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# Does foreign language induce abstract thinking?

By

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## **Abstract**

How would using different languages influence the way people think about the world? The current research examines whether using foreign language induces abstract thinking in individuals. Specifically, by manipulating the desirability and feasibility features of real-life scenarios, I tested whether the language (i.e., native vs. foreign) in which the scenario was presented modulated the weight that people attach to the desirability and feasibility features of the scenarios and consequently, affected their likelihood of engaging in that event. The results showed no significant difference between people's ratings of importance towards the desirability features and the feasibility features when using their native languages and foreign languages. I suggested several improvements for the current study and discussed some potential research directions for future studies that want to examine the underlying mechanisms of the foreign language effect.

Kate is planning for her next summer vacation and wants to book a hotel online. She can review and compare different hotels on the booking website. Some hotels have good overall quality but are expensive. Some other hotels are cheaper but have lower level of quality. How will Kate choose between these two kinds of hotels? When Kate opens the website, the website automatically renders in English. English is a foreign language to Kate, but she understands the information on the website perfectly well and completes the booking. What if the website would have rendered in Kate's native language initially? Would Kate make the same decision about the hotel booking?

With the rapid increase in globalization, more and more people are exposed to multilingual environments. For example, advertisements on YouTube, product descriptions on the packaging, posters for introducing events can all be in multiple languages. Is information received in a foreign language instead of the native language construed and interpreted in the exact same way? Past research on language context can serve as a starting point to examine this question as psychological distance was considered as a potential mechanism to explain foreign language effect on people's decision making (Hayakawa et al., 2016). This study aims to test whether psychological distance that is manipulated by native versus foreign language influences the way people process information. More specifically, as people's abstract thinking is associated with the perceived psychological distance, I examined whether using foreign language will induce an abstract mindset.

### **Foreign-Language Effect**

Language research has traditionally addressed how formal aspects of language affect people's thought. From aspects like grammar, language structures, these studies have shown how native speakers of different languages think and behave differently (Chen, 2013; Lucy, 1992; Sera

et al., 1994; Sutter et al., 2015; Thoma and Tytus, 2018). Relatively recent, another line of language research has also shown that the mere status of a language (native or foreign) can change how people react to the same problem and influence the way they think and decide. Specifically, these studies mainly examined how the foreignness of a language influences people's thoughts and judgments. Most of these studies focus on late-bilinguals (e.g., people who have learned their second language in a classroom context) and found that using a foreign language changes people's judgments and decision making, and people are unaware about the effect (Hayakawa et al., 2016; Hayakawa & Keysar, 2018). For instance, Keysar and colleagues (Keysar et al., 2012) tested how foreign language influences choices when the same description is framed in terms of gains or losses. Research has shown that people are influenced by the way how the same information is framed (gains or losses), which is a cognitive bias and known as the framing effect (REF). Keysar et al. (2012) found that people are less influenced by such framing effects when choices are presented in a foreign language as compared to a native language. The results showed that people perceive risks differently and make more rational decisions when using a foreign language compared to their native language. Similar results were obtained by a number of subsequent studies (Costa et al., 2014a; Winkler et al., 2016). This foreign language effect is quite robust as it is replicated with multiple different languages and in multiple different decision domains (Costa et al., 2014a; Keysar et al., 2012).

The foreign language effect is likely determined by multiple factors. One explanation that has been most concerned by previous studies is emotional resonance (Chan et al., 2016; Geipel et al., 2015; Hadjichristidis et al., 2015). Literatures have shown that people have a strong emotional attraction to sure gains while show a strong aversion to sure losses (Kahneman & Frederick., 2007) and using foreign language might reduce people's susceptibility to framing effect by its attenuation

to emotional intensity people feel (Keysar et al., 2012). More studies have reported a consistent finding about the decreased emotional reactions for the use of foreign languages (Caldwell-Harris, 2015; Ivaz et al., 2016). This finding was also replicated by using physiological measures (Caldwell-Harris & Ayçiçeği-Dinn, 2009). When measuring people's skin conductance responses, Harris and colleagues (2003) found that people show lower levels of automatic arousal to taboo words and childhood reprimands in their foreign language compared to their native language. Therefore, researchers have speculated that emotional processing is enhanced in a first, dominant language and reduced in a later-learned, less proficient foreign language (Pavlenko, 2012).

Another explanation suggested for the foreign language effect focusing on the potential modulation foreign language could cause on psychological distance (Hayakawa et al., 2016; Keysar et al., 2012). Previous research has shown the causal relationship between emotional intensity and psychological distance (Van Boven et al., 2010). People will perceive the target object or event as psychologically closer when their emotional intensity is high. As decreased emotional intensity is related to increased psychological distance, foreign language may also increase the perceived psychological distance. However, different from the consistent findings for emotional resonance, there is no direct evidence to support the causal relationship between language foreignness and psychological distance. According to research on psychological distance, things that are felt more psychologically distant are also represented more abstractly in people's mind (Trope & Liberman, 2010). Therefore, the current study aims to provide direct evidence on how language foreignness influences people's abstract mindset.

### **Construal Level Theory**

Psychological distance is a subjective feeling that something is close or far away from the self, here, and now (Trope & Liberman, 2010). Trope and Liberman has identified four dimensions

of psychological distance as spatial distance, social distance, temporal distance and hypotheticality. Spatial distance matters when considering whether the target object is here or somewhere else. Social distance matters when considering whether you perceive another person as friend or stranger. Temporal distance matters when considering whether the target happens now or far away from the present. Finally, hypotheticality matters when considering the event is real or imaginary. Previous literatures illustrate that these four dimensions of psychological distance are automatically associated (Bar-Anan et al., 2006; Boroditsky, 2007; Macrae et al., 1994) and the distance perceived in one dimension influence the perceived distance on other dimensions (Stephan et al., 2010; Wakslak & Trope, 2008; Williams & Bargh, 2008).

Construal level theory (CLT) posits that people will use different levels of mental construal when their perceived psychological distance changes (Trope & Liberman, 2010). In daily life, people will form mental construals for objects and events and the CLT distinguishes people's construals into different levels. High-level construals are relatively abstract, superordinate mental representations. In contrast, low-level construals are more concrete, subordinate mental representations. When moving from a low-level construal to a high-level construal, people represent the activity in a more abstract way by retaining central features and omitting peripheral features. For instance, in the beginning scenario, the activity of "booking hotel online" can be described at a low level of construal (e.g., "visiting the booking website"). Conversely, at a high level of construal, the same activity can be described in a more abstract way (e.g., "planning a well-deserved vacation"). By representing the activity as "planning a well-deserved vacation", the peripheral feature, hotel, is omitted. As irrelevant details are omitted in abstracts representations, these representations tend to be simpler, more coherent, and more prototypical than concrete representations (Smith, 1998). The CLT claims that people will present the target at a lower

construal level if the target is physically closer (spatial distance), is socially closer (social distance), is happening in proximal future (temporal distance), or is real rather than imaginary (hypotheticality). In contrast, the target will be construed at a higher level if it is physically farther, is socially farther, is happening in distal future, or is imaginary rather than real. This association between distance and construal level develops because high-level construals are more stable and more likely to remain unchanged as one gets farther away from the target. Thus, it is more useful to construe the target at the high construal level. As a result, people adapt to construe psychologically distant objects at a higher level.

The CLT framework has been influential in multiple fields and supported by extensive research. In the meta-analysis conducted in 2015, the results showed a reliable effect of psychological distance on abstraction across 267 experiments (Soderberg et al., 2015). These studies included investigations on psychological distance across all dimensions, temporal, spatial, social and hypotheticality (Fujita et al., 2006; Sánchez et al., 2021; Todorov et al., 2007). At the same time, researchers used various methods to assess people's abstract or concrete processing orientations (Liberman et al., 2002; Wakslak et al., 2006), including the Snowy Pictures Test (SPT; Ekstrom et al., 1976) and the Gestalt Completion Test (GCT; Ekstrom et al., 1976). Both tasks require participants' ability to abstract visual information and focus on the structure. Previous studies also used the opposite task, the Wechsler Intelligence Scale for Children (WISC; Wechsler, 1991), which requires participants to observe details in the situation. Researchers also used the CLT framework to examine the various downstream consequences of the effect of psychological distance on abstraction across multiple fields, including imitation (Genschow et al., 2019), blood donation (Choi et al., 2012), consumer behaviors (Aggarwal & Zhao, 2015; Irmak et al., 2013; Yan & Sengupta, 2011) and other domains of social judgment (Henderson et al., 2006;

Ledgerwood, 2014; Rim & Summerville, 2014). In the current study, instead of focusing on one specific behavior or attitude, I intended to examine how foreign language use will affect people's abstract thinking broadly based on the CLT.

Previous unpublished study which also investigated the potential influence of using foreign language on construal level did not find supportive evidence (Geipel, 2015). In the study, the Behavioral Identification Form (BIF; Vallacher & Wegner, 1989) was used to assess people's level of construal. The BIF is designed to assess people's action identification. For each trial, the target action (e.g., "booking a hotel") will be presented along with two alternative descriptions of the action. One of the descriptions emphasizes how the action is performed (e.g., "visiting the booking website"), representing the concrete version of the target action. While another description emphasizes why the action is performed (e.g., "planning a well-deserved vacation"), representing the abstract version of the target action. Participants have to choose between these two alternative descriptions and decided which one best capture the target action. Choosing the concrete version representing using a lower level of construal. In contrast, choosing the abstract versions representing using a higher level of construal. The BIF was frequently used in the research of CLT to assess people's construal level (Kim et al., 2018; Wakslak et al., 2006). However, after manipulating the languages used to represent the BIF, no difference was found between the use of a foreign and a native language. One potential problem of using the BIF to assess the foreign language effect is that the task is less language heavy. Instead of complete sentences or scenario, the BIF only shows segmented phrases. Therefore, these phrases might not be sufficient to elicit the foreign language effect. Considering the limitations of the BIF, the current study used another method that is language heavier than the BIF to see whether foreignness of language could induce abstract thinking. More precisely, I assessed people's different levels of construe by examining

their evaluations to two aspects of the target event, the desirability feature, and the feasibility feature.

### ***Desirability and Feasibility***

Actions all have desirability features and feasibility features. Desirability features refer to the value attached to the subjects; whereas feasibility features correspond to the means of achieving the actions (Liberman & Trope, 1998; Trope & Liberman, 2010). For example, in Kate's case mentioned above, the overall quality of the hotel is a desirability feature, as it represents the value Kate attaches to the hotel. In contrast, the price of the hotel can be seen as a feasibility feature. In daily life, options both high in desirability and feasibility (HD-HF) are uncommon. Therefore, people are often facing options that are either high in desirability and low in feasibility (HD-LF) or low in desirability and high in feasibility (LD-HF). Focusing on which feature will influence people's decisions when they are facing choices. According to the CLT, desirability features are perceived as more abstract and superordinate, reflecting high construal level. Feasibility features, on the other hand, are more concrete and subordinate, reflecting low construal level. In Liberman and Trope's (1998) study, they manipulated the desirability and feasibility features in the scenario that participants need to make decision regarding a software. While presenting the scenario either in distant future or in near future, participants need to decide how likely they will install the software. As the CLT suggests, presenting events in distant future makes people feel psychological distant and adopt higher construal levels. The result shows that participants at higher construal levels were more affected by the desirability feature (i.e., efficiency of the software), whereas participants at lower construal levels were more affected by the feasibility feature (i.e., time needed to learn the software). More studies in the literature have shown supportive evidence to the effect, suggesting that thinking in an abstract way will make people focus more on the desirability of an

event (Han et al., 2014; Irmak et al., 2013; Liberman & Trope, 1998; Wan & Agrawal, 2011). Hence, the current study aims to explore whether manipulating language affects to which feature (desirability or feasibility) people give more emphasis to.

### **Overview of Experiment**

As language context is unavoidable for people's decision making, the current research investigated how language (i.e., native or foreign) influences people's mode of thinking (i.e., abstract or concrete). Specifically, real-life scenarios were presented as high in desirability features and low in feasibility features (HD-LF) and low in desirability features and high in feasibility features (LD-HF). The study examined whether language influences how people weigh desirability and feasibility features while making the decision.

Overall, we expected the participants to give more importance to desirability features and expected them are more likely to do the event when the desirability feature is high. This is because previous studies using the desirability versus feasibility features always found that overall people are more attracted to desirability features (Trope & Liberman, 2000; Wan & Agrawal., 2011). So we expected the main effect of feature. However, we also expected to observe an interaction between feature and language: If foreign language use leads to higher level of construal and hence directs attention towards the desirability of goals and away from the feasibility of goals, then foreign language use will make people focus more on the desirability features described in a decision scenario and will weigh desirability features as more important. Therefore, people reading the high-desirable/low-feasible scenario (HD-LF) in a foreign language are more likely to do the event compared to the participants reading the scenario in their native language. For example, in an exhibition scenario, participants using foreign language will be more willing to go to the exhibition if the scenario is described with a value attached to it (desirability feature). In contrast,

presenting information in the native language will make people focus more on the feasibility features and will make them perceive feasibility features as more important for their decision making. Correspondingly, people reading the low-desirability/high-feasibility (LD-HF) scenario in native language are more likely to do the event compared to the participants in the foreign language condition. In the exhibition scenario, participants using native language will be more willing to go to the exhibition if the scenario is described in a way that going to the exhibition is convenient (feasibility feature).

## Methods

### Participants

Participants were randomly assigned to perform the task in English ( $n = 125$ ) or in Chinese ( $n = 146$ ). Independent-samples t-tests were conducted to compare two groups. There is no significant difference between the English condition ( $M = 20.0$ ,  $SD = 1.72$ ) and the Chinese condition ( $M = 20.2$ ,  $SD = 1.70$ ) in age,  $t(269) = 0.744$ ,  $p = 0.458$ . There is no significant difference between the English condition ( $M = 9.16$ ,  $SD = 2.42$ ) and the Chinese condition ( $M = 9.26$ ,  $SD = 2.54$ ) in their age at which they had begun learning English,  $t(269) = 0.3308$ ,  $p = 0.741$ . Similarly, no significant difference was found between the English condition ( $M = 3.61$ ,  $SD = 0.503$ ) and the Chinese condition ( $M = 3.61$ ,  $SD = 0.612$ ) in their English proficiency,  $t(269) = 0.0147^a$ ,  $p = 0.988$ .

Participants were recruited in China. Only participants who passed the pre-screen criteria were recruited in the study. The pre-screen criteria included (a) participants need to be native Chinese speakers, (b) participants need to be raised with their native language only, (c) participants were born in China, (d) participants are currently reside in China, (e) participants need to have Chinese nationality, (f) participants don't often speak English at home since childhood, (g) participants have not lived in predominantly English-speaking country for more than 12 months,

(h) participants formally learn English after the age of 3, (i) participants are currently university students and (j) participants can read and write proficiently in English.

358 participants passed the pre-screen criteria and finished the experiment online. We excluded 87 participants from the analysis, as 58 of them failed the recognition tasks at the end of each scenario. 28 of them have duplicated IP addresses along with the same computer settings, duplicated study link reference codes and 1 participant started to learn English before the age of 3. For the remaining 271 participants (182 females, 89 males), their mean age was 20.1 ( $SD = 1.71$ ), and the mean age at which they had begun learning English was 9.21 ( $SD = 2.48$ ). Their mean English proficiency score was 3.61 on a scale from 0 to 7 ( $SD = 0.564$ ).

### **Materials and Procedure**

Participants were asked to read 2 real-life scenarios. One of the two scenarios was randomly selected to describe an event high in desirability but low in feasibility (HD-LF). Another scenario describes an event low in desirability but high in feasibility (LD-HF). The order of presentation was counterbalanced. One of scenarios that was used in the experiment is as follows (see Appendix for the other scenario):

*You and your friends are planning to go to an exhibition. Your friends would ask you to buy the ticket. [Desirability Feature: This exhibition presents work of an artist that you like very much/ This exhibition presents work of an artist that you are not familiar with, and you are not sure if you will like his work.] [Feasibility feature: However, it is conducted in an inconvenient place. The exhibition hall is very far away from where you live. You have to change buses and trains several times on your way. It takes about 1.5 to 2 hours to get there. / But this exhibition is conducted in a very convenient place. There is*

*a direct bus to the exhibition. It takes only 15 to 20 minutes to get there from where you live.]*

After reading each scenario, participants were asked to answer three questions regarding the scenario. The first question examines participants' preference for the event (*In this situation, how likely is it that you will choose to go to the exhibition/ you will attend the lecture?* 1 = unlikely, 9 = very likely). The second question examines the importance participants place on abstract features of the event (*In this situation, how important was it for your decision whether or not the exhibition interests you/ the guest lecture is interesting or relevant to your future work?* 1 = not at all important, 9 = very important). The third question examines the importance participants place on concrete features of the event (*In this situation, how important was it for your decision whether or not going to the exhibition is convenient for you/ the time of the guest lecture is convenient for you?* 1 = not at all important, 9 = very important). Finally, participants were asked to choose an option that describes the scenario correctly. The recognition task aims to check whether participants were paying attention to the scenario during the survey. Participants who failed to answer this question correctly were excluded from the analysis.

Participants were told that they are participating in a study about decision-making. Each participant responded to two scenarios of different types (exhibition and guest lecture) and different versions (HD-LF and LD-HD). Participants were randomly assigned to read the two scenarios either in their native Chinese or foreign English. After completing the main part of the study, participants completed a demographics survey, answering questions regarding their gender, age, English skills and English learning history.

## **Results**

## Likelihood

For participants' reporting of likelihood to go to the event a repeated measures analysis of variance (ANOVA) was conducted with manipulation (HDLF vs. LDHF) as a within-subjects factor and language (English vs. Chinese) as a between-subject factor. The analysis showed a significant main effect of manipulation,  $F(1, 268) = 73.90, p < .001, \eta_p^2 = 0.216$ . Participants reported their likelihood to go to the event significantly different to scenario with high desirability and low feasibility features and scenario with low desirability and high feasibility. As expected, participants reported that they are more likely to go the event with high desirability and low feasibility features ( $M = 78.5, SD = 21.0$ ) than event with low desirability and high feasibility ( $M = 62.9, SD = 24.8$ ) regardless of the language they use.

However, there was no significant main effect of language,  $F(1, 269) = 2.49, p = .115, \eta_p^2 = 0.009$ , showing that people do not respond significant differently when reporting their likelihood to go to the event using English and Chinese. I also found no significant interaction of manipulation and language,  $F(1, 269) = 0.602, p = .439, \eta_p^2 = 0.002$  (Figure 1). These results do not support my hypothesis that people will be more likely to go to the event with low desirability and high feasibility when using English compared to when using Chinese.

## Importance of features

I conducted a repeated measures analysis of variance (ANOVA) on participants' ratings of the importance they place on abstract and concrete features of the event with scenario (exhibition vs. lecture), feature type (abstract vs. concrete) as within-subjects factors and language (English vs. Chinese) as a between-subject factor. The analysis showed a significant main effect of scenario,  $F(1, 269) = 4.87, p < .05, \eta_p^2 = 0.018$ , and a significant main effect of feature type,  $F(1, 269) = 120.81, p < .001, \eta_p^2 = 0.31$ . These results show that participants responded significant differently

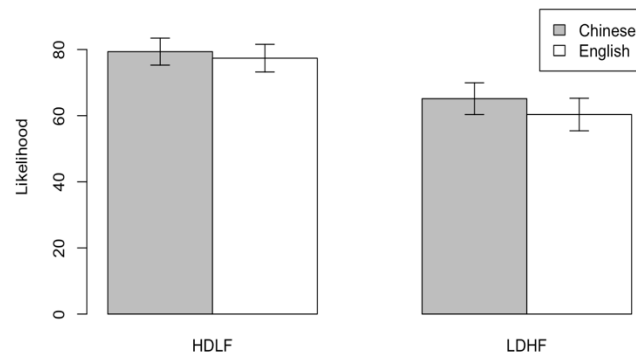
to the exhibition scenario and the lecture scenario. Participants rated two features in the lecture scenario ( $M = 6.50$ ,  $SD = 1.29$ ) more important than two features in the exhibition scenario ( $M = 6.52$ ,  $SD = 1.33$ ). Meanwhile, they also responded differently to the two questions asking about the desirability (abstract) and feasibility (concrete) features respectively. Participants rated desirability features ( $M = 7.17$ ,  $SD = 1.40$ ) more important than feasibility features ( $M = 5.66$ ,  $SD = 1.70$ ). However, there was no significant main effect of language,  $F(1, 269) = 0.374$ ,  $p = 0.541$ ,  $\eta_p^2 = 0.001$ . Participants did not respond significant differently when using English and Chinese.

At the same time, there was no significant interaction of scenario and feature type,  $F(1, 269) = 0.319$ ,  $p = 0.572$ ,  $\eta_p^2 = 0.001$ . No significant interaction of scenario and language,  $F(1, 269) = 0.00258$ ,  $p = 0.959$ ,  $\eta_p^2 = 0.000$ . No significant interaction of feature type and language,  $F(1, 269) = 0.32645$ ,  $p = 0.568$ . The analysis also did not show a significant interaction of scenario, feature type and language,  $F(1, 269) = 1.438$ ,  $p = 0.231$ ,  $\eta_p^2 = 0.005$  (Figure 2). These results do not support my hypothesis that people will rate feasibility (concrete) features more important when using Chinese compared to when using English, while rate desirability (abstract) features more important when using English compared to when using Chinese.

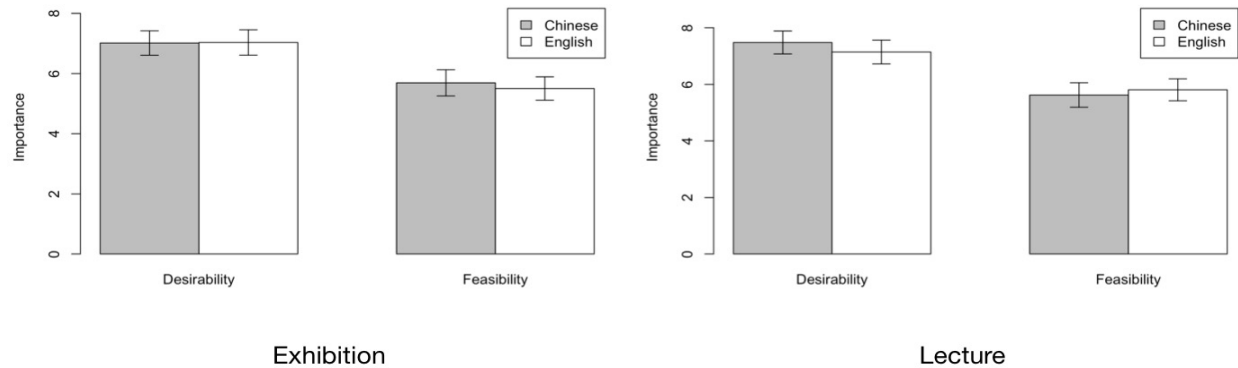
### ***Exploratory analysis***

As we found a main effect of scenario type, I also conducted the repeated measures analysis of variance (ANOVA) for each scenario separately. For the exhibition scenario, there was a significant main effect of feature type,  $F(1, 269) = 49.556$ ,  $p < .001$ ,  $\eta_p^2 = 0.156$ , indicating that participants rated desirability features ( $M = 7.02$ ,  $SD = 2.1$ ) significantly more important than feasibility features ( $M = 5.61$ ,  $SD = 2.11$ ). However, there was no significant main effect language,  $F(1, 269) = 0.289$ ,  $p = 0.592$ . Participants did not respond significant differently to the exhibition scenario when using English and Chinese. There was no significant interaction of feature type and

language,  $F(1, 269) = 0.259, p = 0.611, \eta_p^2 = 0.001$ . For the lecture scenario, the analysis also showed a significant main effect of feature type,  $F(1, 269) = 59.74, p < .001, \eta_p^2 = 0.182$ . Participants also rated desirability features ( $M = 7.32, SD = 1.90$ ) significantly more important than feasibility features ( $M = 5.71, SD = 2.38$ ). There was also no significant main effect language,  $F(1, 269) = 0.216, p = 0.643, \eta_p^2 = 0.001$ . Participants did not respond significant differently to the lecture scenario when using English and Chinese. There was no significant interaction of feature type and language was found for the lecture scenario,  $F(1, 269) = 1.59, p = 0.209, \eta_p^2 = 0.006$ . Therefore, for both scenarios, there was no significant interaction of feature type and language.



**Fig. 1.** Likelihood participants chose to go to the exhibition/ attend the lecture. In this experiment, Chinese was the native language, and English was the foreign language. Error bars represent standard deviation.



**Fig. 2.** Importance of the desirability feature and the feasibility feature participants rated. In this experiment, Chinese was the native language, and English was the foreign language. Error bars represent standard deviation.

## Discussion

The foreign language effect discovered in the literature has interested many researchers. Until now, researchers are still trying to examine the potential mechanisms underlying this effect. One intriguing explanation for the effect is the change of perceived psychological distance by the language foreignness (Hayakawa et al., 2016). The current study aimed to investigate whether using foreign language induced an abstract mindset by manipulating the desirability and the feasibility features in descriptions. I proposed that those using their foreign language would be more likely to go to the high-desirable but low-feasible scenario compared to people in another language condition. People using foreign language would also report desirability features as more important and feasibility features as less important. In contrast, people using native language would be more likely to go to the low-desirable but high-feasible scenario compared to people in another language condition. People using native language would also report desirability features as more important and feasibility features as less important. However, the current results do not support my hypothesis. The results demonstrate that there is no significant difference between people's ratings of importance towards the desirability features and the feasibility features when using their native languages and foreign languages. Therefore, using a foreign language does not

seem to make people focus more on abstract features of the target event by eliciting their abstract mindsets using the present experimental design.

The current study provides evidence showing that using a foreign language does not prompt people to represent information more abstractly. However, during the analysis, the results show consistent significant main effect of scenario type, suggesting the possible influence of scenario type to the study. In this study, I only used two scenarios to assess people's construal levels. I intended to keep the number of scenarios as less as possible to prevent participants from strategic answering, since these descriptions of the scenario all have similar structure which is easy to be detected. On the other hand, the limited scenario types might be insufficient to trigger people's abstract mindset and induce large variability between scenarios. Therefore, future research can try to use a larger number of scenarios with different structures. In addition, for the two scenarios used (lecture and exhibition), the lecture scenario showed more attraction to participants, since participants rated both features (desirability and feasibility) more important in the lecture scenario. These two scenarios were selected from six scenarios (including lecture, exhibition, camera, concert, restaurant, and furniture) used in previous literatures by the pilot study and I cannot exclude the possibility that there are other scenarios that could induce people's abstract thinking. Future research can use other potential scenarios to avoid the influence of scenario types but should be careful to consider the generalizability of the results.

Even though the current results show that using foreign language could not induce people's abstract thinking, one thing need to be considered carefully is that the current results cannot rule out all possibilities that using foreign language will induce psychological distance. As discussed before, the CLT proposes the association between psychological distance and the construal level (Trope & Liberman, 2010). The current study chose to focus on the construal level part and assess

whether using foreign language will lead people to higher construal level. At the same time, the method of assessing people's focus on desirability versus feasibility features is actually assessing the downstream consequences of the potential change of construal level. Therefore, the current study assumes that (1) the detection of the change on the construal level implies the change on psychological distance by using foreign language, (2) the detection of the differences of people's focusing on desirability versus feasibility features implies the change on the construal level. However, these two assumptions both have limitations on its own and thus leave spaces for future investigations on this topic.

Firstly, instead of assessing the construal level, future research can choose to focus on the psychological distance directly by assessing whether using foreign language induces different perceptions of the four dimensions of psychological distance (temporal distance, spatial distance, social distance and hypotheticality). Even though there is solid evidence for the bidirectional causal relationship between the psychological distance and the construal level, it is still different from measuring people's perceived psychological distance directly. For instance, after manipulating the language use, the temporal distance can be assessed by people's self-reports about how long certain events has happened or how people predict when future events will happen. The spatial distance can be assessed by people's self-reports about how far away they feel to certain objects spatially.

Secondly, other than differentiating the desirability and feasibility features, future research can try to assess people's construal level using other methods. One potential scale can be considered is the Memory Characteristics Questionnaire (MCQ; Johnson et al., 1988). The MCQ is designed to discriminate between real- and pseudo-memories based on the fact that real events are presented more vividly and contain more concrete details than falsely remembered events. This

scale has been used widely in the field of reality monitoring. There is also study found that the scale could successfully capture the difference between the representations for the temporally near and distant events (D'Argembeau & Van Der Linden, 2004). In align with the CLT, D'Argembeau and Van Der Linden used this scale and found that people will present temporally near events as more concrete and in detail and temporally distant events as more abstract. Therefore, Grinfeld and his colleagues (Grinfeld et al., 2021) used this scale to their CLT research and successfully replicated the prediction of CLT, showing that people tend to represent more hypothetical events as more abstract. Compared to other measures, the MCQ has several advantages to assess people's abstract mindset. Instead of using short phrases or describing the events in several sentences, the MCQ requires participants to imagine the entire events. In this way, researchers can assess people's mental images to the whole event instead of specific objects or certain features. However, the MCQ requires people report the event by themselves, while self-reports require people's certain language proficiency. People's lower foreign language proficiency might impair their performance on the MCQ. Therefore, researchers need to take care of this limitation when trying to use the MCQ in native versus foreign language research.

It is worth noting that there was a paper touched on the relationship between the foreign language effect and psychological distance (Shin & Kim, 2017). However, the author mainly focused on people's moral decisions and how foreign language could induce greater emotional distance and found that using foreign language will decrease the self-bias effect. Therefore, they did not measure either the perceived psychological distance or people's the construal levels directly when using the native and the foreign language. Another unpublished paper that focused on the construal level reported similar results as the current study that using foreign language has no effect on people's construal levels (Geipel, 2015). The study used the Behavioral Identification

Form (BIF; Vallacher & Wegner, 1989) to assess people's construal level and the BIF is less context dependent, since people just choose between different short phrases. Therefore, for my study and the unpublished study using the BIF, we both used more abstract and emotional-neutral methods and assessed people's construal levels directly. It is then reasonable to speculate that the failure to find the relationship could be related to the lack of emotionality in the descriptions the present study tested. It would be fruitful to investigate how language influences level of construal when using emotional and neutral descriptions.

Based on the current results and the points discussed, I speculate that the foreignness of the language might influence people's construal levels by its effect on the psychological distance. Meanwhile, the foreignness of the language influences psychological distance through the emotional intensity people perceived. Extensive research has provided solid evidence on how using native languages instead of foreign languages increases emotional intensity (Caldwell-Harris, 2015; Ivaz et al., 2016). Many studies confirmed the influence of language nativeness on decision making tasks that involve emotions, ranging from moral judgments (Cipolletti et al., 2015; Costa et al., 2014b; Geipel et al., 2016; Shin & Kim, 2017), framing effects (Hayakawa et al., 2016; Hayakawa & Keysar, 2018), financial decisions (Hayakawa et al., 2019). At the same time, Van Boven et al. (2010) also showed that emotional intensity reduces psychological distance people perceived. Therefore, it is reasonable to hypothesize that using foreign language will increase perceived psychological distance by decreasing emotional intensity. In the current study, however, the two scenarios might be insufficient to increase people's emotional intensity while using native language, leading to no difference between people's perceived emotional intensity in the native language condition and the foreign language condition. Therefore, no difference for the perceived psychological distance and no difference for the construal levels (concrete mindset vs. abstract

mindset) are the results. This speculation is similar with how using foreign languages fails to influence people's decision makings in the switch dilemma. The switch dilemma is formally the same as the footbridge dilemma but does not elicit stronger emotional intensity. Studies have shown consistent foreign language effects of the footbridge dilemma, as people will make more utilitarian decisions in this moral dilemma when using foreign languages (Cipolletti et al., 2015; Geipel et al., 2015). However, by changing the dilemma into a less emotional intense version, the foreign language effect also eliminates. In alignment with these results, the language manipulation in the current study might fail to make a difference for the non-emotional variant initially and then fail to elicit people's abstract thinking at the end.

This hypothesis needs to be formally addressed by future research. Here, I propose two potential manipulations based on the current study design to examine the mediating effect of emotional intensity on the influence of language foreignness on people's abstract thinking. The straightest way is adding scenarios that evoke stronger emotional reactions and including scales for participants to report their perceived emotional intensity. Considering the limited scenario types used in the current study, future studies can include both positive and negative events to see whether the speculated foreign language effect differs for positive and negative events. Previous studies have shown that people perceive less psychologically distant for emotional events compared to neutral events independent of events' valence (Van Boven et al., 2010). But they also found the effect of valence as people reported more emotionally intense to negative events than positive events. It will be interesting to see how the valence of the events could potentially interact with the foreignness of language. For instance, whether the effect of language foreignness on abstract mindsets only exist for negative events as they induce stronger emotional intensity, or the effect is also independent of events' valence. When assessing people's perceived emotional

intensity, the method used should also be considered carefully. Most studies in the literatures used self-ratings, the emotional scales, to directly ask participants' perceived emotionality. However, for foreignness language research, people's ratings on the emotionality for the same event will be different as they are anchored differently depending on the language used to present the emotional scale (De Langhe et al., 2011). Studies also tried to assess people's perceived emotionality by physiological measures like pupil dilation (García-Palacios et al., 2018). The problem with this for foreignness language research is that pupil dilation is also positively associated with processing difficulty, which is affected by the use of foreign languages. Therefore, future studies could explore more different methods for assessing emotional intensity perceived.

Another manipulation future studies could implement is directly making people be in a more emotionally arousing state when completing the main task. Van Boven and colleagues did this in their experiment by assigning different social roles to participants. Specifically, they randomly assigned people into roles either as performers or observers. Performers believed that they need to perform before an audience and therefore felt more emotionally intense than observers. Their study successfully showed that this emotionally intensity reduces perceived psychological distance. Therefore, future research could also adapt this method to manipulate people's emotional intensity indirectly through assigning different social roles. Besides the two manipulations I suggested here, future researchers can also look for other potential designs that could better examine the relationship between using foreign language and abstract thinking and the potential mediating role of emotional intensity.

## **Conclusion**

To conclude, the current study suggests that using a foreign language does not promote more abstract representations of information. More and more people are using foreign languages

in daily lives. Therefore, examining how foreign language use influences how people think, judge and decide is important. Given that extensive studies examined the underlying mechanisms of the effect, the current findings provide more evidence to show that that foreign language use might not influence how we represent information. I suggest that there is a mediating effect of emotional intensity and further empirical evidence is needed to address on it.

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## Appendix

### Scenario 2

*Imagine that a guest lecture will be given tomorrow. Your professor advised you to go to the lecture. [Desirability Feature: You think that it might be interesting and relevant for your future work/ But you do not think that the topic is interesting or that it is relevant to your future work].*

*[Feasibility feature: The lecture is scheduled for an inconvenient time: It is between two classes and you will not have time to rest between the classes if you go to the lecture./ The lecture is scheduled for a convenient time: You don't have any classes at this time, and did not plan to do anything special.]*