the current chapter.

Theoretical accounts. Since the discovery of the FLE, its underpinnings have been widely debated (Langensee & Mårtensson, 2019; Oganian, Korn, & Heekeren, 2016; Pavlenko, 2012, 2017). In a German study for instance, it has been argued that the added cognitive strain caused by a foreign language plays a vital role in mediating the FLE (Oganian et al., 2016). Others have argued that the FLE is caused by a change in the emotional saliency of the stimuli when they are processed in a foreign language (Bereby-Meyer et al., 2018; Caldwell-Harris, 2014; Caldwell-Harris & Ayçiçeği-Dinn, 2009). In most instances however, these arguments lead back to the theoretical framework of dual process theories (henceforth DPT), which explain the FLE by a shift in processing. DPT, while differing in their specifics, conceptualize human cognition as a duality consisting of two types of processing. Type 1 is automatic, emotional and intuitive, while Type 2 is deliberate, logical and rational as well as more resource demanding than Type 1 (Evans & Stanovich, 2013).

The impact of cognitive resources. Based on empirical findings that indicate that humans have a limited amount of cognitive resources available (Hadjichristidis et al., 2017; Oberauer, Farrell, Jarrold, & Lewandowsky, 2016; Sweller, 1988), the DPT posit that the more effortful Type 2 processing is only used when the individual has the capacity and motivation to use it (Alter, Oppenheimer, Epley, & Eyre, 2007). When stimuli are easily processed or cognitive load is high, Type 1 processing is active. While this type of processing is used, and

especially when the cognitive load is high, mental shortcuts like heuristics are used to hinder that more strain is put on the already exhausted cognitive reserves, and to ensure that enough resources are preserved for situations where they are needed (Gigerenzer & Goldstein, 1996; Polonioli, 2018; Volk et al., 2014).

An important cue for Type 2 processing is the ease with which stimuli can be processed. A study by Alter et al. (2007) for instance, found that by making a problem harder to read, more systematic processing was prompted, and consequently these participants answered more correctly than the ones who read the easy-to-process formatted text. The authors argue that the ease with which information can be processed serves as a metacognitive cue for which type of processing is needed to respond appropriately. By making the problems harder to read, Type 2 processing is triggered, and errors that could have resulted from Type 1 processing can be corrected or prevented (Alter et al., 2007). In relation to the FLE it is assumed that using a foreign language, which is more difficult to process than a native language, automatically cues Type 2 processing and consequently more utilitarian and rational reasoning (Keysar et al., 2012; Volk et al., 2014). It is important to highlight though, that while Type 1 processing can lead to incorrect responses that need correction, Type 2 processing is not always needed or appropriate. Easy problems can be solved by depending on automatic and intuitive Type 1 processes, and the use of heuristics can be both frugal and effective (Alter et al., 2007; Polonioli, 2018; Tversky & Kahneman, 1974).

The impact of emotion. Slovic, Finucane, Peters and MacGregor (2007) for instance have pointed out that using readily available cues can be more efficient and practical than carefully analysing all the pros and cons of the different options available. A good example is the way we use affect as a cue for appropriate decision-making when we make risky choices or when we have to make decisions under uncertainty (Bechara, Damasio, Damasio, & Lee, 1999; Damasio, Tranel, & Damasio, 1990; Preston, Buchanan, Stansfield, & Bechara, 2007).

Furthermore, in relation to moral decision-making, as is the case for the trolley/footbridge task, affect might give an expedient cue on which option is the most acceptable one according to social and moral norms (Geipel et al., 2015a; Keysar et al., 2012). Some DPT even focus on how moral dilemmas are processed and solved through Type 1 and Type 2 processing (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001). These DPT of moral judgements explain the differing responses by how emotionally salient the scenarios are. According to this approach, emotionally salient actions like pushing a person in front of a train, as in the footbridge dilemma, will trigger Type 1 processing, and thereby a deontological response. Actions which are less emotionally salient however, like pushing a button or pulling a lever as in the trolley scenario, will trigger Type 2 processing, which then leads to a more utilitarian response (Geipel, Hadjichristidis, & Surian, 2015b).

Seen from the perspective of these moral DPT, the different response patterns in FLE studies on framing are explained by a change in the emotional saliency. More specifically, it has been proposed that since foreign language use appears to affect both risk-taking behaviour as well the tendency for people to act in accordance with social norms, that the FLE might be rooted in a change in the emotional reactivity to different stimuli (Keysar et al., 2012; Pavlenko, 2012).

The impact of learned associations. Keysar et al. (2012) reasoned that due to the fact that foreign languages usually are learned in a different context than an individual's native language, the two might differ in the degree with which they trigger emotional reactions. Said differently, they argued that a foreign language is usually learned in a less emotionally charged context, like school. A native language on the other hand is usually learned in a more naturalistic context, and emotional stimuli, like praise and reprimands, are both encountered and processed in that language (Harris, Ayçiçeği, & Gleason, 2003). This will in turn lead to

stronger associations between the words for the stimuli and the emotional reactions they elicit (Harris et al., 2003; Pavlenko, 2012, 2017). This approach has found support in several studies. One study for instance, has showed that emotionally charged words elicited greater reactions when they were presented in a native language, than when they were presented in a foreign language (Harris et al., 2003). Furthermore, a study on a similar topic showed that well-known emotion-laden text passages from Harry Potter evoked significantly weaker reactions in brain areas associated with emotion when they were read in a foreign language (Hsu et al., 2015). Using a slightly different approach, Cavar and Tytus (2018) found that greater language proficiency and immersion in the culture of a given language, is capable of diminishing the difference between choices made in a native language and choices made in a foreign language. Their results suggest that immersion in the foreign language context, might lead to a reduced FLE, meaning that the emotional associations in a language can be learned and strengthened given the opportunity. Cavar and Tytus (2018) point out however, that other factors like embracement of moral rules, thinking style and working memory might play a role as well.

In sum, these findings strongly indicate that the FLE might be driven by an attenuation of emotional reactions to stimuli, when they are processed in a foreign language. Seen from the perspective of the DPT, this attenuation would impact both availability and saliency of cues that can trigger Type 1 processing during decision-making. As a result, the lack of emotional cues would allow an individual to distance him-/herself from the problem at hand, and to use a more deliberate, impersonal and utilitarian approach to emotional decision-making scenarios which otherwise would elicit a deontological approach (Cipolletti et al., 2016). In agreement with this line of reasoning, it has been widely accepted that emotion plays a role in the FLE (Cipolletti et al., 2016; Pavlenko, 2012). Nevertheless, an ongoing debate still exist about the degree with which emotion can influence the emergence of the FLE. Geipel, Hadjichristidis and Surian (2015b) for instance, have argued that the attenuation of emotions, although playing

an important role, cannot fully explain the shift from deontological to utilitarian reasoning with regards to moral dilemmas.

The impact of social and moral norms. In one of their studies Geipel et al. (2015b) explored the role of emotion in the FLE by asking their participants to indicate how emotionally distressed they felt after solving the personal footbridge dilemma and the impersonal trolley dilemma in either their native or a foreign language. While the participants reported an attenuated emotional reaction to both dilemmas in the foreign language condition, only the response-tendency for the personal moral dilemma was affected. This finding lead Geipel et al. (2015b) to conclude that although the attenuation of emotion might play a role in mediating the FLE, it cannot explain the effect alone. Rather, they argue that the FLE arises from a difference in accessibility of social norms, which then leads to a muted emotional reaction in a foreign language context. More precisely, social norms are assumed to be more mentally accessible while talking in a native language, which in effect can elicit stronger emotional reactions when violated (Geipel et al., 2015b, 2015a). This means that the attenuation of emotions is a result of the differences in accessibility for social norms rather than being the direct cause of the FLE.

The proposition was tested in a related study where participants were asked to judge the moral wrongness of several private actions, which were depicted as harmless in terms of physical harm. For example, participants read a short text describing a brother and a sister having safe and consensual intercourse, or a pet owner deciding to eat his deceased dog (Geipel et al., 2015a). While these actions can be judged to be morally wrong according to moral norms, these do not include the type of harm that other moral dilemmas use, like death in the trolley dilemma for instance (Geipel et al., 2015b, 2015a).

In order to test whether the FLE results in a shift from Type 1 to Type 2 processing, which might explain the change in response-tendencies on moral reasoning tasks, the results

of the moral wrongness task were subsequently compared to a classical logical reasoning task called the Moses illusion. The task asks the reader to indicate how many animals Moses took in the ark, to which the correct answer is "can't say" or "none", as it was Noah not Moses who did so (Geipel et al., 2015a). If the FLE arises from a shift in processing, they reasoned, their participants would be able to solve the Moses task, as well as judging the immoral actions less harshly in the foreign language condition. In line with their proposition, the results showed that their participants rated moral transgression to be less wrong when they were judged in a foreign language, while they still fell prey to the Moses illusion (Geipel et al., 2015a). Based on their findings, Geipel et al. (2015a, 2015b) argued that people do not become more rational in their reasoning. Rather, it appears that foreign language use results in a reduced access to moral and social norms, and muted intuitions in general to guide decision-making.

This proposition of reduced access to norms however, has been challenged by Bereby-Meyer et al. (2018), who found indications that foreign language use leads to less dishonest behaviour, meaning their participants still relied on social and moral norms. In their study participants were seated by themselves in a room and were told that they would be paid according to the outcome of the roll of a dice. All participants were kept under the impression that the true outcome of the roll was only known to them, which gave them the option to lie and thereby inflate their profits without negative consequences. To their surprise, Bereby-Meyer et al. (2018) found that the individuals who completed the task in a foreign language inflated the amount significantly less than the participants who had completed the task in their native language. The findings contradict the assumption that the accessibility of social norms regulates the emergence of the FLE. If it were the fact that social norms become less accessible when a foreign language is used, it should be expected that the participants would lie more in the foreign language condition, rather than less. The authors explain their findings by proposing that the foreign language use triggers Type 2 processing, which then overrides the automatic

tendency of self-serving dishonesty, meaning the temptation to lie for personal gains (Bereby-Meyer et al., 2018).

A multitude of factors. In sum, some have focused on how foreign language use can alter the accessibility to social and moral norms on which we depend when making moral decisions. Most have nonetheless relied on the DPT, in some way or other, in order to explain how the FLE is caused. More specifically, it has been proposed that foreign language use automatically triggers Type 2 processing, due to both a dampened emotional reaction to stimuli, as well as an added cognitive load. This in turn leads to changes in response-tendencies and moral reasoning (Costa, Foucart, Hayakawa, et al., 2014; Hadjichristidis et al., 2015; Keysar et al., 2012). In short, the diversity of empirical approaches discussed above, suggest that the FLE and its underlying mechanisms are tremendously complex and affected by a multitude of context dependent factors. This proposition is also supported by the few studies which have explored the effects boundaries.

Boundaries. A study by Oganian et al. (2016), which originally aimed to investigate whether differing levels of foreign language proficiency would affect the impact of the FLE on different framing and moral decision tasks, found that their participants' responses were mostly affected by an unexpected language switch rather than the foreign language use per se. Their results suggested that the participants' responses were affected regardless of the direction of the switch, meaning a switch from native to foreign had the same effect as a switch the other way around. Based on their discovery, the authors questioned how much of the FLE was actually caused by the foreignness of a language, rather than the added cognitive load of having to switch between two known languages (Oganian et al., 2016).

The proposition of a switch-effect has since been tested in a Swedish study by Langensee and Mårtensson (2019), who failed to find an effect of language switching on decision-making. Instead, they discovered that the FLE might be attenuated by the individual's

language proficiency. Their participants were approached in either Swedish or English and asked to complete several decision-making tasks (for example the Asian disease task). In order to test whether an unexpected language switch would affect the participants' responses, they changed the language used to answer the tasks for half of their participants once the instructions had been given. This means that the participants received instructions in one of the two languages (e.g. Swedish or English), and then had to complete the tasks in either the same language as the instructions, or they had to switch to the other language.

In contrast to Oganian et al.'s (2016) study, Langensee and Mårtensson's (2019) findings revealed that language switching failed to predict the participants' choices, while the language they received the instructions in had a significant effect on their responses. In an attempt to explain the difference in findings, the authors argued that language switching might not have the same cognitive cost for their Swedish participants, as it had for the German participants from Oganian et al.'s (2016) study. They underline this argument by pointing out that Sweden is ranked higher on the EF English Proficiency Index than Germany, and that it thereby can be inferred that the mental cost of switching languages was greater for the German participants than for the Swedish participants (Langensee & Mårtensson, 2019).

The fact that language proficiency might act as a boundary for the FLE, makes other possible boundaries worth investigating. While studies exploring these still are scarce as of yet, there are a few who have explicitly aimed at investigating the effect's extent. One such study was conducted by Vives et al. (2018), as it aimed to explore whether the FLE would extend to biases and heuristics which are rooted in more emotionally neutral mechanisms, as opposed to the moral framing effects for instance. More specifically, the study aimed to test whether the use of a foreign language would reduce the outcome bias and the representative heuristic, which consists of the conjunction and base-rate neglect fallacies.

Vives et al. (2018) conducted the study in two parts, one focusing on testing the outcome bias and the representative heuristic in a neutral context, and the other focusing on whether the use of emotionally imbued materials would result in a FLE. This was done in order to test whether the mere presence of emotionally charged items would result in a FLE, or if the effect is restricted to biases and heuristics rooted in emotional reactions like risk-aversion. In the first experiment, participants were presented with two scenarios with the same introductions, but differing outcomes, one positive, the other negative. What Vives et al. (2018) found was that the tendency to judge actions more favourably when the outcome is positive (e.g. outcome bias), emerged in both the native language condition and the foreign language condition. Similarly, in the second experiment, both the conjunction and the base-rate neglect fallacies emerged, irrespective of the language the participants had used while completing the tasks (Vives et al., 2018).

In the second part of the study, the same type of tasks was used as in the first part, but with added emotional contents focusing on topics like fatal outcomes and disease. However, despite the added emotional valence, the FLE did not emerge for either of the tasks, suggesting that the mere presence of emotional content is not sufficient to elicit the effect. Surprisingly, the participants reported equally as strong emotional reactions for both language conditions throughout the study. The authors argued that these findings indicate that emotion and the FLE might not be related at all, or at least not as strongly as has been proposed by others (Vives et al., 2018).

In sum, the empirical findings indicate that the FLE might be restricted to biases and heuristics which are directly caused by emotional reactions, rather than the contents' emotional resonance. This gives support to the theoretical approach which explains the FLE through a diminished emotional reactivity, rather than an indirect effect on emotions through mental accessibility of moral and social norms. Vives et al. (2018) point out however, that their study

was the first to look at emotionally neutral heuristics and biases, and that more studies are needed to test whether their findings can be replicated.

      Summary. The essence of the thorough review of empirical literature on the FLE is that the effect appears to be influenced by several factors. While most approaches trying to explain and understand the FLE have relied on the DPT, other influential factors like cognitive resources, emotional saliency, learned associations and norms have been considered and occasionally linked up to the DPT. In contrast to the many studies exploring the possible influential factors, there are only a handful to date which have explored the boundaries of the FLE, like unexpected language switching, language proficiency and using heuristics with emotionally neutral mechanisms. This shortcoming in research exploring the FLE's boundaries, as well as the limited number of studies investigating decision-making effects other than framing, calls for a study that aims to expands its scope to other phenomena, like heuristics and biases.

Heuristics and Biases

      Heuristics are efficient rules of thumb, or cognitive shortcuts, that humans can rely on when they need to process and act on information that may be too complex or incomplete to result in an appropriate response (De Martino, Kumaran, Seymour, & Dolan, 2006). While heurisitcs can result in suitiable actions, they can also give rise to systematic errors in a person's responding, known as a cognitive bias (Tversky & Kahneman, 1974).

      Of all possible heuristics and biases, framing, which is one of the most frequently researched heuristics in relation to the FLE (Pavlenko, 2012, 2017; Vives et al., 2018), was chosen in order to set a baseline for comparisons to previous studies, as well as the results for the heuristics which have yet to be tested in a foreign language context. In a similar fashion, the availability and anchoring heuristics were chosen because they are well-researched outside of the FLE context, as well as having emotionally neutral mechanisms, the latter of which has

been highlighted by Vives et al. (2018) as a vital aspect for determening the FLE's exact underpinnings. In other words, exploring these three heuristics in relation to the FLE will give valuable insight on the effect's scope, as well as add to the growing literature on possible influential factors for the FLE.

Framing. Like the well-known conundrum about whether the glass is half-full or half-empty, decision problems can be framed differently depending on which aspects of a given situation are highlighted (Kühberger, 1998). A study by Tversky and Kahneman (1981) showed that different frames or rather the way an individual conceptualizes "the acts, outcomes and contingencies associated with a specific choice" (p.453) can affect people's decisions, especially those made under uncertainty. In the Asian disease problem for instance, the way the task is framed results in a loss-gain asymmetry, depending on which aspects of the options are highlighted (Tversky & Kahneman, 1981).

Framing effects have been found not only in relation to moral decision scenarios and decision-making under uncertainty. A study by De Martino, Kumaran, Seymour and Dolan (2006) found that similar to the Asian disease task, changing the frames between gain and loss has a similar effect on choices in gambling tasks. In their experiment participants were first presented with a text that told them they would be given £50. This was followed by two options, one of which was a certain outcome while the other was a gamble. For the sure option, and depending on the frame, they were either told that they would keep £20 or that they would lose £30. In the chance option however, they were presented with a pie chart that showed the odds for them to either keep all the money or lose everything. Similar to the original Asian disease task, the participants were more inclined to choose the sure option in the gain frame, yet preferred the chance option in the loss frame (De Martino et al., 2006).

Framing-like effects on non-moral decision scenarios have also been found for economic decision-making, for example on tasks like the discount problem or the money lost

problem (Bonini & Rumiati, 1996; Tversky & Kahneman, 1981). In the first problem a person is about to buy a jacket and a calculator and is made aware of the fact that the calculator is currently at a discount in another store a 20 minutes' drive away. Depending on the wording of the problem, the jacket either costs 125$ while the calculator costs 15$, or it's the other way around. In either version of the scenario, the discount is always 5$ and the end sum prior to the discount is 140$. The decision the responder must make is whether they would drive to the other store for the discount. While the amount of money the individual spends does not change, it appears that changing the calculator to be the pricier item results in a declined willingness to drive 20 minutes for a 5$ discount. Clearly saving 5$ on a 15$ item, which means 1/3 of the price, is more attractive than saving 5$ on a 125$ item (Bonini & Rumiati, 1996; Tversky & Kahneman, 1981).

Similarly, in the second problem people indicate that they would be willing to buy a ticket for 10$ after realising that they had lost a 10$ bill, while being less willing to buy another ticket for 10$ after losing a ticket they had bought earlier. In both versions the total amount of money used is 20$, but the frame appears to change how people perceive the expenses. In the first version the total expenses of seeing the play the ticket was for remained 10$, while it increased from 10$ to 20$ in the second version (Tversky & Kahneman, 1981).

Availability heuristic. The availability heuristic refers to the cognitive shortcut where frequency and probability judgements are based on how easily or how difficult related or relevant instances come to mind, meaning the cognitive availability of a given event (Tversky & Kahneman, 1973). The availability of something is influenced by several factors, like the frequency of encounters, exposure to similar events, or the distinctiveness of the memory of an event. Like other heuristics, the availability heuristic can lead to appropriate estimates. Frequent encounters for instance can reflect a pertinent cue for the actual frequency of an event,

but for the most part the composition of factors influencing availability of relevant instances results in biased responding (Tversky & Kahneman, 1973).

Heuristics like availability are used in several different contexts. For example, it has been shown to affect probability estimates of future events (MacLeod & Campbell, 1992), frequency estimates for national populations (Brown, Cui, & Gordon, 2002; Brown & Siegler, 1992), frequency estimates of gender for famous names (McKelvie, 1995, 1997), as well as probability and frequency estimates for causes of death (Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978).

A study by Brown et al. (2002) exemplifies how people's estimates are influenced by the cognitive availability of relevant memories, and how these can affect the accuracy of their estimates. In their study, Brown et al. (2002) asked their participants to first rate their knowledge on over a 100 countries and subsequently estimate the countries' population. Their findings showed that the countries the participants knew most about (e.g. Japan or USA), were rated to have bigger populations than countries the participants indicated to know less about (e.g. Burkina Faso or Paraguay). Importantly though, is that the accuracy of the reported estimates was also influenced by continent-specific common knowledge about countries. Chinese participants were better at estimating the population of east Asian countries that resembled China, while Canadian participants were better at estimating the population of western countries that resembled Canada (Brown et al., 2002). The findings highlight the fact that the availability heuristic is capable of producing appropriate responses, even when it only did so in few of the estimates given by the participants in Brown et al.'s (2002) study.

Additionally, estimates were influenced by priming. This was tested in a related experiment where participants first were asked to rank 52 countries based on how much they knew about them, and subsequently were asked to estimate the population of both the 52 primed countries and 52 new countries. The participants' estimates displayed distinct

availability bias, indicated by higher population estimates for the primed countries compared to the non-primed countries, which were not as prominent in the participants' memories as the primed countries were (Brown et al., 2002).

The results suggest that the influence of availability on individuals' estimates are characterized by two tendencies. First is that relevant domain-knowledge will be used to perform estimates when it is accessible, and secondly is that items recent in memory appear to be estimated higher in both probability and frequency. In relation to that Brown et al. (2002) point out that availability can be used as a cue for estimates when domain-knowledge is sparse or insufficient, for example when estimating the population of an unknown country.

As demonstrated by Brown et al. (2002), availability of a given relevant instance can be influenced by priming. There are however several other cues that can alter the accessibility of relevant memories, for example by increasing the events distinctiveness. Two such cues are the emotional impact of events and the emotional cues an individual is exposed to during the appraisal (Sheldon & Donahue, 2017; Tyng, Amin, Saad, & Malik, 2017). Emotionally impactful events, like terror attacks, accidents or the death of a loved one are distinctive memories which often are remembered vividly (Greenberg, 2015). These memories are perceived to be more complete and detailed than other memories, even when they usually fade on the same timeline as normal memories do (Talarico & Rubin, 2003). As a consequence, these types of events appear to be more available in an individual's memory than other instances which might be more frequent, yet less distinctive.

A study by Lichtenstein et al. (1978) combined the effects of frequent encounters and exposure to events with the emotional impact by asking their participants to estimate both the probability and frequency of several lethal events. In the first experiment of their study the participants were presented with 106 different pairings of 41 lethal events. For each pair, one cause of death was highly frequent yet underrepresented in the media (for example a stroke);

while the other was overrepresented by the media yet much less frequent in real life (for example a tornado). In other words, the participants had a higher chance to be frequently exposed to the low-frequency causes, and a lower chance to encounter the high-frequency causes through the media. The objective of the task was to indicate which of the two was the more likely cause of death within the next year for a randomly chosen person in their country. Additionally, the participants were asked to estimate how many times more likely the chosen cause of death was compared to the other one.

Furthermore, in their third experiment participants were first given the mean frequency of deaths per year for one cause of death and were thereafter asked to estimate the mean of deaths per year for the remaining 40 possible causes. What Lichtenstein et al. (1978) found was that the lethal events with low frequencies (e.g. tornadoes, murder) were overestimated by their participants both with respect to their likelihood and their frequency, while the more likely causes (e.g. breast cancer, cancer of the digestive system) were underestimated.

In order to understand the mechanisms underlying these biases, Lichtenstein et al. (1978) designed a new experiment in which the participants had to rate their personal experiences with different causes of death, as well as how often they had previously heard about them in the media as either a cause of death or a cause of suffering. The results mirrored their earlier findings, as the participants reported that rare and emotionally impactful events (e.g. extremely violent or many deaths at once) were more frequently encountered through the media than the comparably more common causes of death (Lichtenstein et al., 1978).

Holistically, the study results indicated that availability can affect both probability and frequency estimates. One factor which Lichtenstein et al. (1978) did not investigate though, was the impact of the mean frequency example the participants were presented with prior to giving their estimates. It is possible that participants based their estimates on the example, by using a cognitive shortcut called the anchoring heuristic.

Anchoring heuristic. The anchoring heuristic is usually defined as the tendency to use previously encountered values as the starting point for numeric judgements and a subsequent up- or downwards adjustment from that initial value (Mussweiler & Strack, 2001; Tversky & Kahneman, 1974). The anchoring bias emerges when this adjustment is insufficient, meaning that different anchors for the judgement on the same quantity would lead to different estimates (Tversky & Kahneman, 1974).

For example, Tversky and Kahneman (1974) found that when the product of a math equation is estimated, the order in which the numbers were presented resulted in significantly different estimates. Participants that estimated the product of 8x7x6x5x4x3x2x1 judged the product to be significantly higher than participants that were asked to estimate the product of 1x2x3x4x5x6x7x8 (Tversky & Kahneman, 1974).

In a different experiment, participants first watched a wheel of fortune being spun and subsequently were asked to indicate whether the percentage of African countries in the United Nations was higher or lower than the number they were presented with (e.g. 10 or 65). When the participants were asked to estimate the exact percentage following that initial judgement, their estimates appeared to be clearly anchored to the original number from the wheel of fortune (Tversky & Kahneman, 1974). Interestingly, those who had judged the percentage to be higher than the low anchor (e.g. 10), still had a lower estimate than the participants who had judged the percentage to be lower than the high anchor (e.g. 65) (Tversky & Kahneman, 1974).

The results from these experiments have since been replicated and generalized to other situations like estimating mean temperatures (Mussweiler & Strack, 1999), as well as for more complex assessments in for example medical decision-making (Cunnington, Turnbull, Regehr, Marriott, & Norman, 1997; Friedlander & Stockman, 1983).

A striking characteristic of the anchoring heuristic is that its effects appear to be incredibly robust. In a study by Mussweiler (2001) it was discovered that the effects can pertain

even 1 week after the initial exposure to the anchor, and another study found that even explicitly telling participants about the potential effects of the anchor does not dissipate its influence on the estimate (Wilson, Houston, Etling, & Brekke, 1996).

Summary. In sum, these studies indicate that heuristics influence peoples' response tendencies, and that there are a number of factors which can impact their effect. In relation to framing for instance, previous studies suggest that people have a general tendency to be risk-seeking in the face of loss and thus more willing to take chances, while they tend to be more risk averse in relation to gains (De Martino et al., 2006; Tversky & Kahneman, 1981). In terms of the availability heuristc it was indicated that factors like distinctiveness and experience with similar events can affect peoples' frequency and probability estimates of other instances. Furthermore, in case of the anchoring heuristic, exposure to any number prior to a numeral estimate appears to influence how high or low of an estimate is given.

The assumed emotionally neutral mechanisms resulting in the availability and anchoring heuristic, make the two interesting candidates for a FLE study. Especially the availability heuristic is intriguing in this context, as it is easily tested in an emotionally imbued context. This opens for further exploration of whether the mere presence of emotional content can evoke an FLE, as Vives et al. (2018) aimed to do in their study. While the anchoring heuristic can be tested in a similar context, it is its robustness that makes anchoring an interesting phenomenon to study in context of the FLE, especially since the empirical findings for anchoring indicate that the bias would pertain (Mussweiler, 2001), while findings on the FLE predict the opposite (Pavlenko, 2012, 2017).

Aims of the current Study

The empirical findings and theoretical background presented above suggest that using a foreign language influences people's decisions and judgements. More specifically, it has been

argued that foreign language use affects the mechanisms used to process information and to produce an appropriate answer, which in turn influences an individual's use of heuristics. The FLE is however a rather new discovery (Pavlenko, 2012), which makes continued exploration of the effect's scope and boundaries an important research need. As highlighted prior, there are only a handful of studies who have explored the FLE beyond framing effects. There is a need for further exploration of the FLE in relation to emotionally neutral heuristics and biases, as well as contexts in which emotional content is added in order to deepen our understanding of the effect's underlying mechanisms and boundaries. Two heuristics with presumed neutral mechanisms, which are easily combined with emotional content, are the availability heuristic and the anchoring heuristic. These type of heuristics have been proposed earlier (Vives et al., 2018), as they are both robust and common heuristics, which makes them an interesting topic of investigation (Brown & Siegler, 1992; Mussweiler & Strack, 2001). Studying these two heuristics, in a new context could shine a new light on these phenomena, as well as deepening our understanding of the FLE.

Moreover, in order to determine the generalizability of the effect to other languages and cultures, it would be valuable to replicate earlier findings in new countries. Therefore, conducting the study with a Norwegian sample, may allow for exploration of the generalizability to a new language, as well as replicating studies which have managed to produce the FLE in a Scandinavian context (Langensee & Mårtensson, 2019).

In sum, this study aims to explore the generalizability of the FLE to a new subject context and to decision-making heuristics that are related to framing. Consequently, this study aims to further our understanding of the underlying mechanisms of the FLE, and elucidating the relationship between cognition, multilingualism and affect.

Research Questions and Hypotheses

Based on the research needs and the aims for this study, the research question for this thesis was *whether the foreign language effect can be generalized to other related judgement and decision-making effects such as the availability and the anchoring heuristic.*

As neither availability, nor anchoring have been, to the best of my knowledge, studied in a FLE context before, participants completed a framing task in addition to the availability task and the anchoring task, in order to replicate earlier findings. This allowed me to interpret and discuss the results in a more comprehensive perspective. For the framing task the classical Asian disease problem was used, as explained above, and therefore my first hypothesis (H1) was that *when participants complete the Asian disease task in a foreign language, the loss-gain asymmetry in their responses is reduced when compared to the responses given in a native language.*

In order to study the availability heuristic in a FLE context, a version of the lethal events task by Lichtenstein et al. (1978) was used where participants were asked to estimate the likelihood of various causes of death in Norway. More precisely, they had to choose which of two in a pair of lethal events is the more likely one. The task was chosen as its contents revolve around similar topics (e.g. death and disease) as in the Asian disease task. For this task my first hypothesis (H2.1) posits that *when asked to choose the likelier cause of death out of two possible lethal events, participants will choose the more cognitively available event more often in the native language condition than in the foreign language condition.* Furthermore, I expected that (H2.2) *when asked to estimate the likelihood of the chosen cause, participants in the native language condition will estimate the likelihood of the more available events to be higher than participants in the foreign language condition will.* The presence of a tendency to judge the more available cause as the more likely one for the native language condition,

compared to the absence of this tendency for the foreign language condition, would indicate a foreign language effect as previously defined.

The anchoring task first presented the participants with a random example of mean deaths for an unrelated lethal event, and subsequently asked the participants to estimate the frequency of deaths for the lethal event they have chosen to be the likelier one. Based on this task my hypothesis (H3) was that *when asked to estimate the frequency of a chosen lethal event, the participants' responses will be closer to the anchor in the native language condition than in the foreign language condition.*

Methods

The study explored whether foreign language use would affect the outcome on several decision-making, probability estimate and frequency estimate tasks. The data collection took place during the fall semester in 2019.

Research Design

This study was carried out as a randomized experiment with a 2 (Language: Norwegian vs English) x 2 (Frame: Loss vs Gain) x 2 (Availability: Version 1 vs Version 2) x 2 (Anchor: High vs Low) between-subjects design, which resulted in 16 different conditions (see Table 1). The independent variable was the language participants used during the experiment, while the dependent variables were the outcome on the framing, availability and anchoring tasks. The languages used were Norwegian as the native language, and English as the foreign language. The experiment was carried out in a pen and paper format in form of a questionnaire.

Participants

204 university students completed the experiment, of which 18 were excluded from all analyses based on their native language being something other than Norwegian, or English not being a foreign language to them (e.g. reporting it to be the only or one of their native

Table 1. Summary condition combinations for each language condition

Condition	Language Condition		
1	High Anchor	Gain Frame	Version 1
2	High Anchor	Gain Frame	Version 2
3	High Anchor	Loss Frame	Version 1
4	High Anchor	Loss Frame	Version 2
5	Low Anchor	Gain Frame	Version 1
6	Low Anchor	Gain Frame	Version 2
7	Low Anchor	Loss Frame	Version 1
8	Low Anchor	Loss Frame	Version 2

Note. Language condition refers to either the Norwegian condition or the English condition. Condition refers to the 8 different counterbalanced combinations of the variables used for each language condition.

languages). After the exclusion 186 participants remained, aged 18 to 60 (M = 22.33, SD = 4.47), of which 129 were female, 54 were male, 1 indicated another gender, and 2 failed to report their gender. Participants were recruited from several UiB faculties, except the Faculty of Psychology (i.e. the faculties of Humanities, of Law, of Social Sciences, of Mathematics and Natural Sciences, and of Medicine). Psychology students were intentionally excluded from the recruitment process in order to prevent prior knowledge on heuristics and biases or familiarity with the tasks used to influence the study's results.

All participants spoke two or more languages, started learning English around the age of 6, and reported a mean English proficiency of 4.15 and a mean Norwegian proficiency of 4.86. The language proficiency in English and Norwegian respectively, was the same for participants in both conditions. Out of the 186 included participants 150 reported school as their primary context of acquisition, while 33 reported either their home or the media, and three reported to have learned English while living abroad. Additionally, 52 participants reported more than one context of acquisition, with at school and at home being the most common pairing of contexts.

Participation was anonymous and voluntary, and every participant had the chance to win one of 68 gift cards for a local café worth 75 kroner.

Materials

The questionnaire used was divided in four parts in the following fixed order, one availability and one anchoring task (see Appendix A for examples) based on the study by Lichtenstein et al. (1978), one framing task (see Appendix B) based on the classical study by Keysar et al. (2012), and a number of follow-up questions about the participants (see Appendix C). The availability and anchoring tasks were combined and consisted of five sets of 3 subtasks (two availability, one anchoring subtask, see below for details). The questionnaire was administered to eight participants as part of a pilot study and several changes were made subsequently based on their feedback in order to increase the understandability of the content. The revised version was administered to two new participants in a second pilot, who deemed the questionnaire satisfactory in terms of understandability and format.

The framing tasks consisted of the classical Asian disease task, which was explained above. Both the loss frame and the gain frame were used, though each participant was only exposed to one of them. The availability task consisted of five pairs of causes of death, where one cause was highly available yet less frequent, while the other was less available yet highly frequent (see Table 2). This information was however, not known to the participants, and so, the objective of the task was to indicate which of the two causes one believed to be the more likely cause of death of a randomly chosen person in Norway in the next year. The causes used were selected based on the study done by Lichtenstein et al. (1978), and on whether there was available data in the death report database by the Folkehelseinstituttet (http://statistikkbank.fhi.no/dar/). Frequency was operationalized as mean deaths per year between the years of 2013 and 2017 (for details, see Appendix D). Availability was operationalized as media coverage the last seven years (for details, see Appendix E), based on

an archive analysis carried out with the media archive Retriever (https://www.retriever.no/).
The time spans used (e.g. 2013-2019 and 2013-2017) were based on restrictions in what data
was openly available on Retriever and by Folkehelseinstituttet, as well as the length of the time
spans earlier used by Lichtenstein et al. (1978).

The anchor task was part of the lethal events task, where participants were asked to
estimate how many people die every year of the cause of death, they had previously chosen to
be the likelier one. The anchor was introduced as a random and unrelated cause of death, which
was supposed to serve as an example for the first set of subtasks. For the high anchor condition
dementia was chosen (e.g. 2434 deaths per year on average), while AIDS was chosen for the
low anchor condition (e.g. 8 deaths per year on average).

Table 2. Versions of the 5 pairs of causes of death.

Version 1		Version 2	
More Available	Less Available	More Available	Less Available
Murder	Influenza	Influenza	Cardio-vascular disease
Drowning	Diabetes	Murder	Diabetes
Traffic accident	Lung cancer	Suicide	Lung cancer
Suicide	Pneumonia	Traffic accident	Pneumonia
Breast cancer	Cardio-vascular disease	Drowning	Breast Cancer

Note. More available causes of death were more frequently represented in the media yet caused less deaths on average per year than the less available causes of death. Data collection took place prior to the covid-19 pandemic; therefore, influenza and influenza-like illnesses were still less frequently represented in the media. Note that influenza and breast cancer "change position", due to the ranking being based on both real frequency of deaths and media coverage. The ranking goes from "highest frequency with low coverage" to "lowest frequency with high coverage", meaning that causes can be defined as either less or more available than other causes depending on where they rank in relation to the others (see Appendix D and E).

The two framing conditions, two availability conditions, and two anchor conditions were counterbalanced, in order to control for possible effects of specific combinations of the conditions on the participants' responses. There were eight such combinations for each of the two language conditions, which resulted in 16 different versions of the questionnaire booklet (see Table 1). As indicated above, a fixed order was chosen for the three tasks. This was done because the more specific questions concerning the probability and frequency estimates were supposed to come first, as they needed a more thorough and longer explanation (see Appendix F). The Asian disease task was therefore presented last of the three, as it had a separate and much shorter introduction (see Appendix B), which fit more naturally in the middle of the questionnaire. Furthermore, by keeping the order of the availability and anchoring subtasks constant, the design stayed true to Lichtenstein et al.'s (1978) design, as well as allowing for a meaningful anchoring task. More specifically, instead of using unrelated causes of death for the anchoring subtask, the frequency estimates could be based on the previously chosen causes of death (e.g. the first availability subtask).

Following the completion of the tasks, the participants were asked to write a short explanation of what the tasks had asked them to do. This was done as a comprehension check, to ensure that participants had understood the tasks correctly and made it possible to remove their answers from the analysis if they had clearly misunderstood them. No such cases occurred however, meaning no participants were removed from the analysis based on this criterion. Finally, participants were requested to answer follow-up questions about their age of acquisition and context of acquisition of the English language. They were then asked to indicate their perceived language proficiency, as well as language dominance in form of active (e.g. talking and writing) and passive (e.g. listening and reading) use of both Norwegian and English on a 5-point Likert-scale. At the end of the questionnaire, participants were asked to provide their age and gender, and then to hand in the booklet.

Procedure

The actual data collection was conducted in different auditoriums on campus during a 15-minute break between two lectures. Lecturers from each faculty were contacted by me, and permission was gained to approach students in the beginning of the break. The participants were encouraged to participate during the break but were also given the option of participating after the lecture. Participants who opted to participate after the lecture were given the same amount of time for the completion of the questionnaire as the others who participated during the break (e.g. 15 minutes). A short introduction was given in the language that was used by the lecturer prior to the break. The introduction explained the topic and duration of the experiment, as well as the "reimbursement" for participants. It was stated that participation was voluntary and anonymous, and all participants were requested to complete the booklet by themselves rather than working together. Thereafter, the different versions of the paper-booklet were randomly distributed for the participants to complete and hand in afterwards, thereby achieving randomization for the study.

Data Analysis

Microsoft Excel was used to prepare the data for subsequent data analysis. All statistical analyses were performed using SPSS 25.

Output variables. For the test of framing, the participants answers were coded as either the sure option or the chance option. For the tests of availability, the instances of a participant choosing the "more available" and "less available" causes were counted and coded into two separate variables (e.g. *Instances of MA* and *Instances of LA*). For the second availability subtask the mean of the probability estimates were calculated and later compared. Similarly, for the anchoring task the mean of the frequency estimates were calculated for each participant.

For an exploratory analysis on the effect of language proficiency, participants' scores on the self-assessed English proficiency scale were recoded into *non-native speaker level*

Table 3. Overview of excluded participants.

	Non-Norwegian mother tongue	Living abroad	Pre-knowledge of framing
Norwegian condition	7	2	2
English condition	11	2	2

Note. Participants who had a native language other than Norwegian were excluded from all analyses. Living abroad and pre-knowledge participants were only excluded for exploratory purposes in the respective follow-up analyses.

for scores of one to four (e.g. no to good competence) and *native speaker level* for scores of five (e.g. competence of a native speaker).

Exclusion from analysis. As language proficiency is crucial for this study, Norwegian had to be one of the participants' native languages. Moreover, if English was reported to be a native language, the participants answers were excluded from the analysis. In order to control for effects of having lived abroad, where English might be used in more emotionally charged and naturalistic contexts, participants who had indicated that they had lived abroad for any period of time were excluded for a follow-up analysis (see Table 3).

Statistical tests. Where earlier research was available, the same statistical analyses and procedures were used (see Keysar et al., 2012; Lichtenstein et al., 1978). A standard alpha value of $p < .05$ was chosen as the cut-off value for statistical significance.

Exploratory Analysis

Based on the research literature indicating that language proficiency might influence the results, an exploratory analysis controlling for the effect of the participants' self-reported English proficiency was carried out for the framing task. In the event of a significant effect, further exploratory analyses were planned for the availability task and the anchoring task.

Ethical Considerations

All participants were above the age of 18 and had to sign an informed consent form with their initials prior to participating in the study. All participants were informed both verbally and in written format, that participation was voluntary and anonymous, and that they could withdraw their consent at any time without negative consequences. The informed consent forms and the questionnaire were stored separately. Both were marked with the same participant number, in order to allow for removal of the answers if the participant chose to withdraw consent. As the task concerned a topic that might be perceived as morbid, all participants were informed beforehand that the experiment would feature content revolving around different causes of death in Norway.

The anonymity of the participants was guaranteed as the personal information collected (e.g. age, gender, the participants' initials) is insufficient for identifying the individual participant. All personal information collected will be treated confidentially, and no-one outside of the study will gain access to identifying data. The reimbursement of a 1/3 chance to win a 75 kroner gift-card was deemed sufficient for a 15-minute experiment

Results

Four main analyses were carried out in total, one for each hypothesis, as well as several follow-up analyses. Effect sizes were considered as small, medium or large according to Cohen's (1988) criteria of .10, .30 and .50 for phi coefficient values, and .01, .06 and .14 for eta squared, respectively. Due to the great number of analyses carried out, the individual effect sizes will not be discussed for each analysis in the Results part of the thesis, but larger or surprising effect sizes will be mentioned in the General Discussion further down.

Framing

The main analysis for the framing task had no additional exclusion criteria, but a follow-up analysis was completed excluding all participants who had indicated that they had completed either the same or a similar task before (see Table 3). This was done in order to control for possible effects that prior knowledge of the task could have on the results. The findings will be reported after the main analysis, along with the analysis controlling for participants having lived abroad and English proficiency as explained above. One participant in the native condition failed to answer the task and was therefore not included in the analyses.

The hypothesis for framing predicted that the loss-gain asymmetry would be weakened for responses given in a foreign language. A chi-square test was used in order to test for statistically significant differences in the participants preferences when answering in either the loss frame or the gain frame. The tests were done individually for each language condition and results were thereafter compared. Statistically significant findings indicating the presence of a framing effect for the native, but not the foreign language condition, would indicate the presence of a FLE.

Main results. For the Asian disease task, the participants in both the native language condition as well as the foreign language condition showed significant framing effects. For the native language condition, 40.4% preferred the sure option in the loss frame, while 63.8% preferred the sure option in the gain frame, $\chi^2(1, n = 94) = 4.26$. $p = .039$, $phi = -.23$. The loss-gain asymmetry was also present in the foreign language condition, where 34.0% preferred the sure option in the loss frame, while 75.0% preferred the sure option in the gain frame, $\chi^2 (1, n = 91) = 13.74$, $p < .001$, $phi = -.41$. The results do thereby not support the hypothesis that foreign language use leads to different response patterns for the Asian disease task in the current sample (see Figure 1).
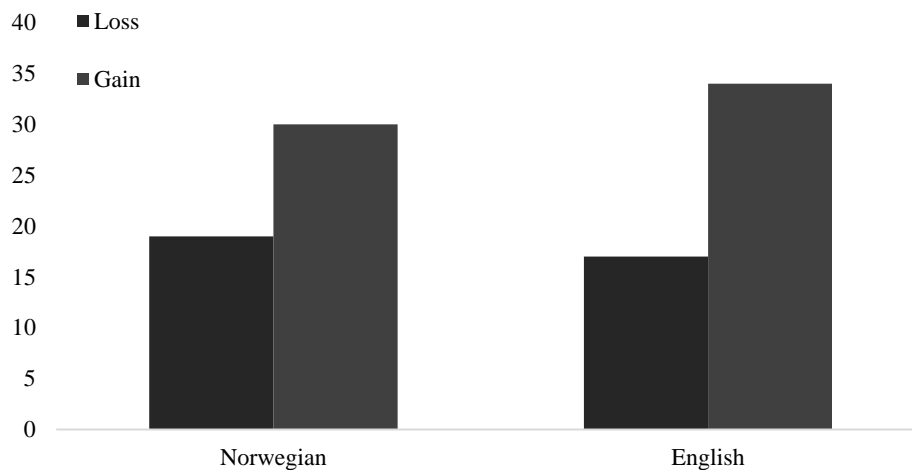
Figure 1. Results of the Asian disease task by language

Figure 1. Amount of participants who chose the sure option as a function of frame and language.

Prior knowledge. In a second step, four individuals were removed from the analysis based on prior knowledge of the task. The loss-gain asymmetry however, prevailed for both conditions. For the native language condition, 40.4% preferred the sure option in the loss frame, while 66.7% preferred the sure option in the gain frame, $\chi^2(1, n = 92) = 5.35$. $p = .021$, *phi* = -.26. The loss-gain asymmetry was also present in the foreign language condition, where 33.3% preferred the sure option in the loss frame, while 75.0 % preferred the sure option in the gain frame, $\chi^2 (1, n = 89) = 13.91$, $p <.001$, *phi* = -.42. Removing participants with prior knowledge did not result in a reduced framing effect in the foreign language condition, a non-surprising finding as the number of removed individuals was small.

Living abroad. Removing participants who had lived abroad from the analysis did not change these findings either. For the native language condition 41.3% preferred the sure option in the loss frame, while 65.2% preferred the sure option in the gain frame, $\chi^2 (1, n = 92) = 4.37$, $p = .037$, *phi* = -.24. The loss-gain asymmetry was also present in the foreign language condition, where 34% preferred the sure option in the loss frame, while 73.8% preferred the sure option in the gain frame, $\chi^2 (1, n = 89) = 12.52$, $p < .001$, *phi* = -.40. In sum, removing

participants, that had lived abroad, did not result in different response patterns for the two language conditions.

      English proficiency. An additional analysis was performed for the English condition using the recoded English proficiency variable as a layer variable in the chi-square test for independence. No FLE emerged for either of the proficiency categories, meaning that both showed a clear framing effect. For non-native level participants 37.5% preferred the sure option in the loss frame, while 70.0% preferred the sure option in the gain frame, a significant difference, $\chi^2(1, n = 54) = 4.46$, $p = .035$, $phi = -.33$. For the native level participant 30.4% preferred the sure option in the loss frame, while 84.6% preferred the sure option in the gain frame, a significant difference, $\chi^2(1, n = 36) = 7.71$, $p = .006$, $phi = -.52$. In conclusion, lower English proficiency does not appear to result in more of a loss-gain asymmetry in the participants' responses than a higher English proficiency does.

Availability

      For the analyses of availability, no additional exclusion criteria were implemented, other than what was outlined in the Methods section above. However, additional analyses were conducted in order to control for possible effects of the different causes-of-death-pair versions used. This was be done to determine the versions' equality in terms of their impact on the participants responses. Additionally, an exploratory analysis comparing the participants estimates of the more available and the less available causes was conducted.

      The hypothesis on the availability heuristic predicted that the participants would choose the more available causes of death more often, as well as give higher probability estimates for the more available causes when they answered in a native language, compared to the foreign language. To test the hypothesis, two separate independent samples t-tests were carried out with *Language* as the independent variable, and *Instances of* MA as the dependent variable for the analysis of the first subtask, and *Mean MA Probability Estimates* as the dependent variable

for the second subtask. For the additional analyses exploring the effect of the versions used, and comparing the different estimates, two-way ANOVAs and paired-samples t-tests were used. Details on these will be mentioned in the respective Results sub-sections.

Main results. For the first availability subtask, the results of the independent samples t-test indicated no significant difference between the amount of times the more available cause was chosen in the Norwegian condition (M = 1.83, SD =1.17) and in the English condition (M = 1.79, SD = 1.20; t(184) = .23, p = .82, two tailed).   Additionally, the magnitude of the differences in the means (mean difference = .04, 95% CI: -.30 to .38) was very small (eta squared = .0003). Participants did not choose the more available cause more often, neither in the native, nor in the foreign condition (see Figure 2). Thus, the hypothesis concerning the choice subtask was not supported.For the second availability subtask, the results of the independent samples t-test indicated that there was no significant difference in the mean estimates for the more available causes between the Norwegian condition (M = 104.35, SD= 442.28) and the English condition (M = 42.52, SD = 113.60; t(106.87) = 1.32, p = .19. The

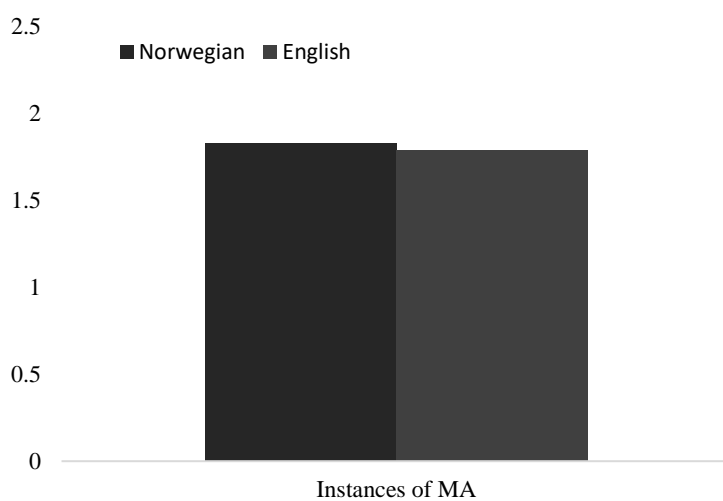*Firgure 2.* Results of first availability subtask.

Figure 2. Mean amount of times participants chose the more available causes of death as a function of language. MA = more available causes of death.

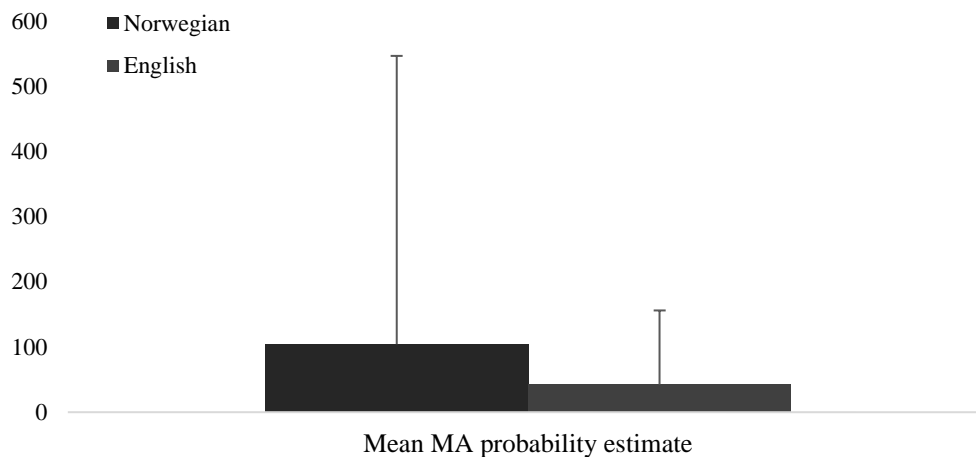*Figure 3.* Results from second availability subtask.

Figure 3. Mean probability estimates and standard deviation of the more available causes of death as a function of language. MA = more available cause of death.

magnitude of the difference between the means (mean difference = 61.83, 95% *CI*: 31.17 to 154.83) was very small (eta squared = 009). Consequently, the hypothesis concerning the estimation subtask was not supported, as the participants did not estimate the more available causes to be more likely in the native condition than in the foreign condition (see Figure 3).

Living abroad. Similar to the framing task, removing the participants who lived abroad from the analysis of the two availability subtasks did not have an effect on the results. For the choice subtask there was no significant difference between the amount of times the more available cause was chosen in the Norwegian condition (M = 1.83, *SD* = 1.18) and in the English condition (M = 1.82, *SD* 1.19; $t(180) = .04$, $p = .97$, two-tailed. The magnitude of the difference between means (mean difference = .008, 95 % *CI*: -.34 to .35) was very small (eta squared < .000).

For the estimation subtask there was no statistically significant difference in the mean estimates for the more available causes between the Norwegian condition (M = 106.52, *SD* = 446.81) and the English condition (M = 43.46, *SD* = 114.71, $t(104.59) = 1.32$, $p = .19$, two tailed). The magnitude of the difference between the means (mean difference = 63.06, 95% *CI*: -31.93 to 158.04) was small (eta squared = .01). In sum, the results indicate that the FLE does

not emerge for the availability task, irrespective of whether participants who lived abroad are included in the analysis or not.

Version. Two separate two-way ANOVAs were conducted, one for each subtask task. For the first analysis *Language* and *Version* were the independent variables, and *Instances of MA* was the dependent variable, while *Mean MA Probability Estimate* was the dependent variable for the second analysis. For the choice subtask neither an interaction effect, $F(1, 182)$ = .80, p = .37 (partial eta squared = .004), a main effect for language, $F(1, 182)$ = .08, p = .78 (partial eta squared = .000), nor a main effect for version, $F(1, 182)$ = .19, p = .67 (partial eta squared = .001), was found. All effect sizes were very small.

For the estimation subtask, the assumption of homogeneity was violated, resulting in a new cut-off alpha of .01. With the new alpha value, the interaction between language and version was not significant, $F (1, 182)$ = 4.00, p = .047 (partial eta squared = .02). The main effect for language was not significant, $F (1, 182)$ = 1.80, p = .18 (partial eta squared = .01). The main effect for version was not significant either, $F (1, 182)$ = 2.73, p = .10 (partial eta squared = .02). All effect sizes were small. In sum, these results indicate that the versions used in the availability task did not lead to different answers and can therefore be considered to be equal in terms of their impact on the participants responses.

Comparing estimates. For the estimation subtask an exploratory paired samples t-test compared the participants' mean estimates for the more available causes and the less available causes. The results indicated a significant difference of mean estimates for the more available and the less available causes for both conditions. In the Norwegian condition the mean estimates of the more available causes (M = 104.35, *SD* = 442.28) were significantly lower than the mean estimates of the less available causes (M = 1713.71, *SD* = 7418.37), $t(94)$ = -2.20, p = .03 (two-tailed). The magnitude of the difference in the means however (mean difference = -1609.36, 95% *CI*: -3061.30 to -157.41) was small (eta squared = .05). In the

English condition the mean estimates of the more available causes (M = 42.52, *SD* = 113.60) were significantly smaller than the mean estimates of the less available causes (M = 111.72, *SD* = 236.37), *t*(90) = -2.76, *p*= .007. The magnitude of the difference in the means (mean difference = -69.20, 95% *CI*: -119.05 to -19.35) was moderate (eta squared = .08). The analysis' results show that participants estimated the likelihood of the less available causes to be significantly bigger than the likelihood of the more available cause, regardless of the language they answered in. Consequently, the results do not indicate the presence of an availability bias or a FLE for availability.

Anchoring

For the analysis of the anchoring task no additional exclusion criteria were introduced. A one-way between-subjects ANOVA was carried out with *Language + Anchor* as the independent variable with four levels, and *Mean Frequency Estimate* as the dependent variable. The anchoring hypothesis predicted that participants would give frequency estimates closer to the anchor in the native condition, than in the foreign condition. Significant differences in the mean frequency estimates for the different anchors in the Norwegian language condition, but not in the English language condition would indicate the presence of a FLE. For the frequency estimates of the anchoring task, individuals with a mean estimate higher than 20 times the mean of all participants were excluded from the analysis as an outlier. This cut-off value was chosen in order to merely exclude extraordinarily high estimates, while still allowing for estimates which are far above the real frequency means. The exclusion procedure was based on a similar method used by Lichtenstein et al. (1978). Two participants, one in each condition, failed to answer the frequency estimate task, and were therefore excluded from the analyses.

Main results. For the test of the anchoring task the participants' results were divided into four groups according to the combination of anchor and language condition (Group 1: NorLow; NorHigh; EngLow; EngHigh). Descriptive statistics were performed in order to
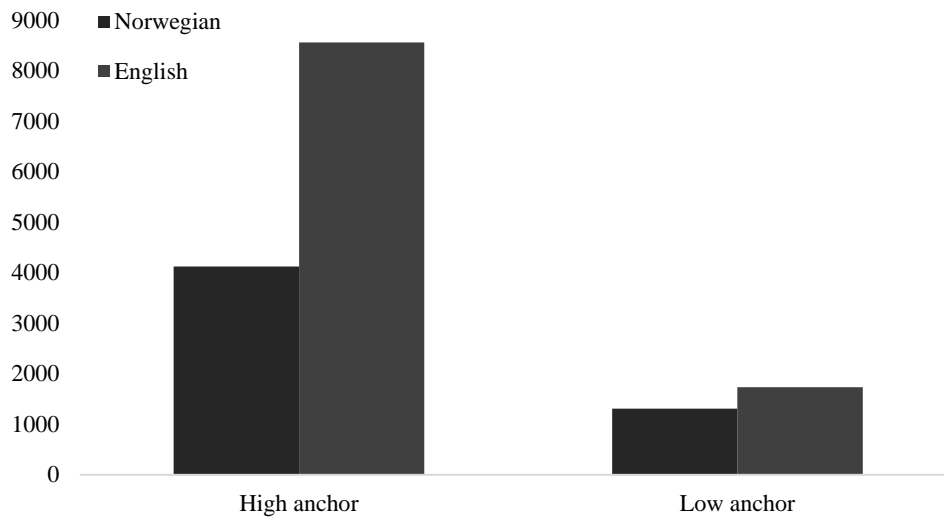
Figure 4. Results of the anchoring task.

Figure 4. Mean frequency estimates of deaths per year (caused by the chosen causes

 of death), as a function of language

assess for normality, several extreme outliers were identified, of which two met the criteria for

exclusion from the analysis. The pre-exclusion one-way between-groups ANOVA failed to

reach statistical significance for the four groups: $F(3,180) = .58$, $p = .63$. The post-exclusion

one-way between-groups ANOVA violated the assumption of homogeneity; therefore, the

Brown-Forsythe test will be reported based on the nature of the data. The differences between

the NorLow (M 1310.59, $SD = 2727.92$), NowHigh (M $= 4125.72$, $SD = 7499.74$), EngLow

(M $= 1732.60$, $SD = 4132.33$), and the EngHigh group (M $= 8559.45$, $SD = 44114.40$) failed

to reach statistical significance, $F(3, 48.75) = .99$, $p = .40$. The difference of the mean scores

between the groups was small (eta squared $= .02$). As these results show that participants did

not anchor their estimates more on the provided anchor in the native condition than in the

foreign condition (see Figure 4), the hypothesis was not supported.

   Living abroad. When the participants who had reported to have lived abroad were

removed from the analysis, the assumption of homogeneity was no longer violated, but there

was still no significant difference between the four groups, $F(3,174) = .93$, $p = .43$, and the

effect size was small (eta squared $= .02$). In sum, anchoring was not affected by the language

the participants used while giving their frequency estimates, even when participants who had lived abroad where removed from the analysis.

General Discussion

Research on the effects of foreign language use has found that people's decision tendencies change depending on the language they use (Pavlenko, 2012, 2017). The most established finding to date is that the loss-gain asymmetry for framing tasks like the Asian disease problem disappears when the task is completed in a foreign language. The aim of the current study was to replicate these findings for a new language, as well as expand on the research by exploring the FLE for the availability and the anchoring heuristic. The FLE did not emerge for the framing task or for either of the heuristics under investigation, meaning none of my hypotheses found support. In the following section I will discuss the findings by focusing on the possible factors which might have impacted the results. Finally, the study's strengths, limitations, implications and future directions will be considered.

Possible Factors

There are a number of possible explanations for the null results of all three tasks. Based on the fact that all tasks used previously tested materials (Keysar et al., 2012; Lichtenstein et al., 1978), the three most prominent explanations relate to certain aspects of the sample rather than the design per se. Although it cannot be excluded that the materials had some influence on the results, the high language proficiency in the sample, the cultural influence of English in Norway, and knowledge on health issues appear to be more plausible explanations for the null results. While the first two appear to have had a more general impact across all the tasks, the latter was most likely to impact only the results of the availability and anchoring tasks, which revolved around diseases as causes of death.

Language proficiency. The aim of investigating a FLE for the framing effect was to replicate earlier findings and allow for comparisons to the results of the availability and anchoring tasks, which previously had not yet been tested in a FLE context. Previous studies had portrayed the FLE for decision-making under uncertainty as robust, surprisingly however, the loss-gain asymmetry emerged in both language conditions, and as a result the (well-established) FLE did not. As research on the FLE is still young, the null results give valuable insight on the phenomenon's underlying mechanisms and boundaries, especially with respect to the differences between groups of multilinguals. Furthermore, while the findings for the framing task are somewhat unexpected, they are not the first of their kind. Others have made similar discoveries (Dylman & Champoux-Larsson, 2020), where the use of English as a foreign language did not results in a FLE. Oganian et al. (2016) also failed to find a true FLE in their study, and instead discovered that the changes in decision-making resulted from a language switch in general rather than foreign language use per se.

As already pointed out by Langensee and Mårtensson (2019) a probable explanation for these findings is the language proficiency of the participants. They proposed that the switch effect resulted out of a low English proficiency in Oganian et al.'s (2016) sample, as it may influence the foreignness of a language, as well as impact cognitive load and the type of processing which is used to respond (Volk et al., 2014). Speaking a foreign language, as explained previously, might result in Type 2 processing due to less emotion cues being available in that language, as well as the added cognitive load acting as a cue for more deliberate processing (Cipolletti et al., 2016; Volk et al., 2014). If language proficiency is high however, as was the case in both the current study (e.g. 4.15 on a 5-point Likert scale) and in Dylman and Champoux-Larsson's (2020) study (e.g. 7.5 on a 10 point Likert scale), using a foreign language will not results in the same amount of strain put on the cognitive system. As

a result, Type 1 processing may remain active and the participants in the two language conditions would respond similarly, with no FLE emerging in their responses.

A follow-up analysis was carried out for the framing task in order to explore the language proficiency effects on the FLE in the current study. While both non-native level and native level participants showed a significant framing effect, the analysis indicated a stronger framing effect for participants who had reported their English proficiency to be on a native level. The effect size for the non-native level participants just about met the criteria for a medium effect (e.g. *phi* = -.33), while the effect size for native level participants was large (e.g. *phi* = -.52). These findings add to the literature arguing that language proficiency might be a fundamental factor in the FLE (Costa, Foucart, Hayakawa, et al., 2014; Geipel et al., 2015a; Shin & Kim, 2017). Costa, Foucart, Hayakawa and collegues (2014) for instance, found that participants with lower proficiency showed a larger increase in utilitarian responding when they answered in the foreign language condition, than the participants with higher proficiency did. In short, the results mirror earlier findings indicating that the language proficiency in the sample played a role in the non-emergence of the FLE.

Taking previous research into account, the current findings indicate that language proficiency may act as a lower and higher bound for the FLE. More specifically, in context of Dylman and Champoux-Larsson's (2020) and Oganian et al.'s (2016) findings, it is probable that the FLE is restricted to *average* language proficiency. While this interpretations appears plausible, the low proficiency individuals in the current study did not show clear indications of a more deliberate type of processing like Costa, Foucart, Hayakawa and collegues (2014) proposed, as their responses were affected by the framing effect as well. This suggests that, while language proficiency might play a key role in mediating the FLE, it cannot account for the study's results in its entirety.

Cultural influence of a foreign language. As already discussed, language proficiency appears to set boundaries on the scope of the effect. Another related explanation to the findings is the special position English has in Norway. Much of the media the Norwegian population consumes on a daily basis is in English, and areas like higher education and the job market are partly dominated by English (Schwach & Elken, 2018; Språkrådet, 2018). A study by Dylman and Champoux-Larsson (2020) found that both cultural influence as well as linguistic similarity affect whether the FLE emerges. As their study was carried out in Norway's neighbour country Sweden, there are several similarities between their findings and the findings of the current study. One important similarity is that English holds a special position of cultural influence in both countries, as several areas of social interaction are permeated by English use. Based on this Dylman and Champoux-Larsson (2020) argue that the Swedish population has several opportunities to be naturally exposed to a variety of emotional situations (for example through movies), which in turn can result in a higher emotional resonance of emotion words for English, as compared to other foreign languages with less cultural influence in Sweden.

In their study Dylman and Champoux-Larsson (2020) compared the results on both the Asian disease task and the trolley/footbridge task for three different foreign languages. One was linguistically similar to Swedish (Norwegian), one had cultural influence (English) and one was neither culturally influential nor linguistically similar (French). As linguistic similarity and cultural influence of a foreign language might result in information being processed similar to the native language, French was assumed to be processed like a proper *foreign* language, as operationalized in previous studies. As a result, it was assumed that a FLE would emerge for the French condition. Their findings showed that both the English and the Norwegian conditions resulted in similar response patterns as did the Swedish condition, while the French condition resulted in a significant FLE. More precisely, the framing effect emerged in all conditions except for when the participants completed the tasks in French.

In relation to the current study, the culturally influential position of English in Norway (Språkrådet, 2018), and the fact that most of the participants were attending lectures that were conducted in English due to the presence of exchange students, might have interfered with the impact of the FLE. As the FLE is assumed to result from an emotionally neutral environment, the exposure to English emotional content in the media, as well as the possibility to converse with exchange students in English might have diminished the FLE. Furthermore, while most of the participants (e.g. 150) had reported school to be their primary language learning context, 85 reported other domains like the home, the media and friends as either primary (e.g. 33) or secondary (e.g. 52) learning environments. These language learning and usage domains might have provided sufficient emotional association in the language to cue Type 1 processing. Eventually, this would lead to deontological reasoning even when a foreign language is used, and therefore no FLE would emerge for framing.

Taken together, it appears that English might not be a *true* foreign language to the Norwegian participants in this study, as both proficiency and cultural influence of the language were high. This again gives support to Bialystok et al.'s (2012) proposition that different groups of multilinguals can be difficult to compare. The multilingual participants in the current study were heavily exposed to English in their daily life and in a variety of contexts, as was indicated by "at home or the media" being the second most reported learning environments, as well as the early age of acquisition (e.g. age six). Seen from the point of view of Cavar and Tytus (2018), this environment gave the participants the opportunity to effectively learn and strengthen the emotional associations for English words. Consequently, this will make it difficult to compare the current subject pool to other multilinguals who might learn and use the language in more a neutral context. Nonetheless, these findings are valuable in deepening out understanding of both the FLE and multilingualism in general.

Knowledge on health issues. Similar to the framing task, no FLE was found for either of the two heuristics under investigation in the current study. These null findings are at odds with the respective hypothesis, which predicted that a FLE would emerge in the English condition but are in line with the findings from the framing task. Since the materials used for the framing task have reliably produced the FLE in previous studies, there is little reason to assume that these null findings were due to the tasks used in the current study. As already discussed, there are several factors related to the subject pool which may have impacted the effect of the foreign language use on the participants' choices. Consequently, the absence of a FLE in the framing task results gave little reason to expect the emergence of a FLE for availability and anchoring, which had not yet been probed in the context of this effect. Furthermore, the results suggest that neither an availability, nor an anchoring bias were produced by their respective tasks. This, in consequence, means that the expected attenuation effect of foreign language use would have been nearly impossible to detect in comparison with the native language condition, since the reference for comparison (e.g. the native condition) did not contain the effect under investigation.

A possible explanation for these twofold null findings is the topic of health issues, which was used as a content for both the availability and the anchoring tasks. The choice of health as a topic was deemed favourable, as the framing task used a similar topic (e.g. curing a disease), and as a result a coherent content across all three tasks could be achieved. It may be possible though, that the students who participated are more informed on the topic of health and disease, than the participants in the original study of Lichtenstein et al. (1978) were. Similar to the participants in Brown et al.'s (2002) study, the participant in the current study might have relied on relevant domain knowledge while giving their estimates, rather than having to rely on the availability heuristic or anchoring to produce an appropriate answer. The significant results of the follow-up analysis comparing the probability estimates for the more available and

the less available causes of death support this supposition. More specifically, the participants correctly estimated the less available, yet more likely causes as the more probable ones, indicating that they might have had some general understanding of the causes' probability. As health issues are only one of many topics for which availability and anchoring have been investigated, it is probable that they can be produced for other topics like frequency estimates of gender for famous names, probability estimates of future events, and population estimates (Brown et al., 2002; Brown & Siegler, 1992; MacLeod & Campbell, 1992; McKelvie, 1995, 1997).

Looking at the tasks separately, the availability task consisted of two parts. The first asked the participant to choose between two causes of death by indicating which one they thought to be the more likely one. The second part asked them to indicate how many times more likely the chosen cause is. While the first part clearly failed to produce both an availability bias and a FLE, as participants chose the less available causes to be the more likely ones, the second part showed an indication of an FLE for availability. More specifically, when comparing the probability estimates for the more available causes for the two language conditions, the mean probability estimates from the Norwegian condition were higher (e.g. 104.35) than the mean probability estimates from the English condition (e.g. 45.52). Although this difference did not reach significance, this finding indicates that an FLE might exist for availability if it were studied with a design that produces stronger availability effects. Consequently, the results are a valuable starting point for further investigation of the FLE for availability.

Similar to the availability task, the anchoring task produced no significant effects, neither for the anchor itself, nor for the FLE. While the frequency estimates pointed in the expected direction, meaning the different anchor conditions show an indication of an anchoring effect, the estimates show no indication of an FLE for the different language conditions. More

specifically, while not significant, the higher anchors produced higher estimates compared to the low anchors. However, this pattern was present for both language conditions. This finding is compatible with earlier research suggesting that anchoring is robust (Mussweiler, 2001; Wilson et al., 1996), but no definitive conclusions can be drawn from the current non-significant results. A possible explanation for the lack of a statistically significant difference between the two anchors is the fact that the probability estimates (e.g. availability task) and the frequency estimates (e.g. anchoring task) were completed one after another for each separate set (see Appendix A). This combination of estimation tasks might have interfered with the impact of the original anchor, and thereby reducing the anchoring effect. To be more specific, participants might have relied on their previous probability estimates of a given lethal event, as a kind of self-generated anchor, which has been shown to have stronger effects than experimenter-given anchors, especially when the self-generated anchor is based on some kind of relevant domain knowledge (Epley & Gilovich, 2001). Although it is evident from the results that the initial anchor had an impact on the frequency estimates, such an interference from the availability task might explain why the effect did not reach significance despite empirical evidence suggesting anchoring effects to be robust (Mussweiler, 2001).

In sum, while no FLE was found for either of the heuristics, some of the findings pointed in the right direction. As this was the first time that the FLE was investigated in relation to both availability and the anchoring heuristics, more studies are needed to explore the possible existence of a FLE for these heuristics.

Strengths

The current study was (to the best of my knowledge) the first attempt to explore the FLE for the availability and the anchoring heuristic. The study design combined the tasks for the three phenomena under investigation, by basing the task on the classical studies by Lichtenstein et al. (1978) for availability and anchoring, and Keysar et al. (2012) for framing.

This procedure allowed to produce a strong design, as it used tested materials, allowed for comparison of the current findings to existing literature, as well as creating a template for future studies which is easy to use and low-cost to produce. The tasks were adapted to fit the current context, by using real, current and available data from the participants' home country. This resulted in a relevant and relatable content in relation to the participant pool. In addition, the same theme was used for all task, as already mentioned, which allowed for a coherent content throughout the questionnaire. Taken together, the current design allows for easy replication and testing of the results, as well as opening for the investigation of other related themes, heuristics and effects.

Limitations

The aim of the study was to replicate earlier findings, as well as investigating two effects that, to my knowledge, have not been studied in the context of the FLE before. The design was chosen in order to investigate three effects simultaneously in a questionnaire type of format in a classroom setting. This choice, albeit advantageous in terms of being able to study three separate effects in the context of the FLE, had a few limitations which need to be addressed.

First, despite excluding psychology students, the sample was composed of university students, a subject pool which is not representative of the general population. Additionally, the context for the data collection (e.g. in auditoria), made it difficult to control for possible inferences. For example, since completion of the data collection took place during a 15-minute break between lectures, there was a strict time constraint which might have impacted the participants' responses. Some participants, for instance, might not have taken their time to read all the instructions and answer the questionnaire, in order to still be able to take a break after handing in the booklet. While all participants were offered the opportunity to complete the questionnaire after the next lecture, most of them had to attend other classes afterwards,

effectively resulting in a similar situation as completing the questionnaire during the break would. Hence it is plausible that the option to participate later did not necessarily ensure that participants would take their time. Although only a few participants appeared to hand in the booklet before the expected minimum of time needed to complete the questionnaire (e.g. 10 minutes), it cannot be completely ruled out as a possible interfering factor for at least some of the participants.

Secondly, while the operationalization of availability was based on earlier research (Lichtenstein et al., 1978), it did not take into account other factors which have been related to the cognitive availability of events. In order to fully capture the availability of certain events, other factors like emotional impact and other sources of information like social media should be taken into consideration in future studies. Even if aiming to take into account all possible influential factors might be too ambitious for one study alone, adding follow-up questions asking for personal experiences with the different diseases might be one way to control for at least some of these factors in the future. Furthermore, while choosing health issues as a topic allowed for a coherent topic across all the tasks, it may have limited the study's ability to detect a FLE for availability and anchoring as previously pointed out.

Thirdly, a related limitation to the chosen content is the order in which the tasks were presented. While all conditions were counterbalanced in order to control for the effect of certain combinations of the conditions, the order in which the tasks were presented (i.e., availability, anchoring, framing), was held constant. While this choice was expedient with regards to the original template material and length of the respective introductions, it cannot be excluded that the order of the availability and anchoring subtasks had an effect on the impact of the anchor on the subsequent frequency estimates.

Finally, no objective measure of English proficiency was used, which might give a more reliable indication of how well the participants spoke the language. While most studies on the

FLE have used similar methods for measuring proficiency as the current study did, especially due to it being highly accessible and low-cost, it is possible that a lack of insight on one's own language abilities might distort participants' evaluation of their language proficiency. Studies on the matter indicate however, that self-assessment of language proficiency is sufficiently accurate (Diamond et al., 2014; Ma & Winke, 2019), suggesting that the self-assessment should not have influenced the study's results.

Implications and future Directions

Despite the fact that none of the hypotheses found support, the current findings have important implications for the future of FLE research. To begin with, the finding that English, a language with cultural influence in Norway, did not produce a FLE for framing when compared to Norwegian, adds to the findings of recent studies with similar results. Even though this proposition needs further investigation in a context aiming at the cultural influence variable, these findings point toward yet another factor beside proficiency, age of acquisition and context of acquisition, which can influence the emergence of the FLE. It would be of interest to explore this variable in countries with similar linguistic histories as Sweden and Norway, where non-native languages possess a position of cultural influence through media, education and job market. Investigating this variable might not only broaden our understanding of the FLE per se, but also add to our knowledge on how the use of and exposure to foreign languages in daily life can influence the way we perceive and process foreign languages.

Furthermore, the results add to our knowledge about the effect's boundaries. They indicate that the FLE might be produced by a complex interplay of variables, and therefore might not be as easy to produce as earlier studies suggest. Taken together, this will have real-life implications for a number of contexts where decisions are made in a foreign language, like aviation, medicine and law. In these areas, both the decisions of an individual, as well as interactions between several people can affect the well-being of many. An important question

to ask in relation to these real-life decision-making contexts is whether the FLE persists when individuals arrive at a decision through discussion. Consequently, future research should aim to study the FLE both for other themes than health issues and in contexts where people are asked to interact in a foreign language.

In sum, the current findings have the potential to broaden our understanding of the effect's boundaries, as well supplying several indications of influential factors worth further exploration.

Conclusion

The current covid-19 pandemic highlights how impactful research on the FLE can be. Albeit not as simple as the Asian disease task, the choices the governments have to make regarding protection and treatment of their citizens, can be compared to the classical framing task. The current findings, as well as earlier empirical contributions suggest that their choices can be influenced by several factors related to the language the decisions are made in, as well as the way the options are framed in. The linguistic background of the different governments might lead to decidedly different decisions in a time where unity on the course of action is needed. In short, while the current findings failed to support my hypothesis, a continued exploration of the FLE in both similar and new contexts have vital implications for real-life situations that may affect the health and well-being of entire nations.

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Appendix A

Example of first two availability and anchoring subtasks

These are examples of the availability (e.g. a and b) and anchoring (e.g. c) subtasks.

Here the first two lethal events pairs of version 1 and the high anchor condition were used.

The other subtasks had the same format and used the other pairs as reported previously. For

the low anchor condition dementia (e.g. 2 343 deaths per year) was switched with AIDS (e.g.

8 deaths per year).

1a: Which is more likely?

☐   influenza

☐   murder

1b: How many times more likely is the cause you chose?

_____:1

1c: About 2 343 people die of dementia each year. Estimate the frequency of deaths

for the cause you judged to be more likely than the other.

_____ deaths per year.

2a: Which is more likely?

☐   drowning

☐   diabetes

2b: How many times more likely is the cause you chose?

_____:1

2c: Estimate the frequency of deaths for the cause you judged to be more likely than

the other.

_____ deaths per year.

Appendix B

Asian disease task

Below are the two frames of the Asian disease task from the English condition, in their original format. The introduction to the task is the same for both frames and will therefore only be included once, followed by the loss frame first, and the gain frame second. Note, the participants in the current study only read one of the two frames.

In the second task you will be presented with a dilemma and two possible solutions. There are no right or wrong choices, we just want you to answer which option you would choose if you were in the described situation.

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

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

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

Which medicine do you choose?

_____

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

B: 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?

_____

Appendix C

The follow-up questions

　　　　The following questions were originally asked and answered in Norwegian but were translated for this appendix. Note that the English version of the booklet contained a small text passage prior to the follow-up questions, which explained that they should be answered in Norwegian, as seen below. The Norwegian version of the booklet, however, did not contain an additional text prior to the follow-up questions.

Now that you have completed task 1 and 2 you will be asked a few questions that you can answer in Norwegian. As stated earlier all the information collected will be anonymous, so we ask you to answer them truthfully.

Answer in Norwegian: What did the tasks ask you to do?

Have you previously completed similar assessment tasks?

Yes: ○

No: ○

If yes, explain shortly what you did:

How old were you when you started to learn English?

Where did you start to learn English? (f.e. in school, at home, internet, language course, friends…)

What is/are your native language(s)? Optionally – what is your «hovedmål»?

Which language do you most often use in your daily life?

Check with a cross: How do you appraise your language competence?

	(1) Almost no competence	(2)	(3)	(4)	(5) Very good competence*
English	O	O	O	O	O
Norwegian	O	O	O	O	O

Very good competence will be on the level of a native speaker

Check with a cross: How often do you actively use the language (write/talk)?

	(1) Never	(2)	(3)	(4)	(5) Daily
Write English	O	O	O	O	O
Talk English	O	O	O	O	O
Write Norwegian	O	O	O	O	O
Talk Norwegian	O	O	O	O	O

Check with a cross: How often do you use the language passively (read/ listen to)?

	(1) Never	(2)	(3)	(4)	(5) Daily
Read English	O	O	O	O	O
Hear English	O	O	O	O	O
Read Norwegian	O	O	O	O	O
Read Norwegian	O	O	O	O	O

Check with a cross: What is your gender?

Man: O   Woman: O   Other/do not with to answer: O

Answer: How old are you?

What do you study?

Thank you for participating!

Appendix D

Table D. Overview of mean deaths per year in Norway.

Deaths per year in Norway	
Cause of death	Mean frequency
Cardio-vascular disease	11421.4
Lung cancer	2186.6
Pneumonia	1476.8
Breast cancer	628
Diabetes	628.8
Suicide	576.4
Traffic accident	191.4
Influenza	121.2
Drowning	58.2
Murder	32.4

Note. Mean frequency refers to deaths per year on average, calculated based in the data for the time frame 2013 to 2017.

Appendix E

Table E. Overview of instances of media coverage on lethal events in Norway.

Media coverage	
Cause of death	Mean frequency
Murder	10916
Suicide	10160
Drowning	1847
Traffic accident	1284
Pneumonia	237
Breast cancer	166
Diabetes	129
Lung cancer	124
Influenza	91
Cardio-vascular disease	3

Note. Mean frequency refers to instances of media coverage on a given cause of death per year on average, calculated based on the data for the time frame 2013 to 2019. Several synonyms were used in the archive analysis on all available data (e.g. TV, radio, web). The archive analysis was performed in Norwegian.

Appendix F

Introduction section of the questionnaire

This is the complete English introduction and explanation of the availability and the anchoring tasks, in its original format. Note that "Part I" refers to all three main tasks of the questionnaire, while the follow-up questions were called "Part II".

Causes of death in Norway

This booklet consists of two parts.
The first part contains the two main tasks.
In the second part you will be asked to provide some general information. Please answer all questions.

(Part I)

Task I

The first task contains 5 similar blocks of questions. Each block mentions two different causes of death. The first question you are to answer in each block is: Which of these two causes of death is more likely? We do not mean more likely *for you*, we mean more likely *in general*, in Norway.

Consider all people living in Norway – both children and adults. If we randomly picked one of those people, would that person be more likely to die next year from cause A or from cause B?

For example: Dying in a bicycle accident versus dying from an overdose of heroin. Death from each cause is very unlikely. Our question is, which of these two is the more likely cause of death? For each pair of possible causes of death, A and B, we want you to state which cause you think is MORE LIKELY.

Next, we want you to decide how many times more likely the cause you chose from the pair is compared to the other cause of death. The pairs in the exercises vary widely in their relative likelihood. You can go as high or low as you want. For some pairs you may think that the two causes are almost equally likely. If so, you can use decimal points like 1.1 or 1.3 or 1.5 and so on to indicate that one cause is only slightly more likely than the other.

For example, if you believe that dying from a bicycle accident is only slightly more likely than dying from an overdose of heroin you can write it like this in the space provided:

1.7 : 1

This answer means that you believe that 1.7 people die of bicycle accidents for every person that dies of an overdose of heroin. Said differently it means that you believe the chosen cause is 70% more likely than the other.
For other pairs you may think that one cause of death is 2 times, 10 times, 33 times, 100 times, or even a million times as likely as the other cause. For those instances you can write your answer like this:

268 : 1

This answer means that you believe that 268 people die of the chosen cause for every person that dies of the other cause. Said differently it means that you believe the chosen cause is 268 times more likely than the other.

In the end you will be asked to estimate the frequency of deaths in Norway for the cause you judged to be more likely than the other. For example, if you chose the bicycle accident in the earlier example, you will have to estimate how many people die on average each year as a consequence of bicycle accidents.
Again, you can go as high or as low as you want. For example, you can write 3, 52, 689 or 19 856 deaths per year.

In order to help you with the estimate, the frequency of a random cause of death will be presented for the first exercise. *Write the number in the space provided.*