Are there individual differences in the foreign language effect?

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by

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Abstract

A foreign language effect (FLE) occurs when the language a problem is presented in influences its outcome (Keysar et al., 2012). So far, it has been unclear under which conditions the FLE appears (Driver, 2020; Dylman & Champoux-Larsson, 2020). One hundred and sixty-eight Arabic-English bilinguals from Prince Sultan University were presented with the Trolley Dilemma (a low-conflict, impersonal moral dilemma) and the Footbridge Dilemma (a high-conflict, personal moral dilemma) and responses to these dilemmas were measured on a slider indicating likeliness to take a suggested action. Participants saw Dilemmas either in a gain-frame or a loss-frame condition, and in either Arabic, English, or a Language-Switching condition. Levels of bilingualism, language-switching abilities, and levels of acculturation were recorded. While there was no disappearance of a framing effect, participants’ mean judgments in the Trolley Dilemma were significantly lower than mean judgments in the Footbridge Dilemma in comparison to native language and language-switching conditions, $F(2,154) = 3.26, p = .041, \eta^2_p = .041$. Levels of bilingualism, language-switching abilities, or levels of acculturation did not explain a significant amount of variance in judgments. These findings provide mixed support for the notion that certain types of language-switching might form a boundary of the FLE.

Keywords: Foreign Language Effect, Language-Switching, Judgment, Decision-Making, Bilingualism
Are there Individual Differences in the Foreign Language Effect?

In the United States alone, more than 21% of Americans over the age of five report speaking a language other than English at home (U.S. Census - American Community Survey, 2019). Based on this finding, it is not unreasonable to assume that at least one fifth of individuals living in the United States have at least a rudimentary understanding of English while also having fluency in another language. Anecdotally, researchers speculate that the actual number of bilinguals might be even higher than that. In comparison, the European Commission (2012) found that more than 54% of Europeans in the EU can hold a conversation in at least one non-native language. As the world becomes more and more interconnected, it is not unreasonable to assume that speaking more than one language will become more and more relevant, as well. To this day, overall world-wide bilingualism statistics seem unavailable. A potential underlying reason might be the differing opinions on the definition of bilingualism.

There is no overall definition of bilingualism; in fact, it appears that definitions vary along a continuum, as the attributes of bilingualism seem to vary from definition to definition. Bialystok (2001) defined bilingualism as speaking more than one language. Valdés and Figueroa (1994), for example, define bilingualism as having knowledge of two languages. Mindt and colleagues (2008), on the other hand, define bilingualism as having high proficiency in one language and adequate proficiency in another language. As researchers debate the definition of bilingualism, Bialystok (2001) offers the most generalized account as she defines bilingualism as the ability to speak more than one language. Bilingualism is assumed to induce a variety of advantages and disadvantages for the speaker. For example, being bilingual may delay the onset of Alzheimer's Dementia (AD) (Craik et al., 2010). In contrast, speaking more than one language can also create obstacles to everyday communications, for example, tip-
of-the-tongue-states (ToTs) (Gollan & Acenas, 2004). A tip-of-the-tongue state describes the phenomenon of attempting to retrieve a word, and, while not being able to do so, or to do so only partially, feeling like the recall of the word might be imminent. Bilinguals tend to experience more of these ToT states than monolinguals due to cross-language interference of the non-target language.

Aside from the obvious benefit of being able to communicate in more than one language, Bialystok (2009) purported that there might be additional cognitive benefits to being bilingual. For example, given that in bilinguals both language systems would be active at all times, they require increased executive control to inhibit one language and prohibit the other (Bialystok, 2009). Therefore, it is not unreasonable to assume that bilinguals could be more trained in executive control, which Bialystok and colleagues (2003) found to be the case. However, since then, a number of researchers (e.g., Paap & Greenberg, 2013) have brought forward conflicting evidence. Thus, it has been suggested that perhaps a bilingual executive control advantage may be limited to young children (e.g., Carlson & Meltzoff, 2008), as well as older adults (Craik et al., 2010) rather than there be an existence of a general bilingual cognitive advantage for all age groups and language pairings. Despite conflicting findings regarding a cognitive bilingual advantage, for the purpose of this thesis, a relationship between bilingualism and other aspects of cognition is assumed.

**Cognitive Biases in Judgment and Decision-Making**

Prior to the continuation of the discussion regarding the relationship between bilingualism and other aspects of executive functions, it is essential to consider cognitive biases, as well as judgement and decision-making in monolinguals. Prior work by Kahneman (2011) suggests that humans make decisions by two different decision systems, System 1 and System 2.
System 1 decisions tend to be decisions that are made quickly, automatically, and oftentimes rely on intuitive emotional heuristics. System 2 decisions, on the other hand, rely heavily on systematic and logical processes. Aside from System 1 and System 2 processes, there are several problem-solving strategies that work in tandem with these systems. The three main ways to solve problems or arrive at decisions are: trial and error, algorithms, and heuristics (Wang & Chiew, 2010).

Cognitive algorithms that are used in problem solving are similar to their mathematical or computer-scientific counterparts and can be understood as a formula that provides a specific outcome. Algorithms can take different forms that follow different forms of learning given the learning context, for example inductive or deductive, or incremental or non-incremental (Machova & Paralic, 2003). It is not unreasonable to assert that algorithms are therefore data-based. Heuristics, on the other hand, can be understood as a special kind of algorithm. Many heuristics and algorithms work in a “fast-and-frugal” manner in automatic problem-solving capacities. Heuristics are another automatic, fast way for the brain to come to a decision, similar to a rule of thumb (Hutchinson & Gigerenzer, 2005). As biases have been mentioned in the previous paragraph, next it is essential to define what cognitive biases are and how they are related to the current experiment. While algorithms may lead to a correct decision most of the time, they may not be immune to mistakes. However, in comparison to algorithms, heuristics can lead to a wrong decision, or an incorrect decision and thus create biases as heuristics are subjective and not always biases on data (Tversky & Kahneman, 1974). Whereas there are a number of different kinds of biases (representativeness, availability, adjustment, and anchoring, etc.), the current review will focus on the framing bias which is a consequence of the adjustment.
and anchoring heuristic (Tversky & Kahneman, 1981). The framing bias relates the most to the language that is used in the presentation of a problem.

A framing bias is an automatic thought process that becomes apparent when a person is influenced by the presentation or the framing of a problem, which thus changes their response to it (Tversky & Kahneman, 1981). For example, a moral dilemma might be presented using either positively valanced language (gain frame) or in negatively valanced wording (loss frame). Based on whether the participant is given the gain frame or a loss frame of a moral dilemma, the participant may choose a risk-seeking or a risk-averse option. Tversky and Kahneman (1981) used the Asian Disease Problem to investigate a framing bias. In this moral dilemma, the participant read about an Asian disease coming to the United States. Participants were either presented with the gain-frame or the loss-frame regarding how the United States should handle the situation. In the gain-frame, the outcome options were framed positively regarding how many people could be saved. In the loss-frame, the outcome options were framed negatively regarding how many people would not survive. Both frames had the same two options for the participant to choose from. One was risk-seeking, and one was risk-averse. It was found that when participants were given the gain-frame, they tended to select the risk-averse option. On the other hand, when participants were given the loss-frame, they tended to select a risk-seeking option. When the Asian Disease Problem was given to groups of different bilinguals by Keysar and colleagues (2012), they found that a framing bias as described above disappeared.

The Foreign Language Effect

Keysar and colleagues (2012) termed this disappearance of a framing bias in a foreign language as compared to a native language as the Foreign Language Effect (FLE). In their initial study, the researchers investigated the existence of a Foreign Language Effect in a diverse group
of college students who lived in different countries and spoke various first and foreign languages. The researchers hypothesized that if the Foreign Language Effect existed, participants' judgments would not be affected by a framing bias. When they presented all participants with a moral dilemma, they found that the participants' responses did not depend on the gain-frame or the loss-frame. Moreover, the researchers suggested that when a person thinks and makes decisions in a foreign language, he or she would rely heavily on systematic and logical processes (System 2 – Kahneman, 2011) and rely less on intuitive and emotional heuristics (System 1 – Kahneman, 2011). Pavlenko (2012, 2017) suggested that this perceived reduced emotionality may be due to the fact that emotions could potentially be processed differently in different languages (native languages versus foreign languages). However, it is unclear if this difference in emotion processing could be due to differing levels of proficiency of both languages or rather due to the mode of acquisition (classroom in comparison to at home). A competing explanation is based on the claim that bilinguals may have enhanced cognitive control abilities (Bialystok et al., 2007) which stems from two language systems being active simultaneously leading to one system being prohibited while the other system needing to be inhibited. If bilinguals indeed had enhanced cognitive control, then the logic continues that they should have more cognitive control to switch from System 1 to System 2 processes. Consequently, they would be less likely to be affected by a framing effect as they may have slower, more rational decision-making abilities. These are just two of the many explanations that have been brought forward to explain a potential Foreign Language Effect, and the purpose of this thesis is not to endorse the validity of either account, but rather to further solidify potential boundaries of a Foreign Language Effect.

Thus far, about half of the studies that thus far investigated the Foreign Language Effect found evidence of this effect (Gross & Altarriba, under review). One potential reason for this
inconsistency in findings could be the varying explanations of a Foreign Language Effect that have been brought forward to this day. Keysar et al. (2012) defined a Foreign Language Effect as a disappearance of the Framing effect. Driver (2020), on the other hand, defines a Foreign Language Effect as a preference for deontological decisions when a problem is presented in a foreign language. These definitions are not necessarily mutually exclusive. It is not unreasonable to purport that a Foreign Language Effect could simply be a different decision made in foreign language conditions in comparison to native language conditions (Geipel et al., 2016). This broader definition of a Foreign Language Effect will be used throughout the rest of this thesis. In an attempt to further explain some of the inconsistency in Foreign Language Effect findings, the next section will highlight other current issues in the field.

Disparities in Past Foreign Language Effect Research

As mentioned before, only about 50% of the studies that thus far investigated the Foreign Language Effect found evidence of this effect (Gross & Altarriba, under review). Typically, most studies used different types of bilinguals (oftentimes late bilinguals) with varying language-combinations and asked them to respond to moral dilemmas. These dilemmas would vary in their level of personal involvement (personal/impersonal) and resulting perceived involvement (low-conflict/high-conflict). One dilemma that was used until recently was the “Asian Disease Dilemma” that was described above. However, given the state of the world in times of COVID-19, using this measure may not be appropriate at this time. Thus, researchers resorted to using the Trolley Dilemma (Foot, 1967) and the Footbridge Dilemma (Thomson, 1985). In the Trolley Dilemma, the reader is asked to imagine themselves as the conductor of a train (otherwise referred to also as a tram or a trolley) that is running towards a splitting track. On one side of the split are five workers currently on the track, and the other one holds one worker. The reader is
then instructed to pull a lever to switch tracks the train to either track as a collision would be inevitable. In comparison, in the Footbridge Dilemma, the reader is asked to imagine themselves standing on top of a bridge that spans a railroad track with the train approaching. Again, there are five workers on this track. The reader is then instructed that a large man is standing next to them and pushing the large man in front of the train would save the lives of the five workers. It is not unreasonable to assume that imaging oneself pushing a lever or a button is to be quite different than imagining oneself pushing another man.

The reasoning behind this observation is a concept called “believability” which refers to how realistic or believable a moral dilemma is. Monolingual research (e.g., Evans 2007, 2008) suggested that the believability of a moral dilemma influences the decision-making process. For example, in terms of the Trolley and Footbridge Dilemmas, research (e.g., Evans 2007, 2008) has suggested that participants perceive themselves more removed/less involved from a scenario where they are asked to press a button or push a lever in comparison to when they are imagining themselves to push a person. A Foreign Language Effect was found more often in Footbridge Dilemma than it was in the Trolley Dilemma (e.g., Brouwer, 2019, 2021; Caldwell-Harris & Aycicegi-Dinn, 2020; Čavar and Tytus, 2018; Driver, 2020; Dylman and Champoux-Larsson, 2020; Miozzo et al., 2020; Muda et al., 2020; Winskel & Bhatt, 2019).

Another concern about the use of moral dilemmas is that gender effects might be possible. More specifically, Armstrong et al. (2019) suggested that females might prefer deontological decisions while men do not appear to show that tendency. However, this particular study did not use the Trolley or Footbridge Dilemmas that were used in the current study. Yet, Capraro and Sippel (2017) argue that a previously reported difference in gender may be moderated by the level of emotional salience of a dilemma suggesting that personal moral
dilemmas might be more emotionally salient. The researchers used a number of dilemmas to explore this hypothesis including the Trolley and Footbridge Dilemmas that were used in the current experiment. While they also found that women preferred deontological choices in personal dilemmas in comparison to men, they found that this preference was driven by emotional salience and by extension, how gender differences in emotion processing. It is not unreasonable to assume that based on these findings men and women might show differing sensitivities to particular valence or arousal levels of emotional wording like it was used in the current experiment. Further, these findings indicate the need to consider possible gender as a moderating variable in the current experiments as no causal effects can be considered given emotional salience was not measured and all genders saw words in each condition that had the same levels of valence and arousal. Gender effects are just one example of individual differences in the Foreign Language Effect field of research. Another possible cause of individual differences could be the concept of culture or an individual’s cultural background.

**Culture and the Foreign Language Effect**

Aside from the previous possible explanations of the disparities so far in this field, there may be other extraneous variables that may affect judgment and decision-making processes aside from the language a problem might be presented in or the moral dilemma itself. For example, the influence of individual differences, such as an individual’s cultural background have not received much attention in the bilingualism and decision-making literature. However, language, cognition, and culture are very closely interrelated (Semin, 2009). In fact, these concepts are so closely intertwined that they are inseparable, and they form the base of individual differences in cognition and behavior (Boroditsky, 2001). Therefore, it remains unexplained whether the Foreign Language Effect is solely caused by the language a judgment is made in or if there could
be an interplay of language and culture. Awad et al. (2020) considered solely cultural variations in preferences during the Trolley Dilemma and the Footbridge Dilemma. They found that there are universal preferences across cultures, for example the reluctance to make sacrifices for the greater good of the largest group of individuals. In addition to that, they suggested that particularly in Eastern countries participants’ preferences were heavily influenced by the unease of sacrificing a life. These data suggest that may be the Foreign Language Effect should be considered the Foreign Language and Culture Effect.

Čavar and Tytus (2018) explain this apparent difference in moral decision-making preferences with the social and cultural restrictions that may be attached to a language. Making a decision in a different language liberates the individual from social and cultural restrictions that a native language might offer. Čavar and Tytus (2018) were one of the first (and only) researchers to consider culture as a variable in the FLE, as they were evaluating highly fluent and highly acculturated German-Croatian bilinguals in their studies. However, their findings have been debated as invalid by Bialek and Fugelsang (2019) who suggest that their findings are invalid due to lack of statistical power and inadequate experimental design. Krautz and Čavar (2019) responded to Bialek and Fugelsang’s (2019) criticism in a separate publication. Krautz and Čavar (2019) refuted that while acculturation was not their variable of interest, rather a covariate, its relevance is not to be forgotten. This was particularly the case when a weak, but significant correlation was found between acculturation and a moral FLE. A possible explanation centers on a concept called emotional acculturation (De Leersnyder, 2017) which indicated an emotional assimilation to the culture of one’s current country of residence. The findings constitute further evidence for the relevance of acculturation to be considered as a possible factor in a FLE. A similar effect might be seen during intense immersion, when an individual might be surrounded
by a foreign language and the corresponding culture. If a FLE might induce psychological or emotional distance, then being immersed in another language or culture might reduce these effects and as a consequence of that, a FLE might not be found (Čavar & Tytus, 2018). This finding leads itself to what other linguistic components might limit an appearance of the FLE. Examining the language-pairs that have been used by researchers thus far might explain some inconsistencies in findings as well, for example comparing closely related languages such as German and Dutch, or Swedish and Norwegian, to largely unrelated languages, such as Swedish and French (Dylman & Champoux-Larsson, 2020).

Ascher et al. (2017)’s aim was to add to the conversation surrounding the role of culture in the Foreign Language Effect. They evaluated the decision-making behavior of Portuguese-English bilinguals and Polish-English bilinguals from Brazil and Poland, respectively, in a betting game. It was found that Portuguese-English bilinguals’ behavior was more risk-averse than Polish-English bilinguals. While no valid claim can be made that this finding is due to levels of acculturation or culture, Ascher et al.’s (2017) findings do generate more research questions regarding whether or not culture does influence the Foreign Language Effect. Further, these findings can be used as support that bilingualism, cognition, and culture should be considered in a holistic manner.

If this relationship is indeed inherent, then it is also important to consider the role of emotion in this triad. Emotion can be understood as part of cognition and has been found to play a role in the Foreign Language Effect. Further Chiao et al. (2015) highlighted the existence of the field of cultural neuroscience and in his publication pointed out how emotions are processed differently in different cultures. This further supports the need to consider emotion under the umbrella of individual differences when evaluating bilingualism, cognition, and culture.
Linguistic Boundaries of a Foreign Language Effect

Aside from the aforementioned inconsistent findings, researchers have also noticed that there may be language-specific assumptions that the Foreign Language Effect relies on. For example, not all levels and types of bilingualism seem to elicit a foreign language effect in judgment and decision-making (Brouwer, 2019; Čavar & Tytus, 2018). Specifically, in order for a Foreign Language Effect to appear, a participant needs to have a certain level of proficiency to understand the instructions and the moral dilemma they are presented with. Additionally, it has been found that if the participant has an equally high proficiency in their native language as well as in their foreign language, there also was no Foreign Language Effect (Brouwer, 2019; Čavar & Tytus, 2018). Consequently, there also has been no Foreign Language Effect found in simultaneous/balanced bilinguals (using both languages either all of the time or using either language about 50% of the time, Čavar & Tytus, 2018). Thus, Foreign Language Effects are frequently seen in sequential bilinguals (Costa, Foucart, Arnon, et al., 2014; Costa, Foucart, Hayakawa, et al., 2014; Hadjichristidis et al., 2015; Keysar et al., 2012).

Aside from having adequate proficiency and being in the appropriate segment of the language continuum, there seem to be additional language axioms involved in the emergence of a Foreign Language Effect. For example, Dylman and Champoux-Larsson (2020) suggest that English as a foreign language is unlikely to induce a Foreign Language Effect compared to other languages. Specifically, they assert that given that English tends to intrude into everyday interactions through music, media, and structured language intrusions, those intrusions create a certain familiarity. Accordingly, while the researchers were not able to find a Foreign Language Effect in their Swedish-English participants, they did find a foreign language effect in their Swedish-French participants. Moreover, Dylman and Champoux-Larsson also found that there
was no Foreign Language Effect in Swedish-Norwegian bilinguals. Therefore, they asserted that there might not be a Foreign Language Effect in languages that are too linguistically similar—a conclusion that certainly demands further exploration.

**Language Switching as a Linguistic Boundary of the Foreign Language Effect**

Interestingly, some evidence has suggested that it might not be the language that a decision is made in that may change the outcome (native language or foreign language), but it could be the process of switching between the two languages (Oganian et al., 2016). Language switching is assumed to be a significant aspect of being bilingual. It can consist either of switching back and forth between languages, or of mixing multiple languages. This can happen within words (e.g., “carro” for ‘car’ in Spanish-English bilingualism), sentence fragments (e.g., “Ese momento when you are pensando en two idiomas at the same tiempo”), or even whole conversations, and sometimes without the individual noticing it (Rodriguez-Fornells et al., 2012). Bilingual individuals may choose to switch languages for various reasons, including situational and environmental demands, and this choice may be intentional or unintentional (Heredia & Altarriba, 2001). Opinions have been divided whether the gender of the speaker affects language-switching behavior. For example, Kane (2020) suggests that there are gender variations in language-switching behavior in terms of frequency and types of language-switching as it was found that women tend to language-switch more than men. It was also found that women tend to language-switch most within sentences. However, Cheshire and Gardner-Chloros (1998) found no consistent pattern of sex differences in language-switching behavior.

Furthermore, language switching can be examined based on intentional and unintentional switches that an individual makes throughout a conversation. When bilinguals switch languages intentionally, they are conscious of the switch, whereas unintentional switches occur without the
individual consciously being aware of switching languages (Poulisse & Bongaerts, 1994). Given these differences in the types of switching that occur in bilinguals, it is not unreasonable to propose that the frequency with which a specific type of language switching occurs for an individual may be used as an indication of how fluent a bilingual is in either language or how balanced an individual is in the use of both languages. Specifically, a certain fluency in either language is needed in order to be able to use both languages. Further, based on how much or how little each individual switches between languages, researchers can infer how balanced or unbalanced an individual might be.

Language-switching is thought to affect cognitive functioning. Specifically, researchers (e.g., Weissberger et al., 2015) suggested that language-switching may be bi-directionally related to increased cognitive flexibility. Further, it has been found that cognitive flexibility may enhance decision-making abilities (Laureiro-Martinez & Brusoni, 2018). If this is the case, then language-switching should increase cognitive flexibility in judgment and decision-making processes. Following this logic, individuals who are experienced language-switchers should show a benefit in decision-making by making more deliberate, rational decisions mirroring those seen in the Foreign Language Effect. Notwithstanding, considering that language-switching requires high proficiency in both languages, boundaries of the Foreign Language Effect indicate that language-switchers should not show a Foreign Language Effect due to being too fluent. However, language-switching cannot be viewed as an all or nothing concrete idea but should rather be seen as a continuum ranging from those individuals who language-switch rarely to those who language-switch frequently. Additionally, it is also essential to take into consideration the reason why individuals switch from one language to another.
Oganian et al. (2016) investigated the effect of language switching on the appearance of the Foreign Language Effect in judgment and decision-making. Through a series of experiments, they found that language-switching, but not the use of a foreign language per se, caused a Foreign Language Effect. Using Germans who had either English or French as their foreign language, they conducted two experiments to test the influence of language proficiency and language shifting, independently, on decision-making biases. Participants were either placed in a low or a high proficiency group. They were then given numerous moral dilemmas that were modeled after the Asian Disease Problem (Unemployment problem, Computer virus problem etc.) and either gain or loss frames. One of these moral dilemmas was the Trolley Dilemma mentioned earlier in which an out-of-control train is headed towards a split in the tracks. The participant has a choice between keeping the train on the same track and saving one person or pushing a button for the train to switch tracks where it would save five people. In the gain frame version, the word "save" is used while in the loss frame version, the word "kill" is used. In Experiment 1 it was found that language proficiency did not affect the emergence of a Foreign Language Effect as a framing effect was present in both native and foreign language groups. In Experiment 2, the language that the problem was presented in was switched immediately prior to presenting the moral dilemmas. It was found that a framing effect was reduced, which Keysar et al. (2012) defined as an appearance of a Foreign Language Effect, when a language-switch occurred immediately before the presentation of the moral dilemma. Nevertheless, Oganian et al. (2016) did not collect any information on language-switching habits or abilities, or levels of acculturation.

Driver (2020) extended Oganian et al.’s (2016) findings by considering language-switching as a concept. In particular, Driver (2020) integrated many of the previously mentioned
studies into one experiment. Driver was interested in whether there might be a difference in moral decisions made in a foreign language as compared to having been made in a native language. Further, Driver investigated whether decisions made in a language-switching context would mirror decisions made in a foreign language or decisions made in a native language. It is important to note that Driver defines a Foreign Language Effect by the number of deontological judgments as compared to utilitarian judgments depending on the language condition a problem was presented in.

Driver belongs to a group of researchers (Čavar & Tytus, 2018; Costa et al., 2014; Driver, 2020; Geipel et al., 2016; Hayakawa et al., 2017) who take a rather non-cognitive approach to attempt to explain the Foreign Language Effect. In this cohort of researchers, they consider a FLE to be a preference for utilitarian decision-making over deontological decision making in a foreign language (Costa et al., 2014; Driver, 2020; Geipel et al., 2015; Hayakawa et al., 2017). Driver (2020) administered multiple versions of the Trolley Dilemma and the Footbridge Dilemma to simultaneous English-Spanish bilinguals. Participants saw these dilemmas in either a native language condition, a foreign language condition, or a language-switching condition. A Foreign Language Effect was found for judgments made in a foreign language. However, it was also found that contrary to Oganian et al.’s (2016) findings, judgments made in the language switching condition imitated those made in the native language conditions.

Given this inconsistency in findings, more research is warranted in the domain of language switching and its effects on the Foreign Language Effect. More specifically, language-switching needs to be examined in terms of its individual differences and whether these individual differences could potentially form a boundary to the Foreign Language Effect. While it is not unreasonable to assume that in fluent or frequent language-switchers both languages
might act as a native language rather than a native and a foreign language, it cannot be assumed that this is the case for all different kinds or categories of language-switching. For example, an individual who may not regularly switch between languages or may frequently switch accidentally or only due to specific social cues between languages may not show the same language pattern as a frequent switcher. Therefore, the current study improves on this experiment by more critically assessing participants’ language-switching abilities and categorizing them into frequent or infrequent switchers. As mentioned previously, this categorization is paramount, as frequency of switching indicates language fluencies and switching abilities which can vary greatly between the different categories of language-switchers.

The Current Study

In summary, in the past, researchers have found some boundaries of the Foreign Language Effect (cultural aspects, language combinations, etc.), as well as suggested a number of different explanations of how the Foreign Language Effect might influence judgment and decision-making processes. However, the amount of influence that language-related variables and cultural variables have on the emergence of a Foreign Language Effect remains unclear. This lack of clarity leads to a number of new research questions. Therefore, the purpose of this study was to elicit a Foreign Language Effect in Foreign Language and Language-Switching conditions by disappearance of a framing effect. Further, it was hypothesized that a Foreign Language Effect can be induced in a language-switching condition and that a significant amount of the variance in judgments can be explained by various language specific variables and levels of acculturation. Arabic-English bilinguals were evaluated, and it was hypothesized that again a Foreign Language Effect could be induced in the Foreign Language condition and Language-switching condition. Likewise, it was hypothesized that a significant amount of variance in
judgements could be explained by language and cultural variables in the form of potential covariates.

**Method**

**Research Design**

This study was designed as a 3 (language condition: English vs. Arabic vs. Language-switching – Between-Subject manipulation) x 2 (framing condition: Gain Frame vs. Loss Frame – Between-Subject manipulation) x 2 (dilemma type: Trolley Dilemma vs. Footbridge Dilemma – Within-Subject manipulation) x 2 (participant gender: male vs. female) mixed experimental design. There were multiple independent variables. One factor was language condition which had three levels: English (as the foreign language), Arabic (as the native language), or Language-Switching condition. In the Language-Switching condition, sentences throughout the entire survey, as well as, during the moral dilemmas alternated between English and Arabic.

Another factor was framing condition which had two levels: gain-frame or loss-frame condition. In the gain-frame condition, the dilemmas were worded using the words “save”, where in the loss-frame condition, the dilemmas used the words “die”. The last factor (moral dilemma) was a repeated measures factor with two levels: Trolley Dilemma and Footbridge Dilemma.

Each participant was randomly assigned to one of six survey conditions: English-Gain, English-Loss, Arabic-Gain, Arabic-Loss, Language-Switching-Gain, or Language-Switching-Loss. In all conditions, participants saw the Trolley Dilemma first and the Footbridge Dilemma second. Examples of the dilemmas and wordings can be found in the Appendices A and B. The dependent variables were answer choices in the moral dilemmas. This was operationalized as a number between 0 and 100. For each dilemma, the participant could move a slider between 0 (I will not push the button/I will not push the man) and 100 (I will push the button/I will push the
man) to indicate their likeliness of which choice they would make in the dilemma. Language capabilities, switching preferences, and levels of acculturation were treated as covariates.

**Materials**

**Positive and Negative Affect Schedule (PANAS).**

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) was used to establish a baseline mood measurement. This questionnaire includes a 5-point Likert Scale (not at all to extremely) of twenty affective adjectives of positive and negative affect. Examples include, but are not limited to: “determined, attentive, afraid, inspired, nervous”. Data from this measure were employed during analyses as a possible covariate of dilemma judgments in order to control whether baseline mood may have affected judgments made during the Trolley and Footbridge Dilemmas.

**Trolley Problem.**

The Trolley Problem was first introduced by Thomson (1985). For the purpose of this study, a version modified by Cao et al. (2017) will be used. This moral dilemma involves a train (otherwise known as a trolley or a tram) at a split in the tracks. The participant is presented with two different courses of action. If the participant chooses to do nothing, the train will stay on its track and kill five workers on the track. If the participant chooses to pull a lever, the train will switch to a sidetrack where there is only one worker on the tracks. Thus, the five workers would be saved, but the single worker on the sidetrack would die. In the gain-frame condition, the word "save" is being used, and in the loss-frame condition, the word "die" is being used. Participants indicated their likeliness to take action on a scale from 0 (“I will not pull the lever”) to 100 (“I will pull the lever”). Examples of this have been included in Appendix A.
Footbridge Problem.

This moral dilemma is an extension of the Trolley Problem (Cao et al., 2017). In this extension, the participant is asked to imagine themselves standing on a bridge seeing a runaway trolley coming towards them. Next to them stands a large man, who, if pushed under the train, can save five workers from being killed, while sacrificing the large man. In the gain-frame condition, the word "save" is being used, and in the loss-frame condition, the word "die" is being used. Participants indicated their likeliness to take action on a scale from 0 (“I will not push the man”) to 100 (“I will push the man”). Examples of this have been included in Appendix B.

Language and Social Background Questionnaire (LSBQ).

A modified version of the Language and Social Background Questionnaire (LSBQ; Anderson et al., 2018) was used to determine language proficiency and to assess levels of bilingualism. This questionnaire determines how well the participant knows Arabic and English and other questions regarding the place of the learned language. This questionnaire requires participants to answer how well and how often, on a scale of 1-100, an individual speaks, reads, writes, sees, and listens to a language in their day-to-day life. Participants will be assessed on their bilingual abilities based on their self-reported usage. Example questions include, but are not limited to: “Have you ever lived in a place where English is not the dominant communicating language?” or “Of the time you spend engaged in each of the following activities (speaking, reading, writing, and listening), how much of that time is carried out in this language?”. Data from this measure were employed during analyses as a possible covariate of dilemma judgments in order to control whether levels of bilingualism may have affected judgments made during the Trolley and Footbridge Dilemmas.
Bilingual Switching Questionnaire (BSWQ).

The Bilingual Language Switching Questionnaire (BSWQ; Rodriguez-Fornells et al., 2012) will be used to determine language switching habits. This questionnaire determines whether participants are overall switchers or non-switchers, unintentional switchers, or intentional switchers. The questionnaire requires participants to answer on a five-point Likert Scale ranging from "never" (1) to "always" (5) how often they tend to switch languages on a daily basis and whether they do it consciously. This questionnaire is divided into three subscales: overall switching tendencies, intentional switches, and unintentional language switches. Each of these subscales is calculated from two questions specific to the subscale on this questionnaire and will be cross evaluated with the participants' decision outcomes. Example questions include but are not limited to: “I tend to switch languages during a conversation (for example, I switch from Arabic to English or vice versa).” or “Without intending to, I sometimes produce the English word faster when I am speaking in Arabic.” Data from this measure were employed during analyses as a possible covariate of dilemma judgments in order to control whether language-switching abilities may have affected judgments made during the Trolley and Footbridge Dilemmas.

Arab Acculturation Scale (AAS).

A variation of the Arab Acculturation Scale (Barry, 2005) was used to determine levels of acculturation. This questionnaire is separated into the separation/assimilation scale and the integration/marginalization scale and includes a total of four statements. The former measure includes questions such as “Most of my friends are native speakers of Arab”, while the latter includes questions such as “I am equally at east socializing with native speakers of English and native speakers of Arabic.” Each statement was rated on a seven-point Likert scale ranging from
strongly disagree to strongly agree. Data from this measure was employed during analyses as a possible covariate of dilemma judgments in order to control whether levels of acculturation may have affected judgments made during the Trolley and Footbridge Dilemmas.

**Demographics Questionnaire.**

A demographics questionnaire was created for this study for participants to report their demographic information such as age, ethnicity, and socio-economic background.

**Procedure**

The participants were recruited through social media advertisements on Facebook that included a link to redirect participants to the Qualtrics website to fill out the survey. The participant first read and electronically signed the informed consent form. Then the participant filled out a modified version of the LSBQ to confirm an appropriate level of language exposure and proficiency. Next, the participants were guided through the Trolley Problem and the Footbridge Problem in either a gain-frame or a loss-frame (counterbalanced) and in a particular language condition which were counterbalanced (depending on what group they were randomly assigned to) between native language condition, foreign language condition and language switching condition. Next, participants filled out the BSWQ to assess language-switching habits. Lastly, the participant encountered a demographics questionnaire. The participant was then thanked for their participation and debriefed.

**Participants**

One hundred and sixty-eight undergraduates ($Mean_{age}=20.92$) were recruited from the Psychology Participant Pool of Prince Sultan University in Saudi-Arabia. There were 120 females and 48 males. Participants were predominantly Muslim. Only adults over the age of 18
who speak both English and Arabic were included. Participants were predominantly sequential bilinguals who speak Arabic as their native language and English as their foreign language which they reported to have primarily learned at school. It is essential to note that English is the language of instruction at Prince Sultan University. Exclusion criteria for this study included lacking proficiency in either language. This was controlled for during the recruitment process. At this institution, the language of instruction is English. At this institution, in order to be enrolled in classes, students had to demonstrate English proficiency at level B2 of the Common European Framework of Reference (CEFR) which is the fourth level out of six levels and represents upper intermediate English skills. Students below this level were not invited to participate in this study, thus managing lacking proficiency. An alternative measure of control of proficiency was the use of the Language and Social Background Questionnaire (more information on this measure can be found on page 19).

Results

This results section begins with a breakdown of zero-order correlations between the independent variable (dilemma choices) and potential covariates to identify which potential covariates needed to be included in the ANCOVA. A full report of correlations can be found in Table 1. Next, the imbalance between genders was discussed. Lastly, the main a-priori hypothesis analysis was conducted in form of a 3x2x2x2 repeated measures ANCOVA.

Gender

Prior to discussing the main a-priori hypothesis analysis, a significant concern in the data has to be addressed. Although gender was not included in the original design of this study (hence, this factor was not controlled for), the current sample included significantly more females than males. First, a Chi-Square analysis was run to address if the number of males and
females was comparable across all six conditions (Arabic-Gain, Arabic-Loss, English-Gain, English-Loss, Language-Switching-Gain, and Language-Switching loss). It was found that there were no significant differences in the distribution between males and females across conditions, \(X^2(5, N = 168) = 1.804, p = 0.875\). Lastly, as will be discussed in the following section, in the 3x2x2x2 repeated measures ANCOVA, the effect of gender was negligible \((F(1,168) = 0.13, p = .716)\).

**3x2x2x2 Repeated Measures ANCOVA**

This analysis was performed using SPSS Manova syntax. The data were analyzed using a repeated measures ANCOVA with moral dilemma judgments (2 levels: Trolley Dilemma, Footbridge Dilemma) as a within-subjects repeated variable, and framing (2 levels: gain-frame, loss-frame), language (3 levels: Arabic as the foreign language, English as the native language, language-switching), and gender (2 levels: male, female) as between-subjects variables. The purpose of this analysis was to test the primary hypothesis. The primary hypothesis was that moral dilemma judgments would vary depending on the framing and language condition they were presented in. Further, it was hypothesized that these effects would persist even after controlling for pre-existing mood (as measured by the PANAS), levels of bilingualism (as measured by the LSBQ), language-switching preferences (as measured by the BSWQ), levels of acculturation (as measured by the AAS), gender, or age. Table 2 contains means and standard deviations for the dilemma judgments in each language and framing condition (Arabic-Gain, Arabic-Loss, English-Gain, English-Loss, Language-Switching Gain, and Language-Switching Loss). There were no significant main effects of dilemma, language, framing, or gender, and no significant covariant factors, \(F(1,154) = 2.00, p = .160\).
There was however, a significant interaction effect of dilemma and language ($F(2,154) = 3.26, p = .041, \eta^2_p = .041$). Specifically, in comparison to both the native language condition and the language-switching condition, the difference in mean judgments between the Trolley Dilemma and the Footbridge Dilemma was significantly larger, $F(1,160) = 6.84, p = .010$. This difference in means has been visualized in in the Figure.

**Discussion**

The purpose of this series of experiments was to elicit a Foreign Language Effect in Arabic-English bilinguals in order to delineate whether different types of language-switching would limit the appearance of a Foreign Language Effect. It was hypothesized that language variables could explain a significant amount of variance in dilemma choices made in English as the foreign language. Likewise, it was hypothesized that in Arabic-English language-switching abilities, overall language expertise, and cultural background would explain a significant amount of variance in judgements. Further, it was hypothesized that a Foreign Language Effect would be dependent on the type of language-switcher a participant might be.

No Foreign Language Effect, as defined by Keysar et al. (2012) as a disappearance of the framing effect in the foreign language condition, was found. However, a Foreign Language Effect using a broader definition of differing decisions between native and foreign language conditions was found. In the Trolley Dilemma, but not in the Footbridge Dilemma, participants in the foreign language condition were less likely to take action. In the Trolley Dilemma, this meant pulling the lever, whereas in the Footbridge Dilemma it meant pushing the man (see Figure on page 48). It was also hypothesized that a Foreign Language Effect in Language-switchers would be dependent on the type of language-switcher the participant was. There was
no evidence found for this hypothesis as there was no significant zero-order correlation with either of the moral dilemma choices, and language-switching was not a significant covariate in the ANCOVA. Further, it was hypothesized that language habits, language-switching habits, and levels of acculturation would explain a significant amount of variance in judgements as covariates. There was no support for this hypothesis either as daily mood for the testing day, age, gender, language capabilities, language-switching abilities, and levels of acculturation of the participants did not interfere with the results.

Overall, these findings somewhat align with previous literature that has found a Foreign Language Effect. If the Foreign Language Effect is defined by a disappearance of the framing effect (as was the case in Keysar et al., 2012), then this experiment did not find evidence of a Foreign Language Effect. If however, a Foreign Language Effect is more loosely defined by participants making different decisions in a native language than in a foreign language (Geipel, 2016), then this experiment may have found support for a Foreign Language Effect. The finding of a difference in mean decisions between the Trolley Dilemma and the Footbridge Dilemma in the Foreign Language condition but not in the Native or the Language-Switching condition can be interpreted in two ways. Participants making significantly different decisions in the Foreign Language (English) condition, but not in the Native Language (Arabic) or Language-Switching condition, could be interpreted as support for the Foreign Language Effect if it is defined as a different decision outcome when a problem is presented in a foreign language rather than a native language.

On the other hand, as mentioned earlier, a concept called “believability” could have influenced these results. “Believability” refers to how realistic or believable a moral dilemma is.
Monolingual research (e.g., Evans, 2007, 2008) suggested that the believability of a moral dilemma influences the decision-making process. For example, in terms of the Trolley and Footbridge dilemma, research (e.g., Evans, 2007, 2008) has suggested that participants perceive themselves more removed/less involved from a scenario where they are asked to press a button or push a lever in comparison to when they are imagining themselves to push a person. Unfortunately, in this case no determination can be made regarding either explanation of the interaction found. One potential idea to resolve this discrepancy in interpretation of the results could be to replicate this experiment without the framing manipulation to see if these findings will be replicated in the same form. Further, a believability measure could be added to address whether the results could be attributed to an explanation other than a Foreign Language Effect. Yet, no Foreign Language Effect was tied to the type of language-switcher was among participants.

Regardless, these findings are particularly relevant against a backdrop of having utilized non-WEIRD brains (Henrich, Heine, & Norenzayan, 2010). Weird brains are considered Western, educated, industrialized, rich, democratic countries, which an example of this are the United States of America. An overall trend in research has been the use of predominantly undergraduates in introductory psychology courses which participant pool itself is quite restrictive and makes it difficult to elaborate on greater claims regarding the generalizability of this restricted population. This finding highlights the need of diversifying participant pools and populations recruited overall. Therefore, for this experiment having utilized non-WEIRD brains is an important part of moving the research field of the Foreign Language Effect forward as thus far only one other study has used Arabic bilinguals.
The undergraduates surveyed in this particular experiment come from an Arabic-speaking Eastern background. Further, of particular importance is how closely in Saudi Arabia, language, culture, and cognition are tied to the Muslim religion. Particularly important to mention is the cultural context that is required to adequately interpret the results of this experiment. It is not unreasonable to assume that Arabic culture and Islam are closely related (Al-Yassini, 2011) which is particularly true for Saudi Arabia where participants were recruited. As our sample was exclusively Muslim, the adherence to Islamic views underscores the importance of the preservation of life. Therefore, it is essential to consider the population’s cultural background when interpreting these results.

**Methodological Limitations**

There are several limitations to our experiments. Potential limitations can be categorized into three different categories: methodological or linguistic.

One methodological limitation could have been the use of online data collection and the natural consequences of such. For example, when conducting research online experimenters hold less control on the context in which the survey was taken. In comparison to a controlled laboratory environment, the distractions that occurred at the time of participation are unknown to the experimenters. Further, while Qualtrics was programmed to distribute all six surveys evenly randomly, it appears that there were unexplained differing levels of attrition between the different conditions. Only data from participants who had completed the entire survey were analyzed. All surveys were structured exactly the same, the only difference being in the language that the entire survey was conducted as (English, Arabic, or both). Qualtrics assigned a different condition to each participant, regardless of if the participant prior finished the survey or not.
Further, no consistent trends could be found in the attrition rates. Future experiments might choose to replicate this experiment in person to avoid the level of attrition. Relatedly, this experiment had more female than male participants. Future experiments may consider balancing gender during recruitment as well.

Another potential limitation stems from one of the measures that were used: The bilingual switching questionnaire (BSWQ; Rodriguez-Fornells et al., 2012). The concept of language-switching is psycho-linguistic, as well as, psycho-social. Bilinguals tend to switch between languages for reasons (for a full discussion of this subject, please see Heredia & Alcarri, 2001). Our participants reported their personal reasons for language-switching included using the first word or language that came to mind, or easier communication with their conversation partner, or if they forgot a word in their other language. Additionally, the categories in the BSWQ may be problematic for the population that was evaluated in both experiments as the scale was originally used for Spanish-Catalan speakers. Spanish and Catalan are languages with significantly less linguistic distance and more similarity than Arabic and English. Regardless, it could be possible that the language-switching categories suggested by this measure may not reflect our participants’ language-switching experience.

Other limitations include the chosen decision-making measures. It is possible that participants were already familiar with versions of the Trolley and Footbridge Dilemmas. Further, evidently in the Arabic-English sample, the Qur’an teaches that it is unforgivable to kill a person for no good reason and both dilemmas were based around killing persons/persons dying. It would be interesting to repeat the experiment with a different task. However, the type of task particularly for this group of participants should be chosen according within local cultural traditions. For example, Awad et al. (2020) considered solely cultural variations in preferences
during the Trolley Dilemma and the Footbridge Dilemma. They found that there are universal preferences across cultures. However, they also found that particularly in Eastern countries, participants preferences seemed to be based in the perception of how unacceptable it would be to sacrifice a life which could potentially explain some of the findings of the current study.

Alternatively, a financial decision-making task could be considered. However, in tight cultures, such as the Arabic culture, studies have found that monetary rewards are not held equally as high regards as a family focused reward (Telzer et al., 2013). Therefore, a financial decision-making measure would be equally as inappropriate here. A potential future direction could be the “prisoner’s dilemma” (Poundstone, 1993). This vignette includes a number of prisoners who have the chance to betray one another for a reduced sentence. Prior research has found that participants tend to betray each other. In a Foreign Language Effect experiment it would be expected that if this dilemma was presented in a foreign language, participants would not betray each other.

A related limitation could be found in the word choice of the difference in framing of the moral dilemmas. For both the Trolley and the Footbridge Dilemma, in the gain-frame conditions the words “save” were used, where in the loss-frame conditions the words “die” were used as is customary in this field of research (e.g., Broeders et al., 2011; Brouwer, 2019; Brouwer, 2021; Caldwell-Harris & Ayciceği-Dinn, 2020; Cao et al., 2017; Cavar & Tytus, 2018; Corey et al., 2017; Costa et al., 2019; Driver, 2020; Dylman & Champoux-Larsson, 2020; Geipel et al., 2016; Hayakawa et al., 2017; Winskel & Bhatt, 2019). In future research, it would be interesting to change the word “save” in the gain-frame conditions to the word “rescue” as these words differ in meaning, as well as valence and arousal. Before changing the wording in Foreign Language Effect research, these moral dilemmas should be evaluated by monolinguals to see if a framing
effect can be found using the changed wording. However, it would be interesting to see this variation of these dilemmas in the Foreign Language Effect field.

**Linguistic Limitations**

One possible linguistic limitation could have arisen from using written Arabic given a concept called diglossia. More specifically, there is a fundamental difference between spoken Arabic (with all of its variations and dialects) and written Arabic (also referred to as Modern Standard Arabic or MSA) (Wahba et al., 2006). The study utilized Modern Standard Arabic in all translations of materials which is not to be confused with Classical Arabic. The Qur’an is one example of literature that was written in Classical Arabic (Fischer, 1997). It is not unreasonable to speculate Classical Arabic could be comparable to a form of Elizabethan or Shakespearean English, while Modern Standard Arabic could be comparable to Standard English. Given the prevalence of adherence to Islamic values, it is not unreasonable to consider whether the modality the dilemmas were presented it could potentially have influenced participants’ choices.

L. B. Feldman (personal communication, July 30, 2021) suggested, it is possible that by using written Arabic the experimenters may have increased the likelihood of religious aspects influencing participants’ decision due to the Qu’ran being written in Arabic. While the present sample was exclusively Muslim, religiosity was not assessed in the current experiment, therefore, no valid assertion can be made on this concern. Further, prior research by Brouwer (2021) has found that the modality itself a problem is presented it might affect the appearance of a Foreign Language Effect. She found that participants who the moral dilemmas were presented to in an auditory modality would make more rational decisions than those who the moral dilemmas were presented to in a visual modality. Unfortunately, due to lack of diglossia data, no
valid assertion can be made whether or not diglossia could have been responsible for the present results. In order to address this limitation, future studies should present the moral dilemmas in both an auditory and a visual modality to address whether diglossia or by extension presentation modality specifically in the case of Arabic could be a potential moderating factor.

Lastly, one potential limitation could have been the sample that was chosen for this experiment as the participating undergraduates from Prince Sultan University could have been trained switchers given that English is the language of instruction at this institution. When individuals are experienced language switchers, both languages tend to act more like native languages rather than like a native and a foreign language. The data collected in both experiments only partially answered the research questions. It was hypothesized that the type of language-switching would be correlated with the appearance of a Foreign Language Effect. More specifically, it was expected that no Foreign Language Effect would be found in individuals who are habitually language-switching. In this instance both languages tend to act like native language rather than native and foreign languages. Therefore, we did expect a framing effect to be present. However, in line with Keysar et al.’s (2012) definition, no framing effect was observed in the foreign language condition either. We expected there to be a Foreign Language Effect in those individuals who are infrequent language-switchers and we did not find evidence to support this. These findings imply that the type of language-switcher may not moderate a Foreign Language Effect. Moreover, perhaps English itself may hold a special status in the Foreign Language Effect research (Dylman & Champoux-Larsson, 2020). As English has been considered a lingua franca in many countries, it may not be as “foreign” as other foreign languages as exposure to this language is more and more common through music, movies and
pop-culture. Therefore, it is essential to replicate the current experiment with a language pairing that does not contain English.

**Implications**

On the macrolevel, these implications add to the bigger debate around the boundaries of a Foreign Language Effect. Given that only about 50% of experiments investigating the Foreign Language Effect found evidence to support it, a conversation regarding which exact circumstances are necessary for it to appear is necessary. Past research has found FLE might be tied to certain circumstances—the right language-pairing, the right fluency of the individual, the right modality, along with the right level of immersion and acculturation, or even the “right” task. Regardless, though much is already known about this effect, more research is needed as to what exactly the boundaries are, for this effect (for an exhaustive review, see Gross & Altarriba, under review). Further implications indicate possible additional boundaries of a Foreign Language Effect that have not been discussed extensively to date. Some of which were discussed in an earlier section of this paper. Currently, data are being collected to see whether the same findings can be replicated in comparison groups of English and Arabic monolinguals. While continuing to assess levels of acculturation, further evidence can be collected whether the present findings are valid, reliable, and replicable. Lastly, it will give the researchers the opportunity to compare findings in monolinguals to findings of bilinguals in matched comparison-groups to evaluate a larger picture of potential boundaries of a Foreign Language Effect as the current experiment did not employ any monolingual data.

The current findings raised the question if certain values in some cultures could be less susceptible than other cultures to a Foreign Language Effect. Might some values be so deeply ingrained that no amount of framing or manipulations will change participants’ answers? For
example, in the current sample of Arabic-English bilinguals who were exclusively acculturated to Arabic culture and exclusively Muslim, it is not unreasonable to assume that the adherence to Islamic views underscores the importance of the preservation of life. It would be interesting in the future to evaluate other tight or collectivistic cultures to evaluate whether some values could be immune to a Foreign Language Effect.

**Future Directions**

Future directions in this field include further evaluating the role of culture in bilingual decision-making. Much of the information that has been learned over the past eight years since Keysar et al. (2012) published the first article about the Foreign Language Effect, equally as much remains unknown. This includes the exact boundaries and circumstances for a Foreign Language Effect to emerge. Future research should seek to address these questions. Further, research should be advanced to find one coherent explanation of the Foreign Language Effect. Most importantly, future research should seek to clearly integrate culture into research concerning how the ability to speak multiple languages affects judgement and decision-making as the constructs of language and culture are closely related. For example, Ellefson et al. (2017) have found that one’s culture also affects higher level cognitive function, which might implicate judgment and decision-making processes. Another direction for future research according to Polonioli (2018) should concern areas of judgment and decision-making outside of fast and frugal heuristics which is what most of the Foreign Language Effect literature has focused on thus far. As described in the beginning of this paper, there are many more different areas of judgment and decision-making that have remained largely unnoticed in the Foreign Language Effect research.
Conclusion

To summarize, the research presented here has numerous different practical implications aside from adding to a bigger debate in the field. For example, understanding the way individuals who speak more than one language think, judge, and decide is essential for more effective communications. Further, this understanding can be the background for using bilingualism as a clinical tool during therapy (Santiago-Rivera & Altarriba, 2002). Other practical implications can be found in school environments or environments that employ standardized testing as results from the studies like the present one can be used to support those students or individuals for whom English is a new language. Lastly, findings might become relevant in the judgment of illegitimate information or “fake news” in another language as particularly those who speak more than one language might be vulnerable in this matter. In conclusion, this experiment contributes to the bigger field in numerous ways which aid in uncovering possible boundaries of a Foreign Language Effect.
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### Table 1

*Zero-order correlations between the dependent variable measures Trolley and Footbridge dilemma answers and potential covariates.*

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>LSBQ</th>
<th>BSWQ</th>
<th>AAS</th>
<th>Positive Affect</th>
<th>Negative Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trolley Dilemma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson’s r</td>
<td>0.151</td>
<td>-0.072</td>
<td>-0.100</td>
<td>0.070</td>
<td>0.108</td>
<td>-0.048</td>
</tr>
<tr>
<td>p value</td>
<td>0.052</td>
<td>0.356</td>
<td>0.199</td>
<td>0.267</td>
<td>0.165</td>
<td>0.541</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Footbridge Dilemma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson’s r</td>
<td>0.027</td>
<td>0.095</td>
<td>0.027</td>
<td>0.075</td>
<td>-0.090</td>
<td>0.114</td>
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<tr>
<td>p value</td>
<td>0.731</td>
<td>0.222</td>
<td>0.731</td>
<td>0.333</td>
<td>0.245</td>
<td>0.141</td>
</tr>
</tbody>
</table>
Table 2

Participants’ Mean Responses organized by Survey Condition in the Trolley & Footbridge¹

Dilemmas

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean Trolley Dilemma Answer</th>
<th>Mean Footbridge Dilemma Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Gain (N = 22)</td>
<td>35.50 (SD = 24.80)</td>
<td>61.09 (SD = 32.89)</td>
</tr>
<tr>
<td>English Loss (N = 26)</td>
<td>41.31 (SD = 29.12)</td>
<td>54.42 (SD = 39.03)</td>
</tr>
<tr>
<td>Arabic Gain (N = 36)</td>
<td>52.5 (SD = 29.80)</td>
<td>59.00 (SD = 35.07)</td>
</tr>
<tr>
<td>Arabic Loss (N = 24)</td>
<td>52.5 (SD = 31.52)</td>
<td>47.83 (SD = 35.67)</td>
</tr>
<tr>
<td>LS Gain (N = 24)</td>
<td>51.52 (SD = 31.39)</td>
<td>52.33 (SD = 37.44)</td>
</tr>
<tr>
<td>LS Loss (N = 34)</td>
<td>64.41 (SD = 34.66)</td>
<td>58.03 (SD = 32.22)</td>
</tr>
</tbody>
</table>

¹Judgments were made on a scale from 0 – 100 with zero representing pulling the lever/pushing the man to 100 representing not pulling the lever/not pushing the man.
Figure 1

Mean Trolley and Footbridge Dilemma Judgments according to Language Condition collapsed on Framing condition

<table>
<thead>
<tr>
<th>Language Condition</th>
<th>Mean Trolley Dilemma</th>
<th>Mean Footbridge Dilemma</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹NL represents the native language condition Arabic, FL represents the foreign language condition English, and CS represents the language-switching condition. Blue bars on the left represent Trolley Dilemma judgments, green bars on the right represent Footbridge Dilemma judgments. The star indicates the significant difference in means between judgments made in the Trolley Dilemma and the Footbridge Dilemma within the Foreign Language (English) condition.
Appendix A

Trolley Dilemma

English Gain Frame Version

Suppose you see a running tram on the main road, and five workers are repairing the track in front of you. You can pull a lever in front of you that can force the tram to switch tracks. One worker is repairing the other track. All your actions are legal and understandable. Please pick which of the two options you would favor.
**English Loss Frame Version**

Suppose you see a running tram on the main road, and five workers are repairing the track in front of you. You can pull a lever in front of you that can force the tram to switch tracks. One worker is repairing the other track. All your actions are legal and understandable. Please pick which of the two options you would favor.
Appendix B

Footbridge Dilemma

English Gain Frame Version

Suppose you are standing on a bridge and see a runaway tram with no fork on track. Five workers will be killed on the front rail if no actions are taken. You are standing next to a large man. The only way to save the five workers is if you push the large man off the bridge. The man will be killed, but his body will stop the trolley and save the workers. All your actions are legal and understandable. Please pick which of the two options you would favor.

How likely are you to push the man?

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will push the man.</td>
<td>I will not push the man.</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
English Loss Frame Version

Suppose you are standing on a bridge and see a runaway tram with no fork on track. Five workers will be killed on the front rail if no actions are taken. You are standing next to a large man. The only way to save the five workers is if you push the large man off the bridge. The man will be killed, but his body will stop the trolley and save the workers. All your actions are legal and understandable. Please pick which of the two options you would favor.

![Questionnaire](image)