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Original Article

The International Journal of Bilingualism

The Foreign Language Effect on Tolerance of Ambiguity in an Asian Collectivist Culture

International Journal of Bilingualism
1–16
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DOI: 10.1177/13670069261492974
journals.sagepub.com/home/ijb
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Abstract

Aims and Objectives: The present study investigated the foreign language effect (FLE) on tolerance of ambiguity (TOA) among bilinguals from an Asian collectivist culture.

Methodology: Chinese-English bilinguals completed a questionnaire measuring levels of TOA either in their first (L1: Chinese) or second language (L2: English), as well as a measure of emotional resonance reduction in Chinese.

Data and Analysis: We performed analysis of variance (ANOVA) to explore whether there was an effect of language (i.e., FLE) on TOA. A bivariate correlation analysis was conducted to explore further whether emotional resonance reduction in the L2 condition is related to the FLE on TOA.

Findings: The results revealed that processing information in the L2 promoted higher scores on TOA than in the L1, particularly on the dimensions of challenging perspectives and unfamiliarity. However, no association was observed between emotional resonance reduction and TOA, which suggests that emotional resonance reduction may not contribute to the FLE on TOA.

Originality: This study was a first attempt to provide evidence that culture may play an important role in modulating the FLE on TOA.

Significance/Implications: Taken together, our findings provide new evidence that functioning in an L2 can affect TOA, contributing to a better understanding of the FLE from a cultural perspective.

Keywords

bilinguals, tolerance of ambiguity, foreign language effect, Asian collectivist culture, emotional resonance

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Introduction

Tolerance of ambiguity (TOA) refers to how individuals perceive and process information about ambiguous situations or stimuli when confronted by an array of unfamiliar, complex, or incongruent clues (Furnham & Ribchester, 1995). TOA has been defined as an "emotional and perceptual personality variable" (Frenkel-Brunswik, 1949) whereby individuals with higher TOA can more effectively navigate uncertainty and adapt to changing circumstances, which can be a valuable skill in various personal, professional, and social contexts. Recent studies have begun to reveal that language experience can play a role in shaping TOA. Specifically, research indicates that bilingualism/multilingualism (Dewaele & Botes, 2020; Dewaele & Li, 2013) can influence TOA, and there is emerging evidence suggesting that the use of a second language (L2) might impact TOA compared to a first language (L1) (Purpuri et al., 2024). However, despite these findings, little is known about whether or how L1s and L2s might differentially affect TOA within an Asian collectivist culture, and the specific mechanisms driving these potential differences remain unclear.

The TOA scale has been commonly used to measure individuals' TOA. The measure divides TOA into four dimensions: *valuing diverse others*, *change*, *challenging perspectives*, and *unfamiliarity* (Dewaele & Li, 2013; Herman et al., 2010). *Valuing diverse others* refers to an individual's inclination to choose situations involving other individuals who have differing values, demonstrating comfort and acceptance toward diverse backgrounds. *Change* pertains to an individual's willingness to step out of their comfort zone and employ effective coping strategies (Herman et al., 2010). *Unfamiliarity* refers to situations in which an individual is faced with new challenges and may "unfreeze and change prior mental models" (Hollenbeck & McCall, 2002; Oddou & Mendenhall, 1984), reflecting the tendency to opt for less familiar situations. This dimension can be linked to *challenging perspectives*, where people engage in situations in which they would not ordinarily place themselves.

To investigate the relationship between language and TOA, Dewaele and Li (2013) administered the Tolerance for Ambiguity Scale (TAS) to participants and gathered information about their language background. The results indicated that both monolinguals and bilinguals scored significantly lower on the TAS compared to multilinguals, suggesting that knowledge of multiple languages contributes to greater TOA. Similar findings were reported in a subsequent study by Dewaele and Botes (2020). These studies, however, explored the relationship between the number of languages known (i.e., bilingualism/multilingualism) and TOA, rather than whether and how the TOA could be influenced by the foreign language effect (FLE), a phenomenon in which using a foreign language affects individuals' choices and preferences compared to their native language (Liu et al., 2022; Vives et al., 2018; Zhang & Hu, 2017).

The FLE is typically explained through multiple interacting mechanisms (for a comprehensive review, see Purpuri et al., 2025). For instance, the *reduced emotion hypothesis* suggests that using an L2 elicits weaker emotional responses, creating psychological distance. In addition, the *increased deliberation* (or *controlled processing*) *hypothesis* posits that the cognitive effort required to process an L2 disrupts fast, intuitive thinking and promotes slower, more analytical, and deliberate reasoning. Taken together, these explanations suggest that the FLE may be closely associated with TOA, because TOA involves evaluating uncertain or underspecified situations, and using an L2 may reduce affect-driven responding or increase deliberation when individuals face uncertainty.

To the best of our knowledge, only one study has investigated the FLE on TOA. Purpuri et al. (2024) asked 387 Italian-English bilinguals to complete the TAS either in Italian or English. The results showed that thinking in a foreign language (i.e., English) promoted overall TOA. However, when evaluating the FLE on the four dimensions of TOA separately, significant effects were only observed in *challenging perspectives* and *change*, but not in *valuing diverse others* and

unfamiliarity. It is worth noting that the participants in Purpuri et al.'s study were Westerners living in and from a Western individualist culture. Based on the definition provided by Hofstede et al. (2005), collectivist culture (e.g., Asian collectivist culture) usually refers to societies where individuals are integrated into strong and cohesive groups based on protection and loyalty. In contrast, Western individualist culture refers to societies characterized by a loosely knit social framework. Previous research has suggested that individuals from Asian collectivist and Western individualist cultures differ in both thought patterns and language use (Triandis, 1989). Specifically, individuals in Asian collectivist cultures generally exhibit a greater inclination for avoiding uncertainty and seeking stability. They may demonstrate a reduced tolerance for ambiguous or unknown situations, potentially perceiving them as threatening. By contrast, individuals in Western individualist cultures generally exhibit a greater inclination toward seeking uncertainty and change. They may demonstrate a higher tolerance for ambiguous or unknown situations, potentially perceiving them as desirable, challenging, and interesting. Critically, previous studies have indicated that culture can influence TOA (e.g., Hu & Deng, 2004; Park, 2007; Tapanes et al., 2009). Therefore, given that the observed FLE on TOA reported by Purpuri et al. (2024) was found among individuals from a Western individualist culture, it remains unclear whether such effects would emerge among individuals from an Asian collectivist culture. Accordingly, we address this issue in the present study.

Furthermore, an additional factor that remains unknown regarding the FLE on TOA is the role of emotional resonance. Purpuri et al. (2024) contextualized the FLE within the Reduced Emotionality Hypothesis (Dewaele, 2010; Pavlenko, 2005, 2012), which proposes that individuals are less emotionally driven when making decisions in a foreign language compared to in a native language. Notably, previous research has also documented the emotionality advantage for native languages using diverse techniques (e.g., Colbeck & Bowers, 2012; Harris et al., 2006; Puntoni et al., 2009). Presumably, this occurs because L1 acquisition involves affect-rich experiences, whereas foreign language learning often takes place in classroom contexts with less emotional involvement (Caldwell-Harris, 2015; Circi et al., 2021; Dewaele, 2010; Hayakawa et al., 2016). Consequently, the use of an L2 reduces emotional resonance, creating a certain degree of emotional distance (Costa et al., 2014; Iacozza et al., 2017; Purpuri et al., 2024). As such, individuals may be more rational and logical in situations involving their L2 (e.g., Costa et al., 2014). For this reason, in an L2, individuals may be more prone to invest in situations that are more distant and unfamiliar to them. It should be noted that, although the Reduced Emotionality Hypothesis appears to effectively explain the FLE, it has been difficult to test and has been mainly based on subjective speculation without objective empirical evidence (e.g., Purpuri et al., 2024). Moreover, some studies have indicated that there are no differences in emotional resonance between L1s and L2s (e.g., Geipel et al., 2015; Kyriakou & Mavrou, 2023). Therefore, it remains uncertain whether emotional resonance reduction serves as the mechanism underlying the FLE on TOA. Recently, the development of the Reduced Emotional Resonance Scale in bilinguals' later-learnt language (RER-LX; Toivo et al., 2024) has enabled the objective quantification of the reduced emotional resonance in a foreign language. Therefore, the present study used the RER-LX to examine the role of emotional resonance in the relationship between the FLE and TOA.

Overall, the current study seeks to investigate the FLE on TOA and the role of emotional resonance (i.e., Chinese-English bilinguals in China). Following similar procedures as Purpuri et al. (2024), two groups of Chinese-English bilinguals completed the TAS, with one group doing so in Chinese (L1_Chinese condition) and the other group in English (L2_English condition). In addition, all participants completed a questionnaire measuring emotional resonance reduction in their L2 relative to the L1.

If there is an FLE on TOA for Chinese-English bilinguals in an Asian collectivist culture, then presenting information in their L2 (i.e., English) may lead them to be more tolerant of ambiguity

compared to processing information in their L1 (i.e., Chinese). However, because cultural differences between Asian collectivism and Western individualism shape different thinking patterns and behaviors (Gouveia & Ros, 2000), we predict that the FLE on the four dimensions of TOA will be distinct from Purpuri et al.'s (2024) findings. Moreover, if emotional resonance reduction is an underlying mechanism of the FLE on TOA, emotional resonance reduction in the L2 should be positively associated with TOA. We anticipate that the lower the emotional resonance individuals have, the higher their TOA will be.

Methods

Participants

The study was approved by the research ethics committee at Qingdao University, and all participants provided their informed consent before taking part in the study. We recruited 267 university students to take part in the study. Half of the individuals were randomly assigned to complete an online questionnaire measuring TOA in Chinese (L1_Chinese condition) and the other half in English (L2_English condition). Thirty-five participants were excluded because of random responses, such as selecting only one answer in the questionnaire or providing answers with stepped shapes. Therefore, 232 participants were included in the statistical analyses (L1_Chinese condition: $N = 120$, 93 females, $M_{age} = 18.98$, $SD_{age} = 1.01$; L2_English condition: $N = 112$, 84 females, $M_{age} = 19.56$, $SD_{age} = 1.08$). This sample exceeded the minimum sample size of 156 calculated by G*Power 3.1 (between-subjects design, $d = .40$, $\alpha = .05$, power = .95, allocation ratio L1/L2 = 1). All participants were Chinese-English bilinguals who studied English as part of their university programs. None of them had experience living in English-speaking countries. On average, they began learning English at the age of 8.33 and continued doing so for 10.91 years. They were also asked to self-assess their L1 Chinese and L2 English proficiency levels based on a 7-point scale (1 = *very poor*, 7 = *excellent*) (Jiao et al., 2025; Liu et al., 2022). Paired-sample *t*-tests revealed that their L1 proficiency ratings ($M = 6.53$, $SD = .72$) were significantly higher than L2 ratings ($M = 4.19$, $SD = 1.19$), $t(231) = 27.64$, $p < .01$. However, there was no significant difference between the two conditions in terms of L1 proficiency (L1_Chinese condition = 6.60, L2_English condition = 6.47), $t(230) = 1.37$, $p = .17$, or L2 proficiency (L1_Chinese condition = 4.12, L2_English condition = 4.27), $t(230) = -.98$, $p = .33$, indicating comparable language proficiency across conditions (Liu et al., 2026).

Measures

TAS. Herman et al. (2010) developed the TAS, describing it as a "conceptually clear and internally consistent assessment tool" (p. 60). Subsequently, Dewaele and Li (2013) removed one question and made some minor stylistic adaptations to the TAS. The latter is the version we adopted in the present study (see Appendix A). The questionnaire consisted of four dimensions: valuing diverse others, change, challenging perspectives, and unfamiliarity, and was presented with 5-point Likert-type scales (1 = *strongly disagree*, 5 = *strongly agree*). The specific corresponding items for each dimension are presented in Table 1. A higher composite score on the scale indicates stronger TOA. In the study by Dewaele and Li (2013), 1,990 participants were recruited, and Cronbach's alpha was .64. However, the Cronbach's alpha in the present study was below accepted standards, which was similar to previous studies (e.g., Budner, 1962; McLain, 1993). It may be due to our homogeneous and smaller sample size. Nonetheless, the scale was valid and has been adopted in many studies, including Purpuri et al. (2024), who verified its validity.

Table 1. Four TOA Dimensions and Corresponding Items.

Dimension	Item
Valuing diverse others	1. I avoid situations where people don't share my values.
	5. I can be comfortable with nearly all kinds of people.
Change	4. The sooner we all acquire similar values and ideals, the better.
	8. A good job is one where what is to be done and how it is to be done are always clear.
	9. A person who leads an even, regular life in which few surprises or unexpected happenings arise really has a lot to be grateful for.
	10. What we are used to is always preferable to what is unfamiliar.
Challenging perspectives	2. I would like to live in a foreign country for a while.
	6. If given a choice, I would visit a foreign country rather than vacation at home.
	7. A good teacher is one who makes you think about/consider your way of looking at things.
Unfamiliarity	3. I like to surround myself with things that are familiar to me.
	11. I like parties where I know most of the people more than ones where all or most of the people are complete strangers.

RER-LX. Toivo et al. (2024) developed and validated a psychometric scale to measure the emotional resonance reduction in bilinguals' LX (i.e., later-learnt language) relative to their L1. The adapted versions we used in the present study can be found in Appendix B. The measure comprises 15 items, with each item being scored on a 6-point Likert-type scale (1=*strongly disagree*, 6=*strongly agree*). Higher scores on the measure indicate a stronger emotional resonance reduction in the L2 compared to the L1. The Cronbach's alpha for this scale was .79 in the study.

Both original questionnaires (i.e., TAS and RER-LX) were in English. A highly proficient Chinese-English bilingual translated them into Chinese in the present study. The Chinese versions of both scales were controlled by one independent judge, a highly proficient English-speaking university professor, to ensure consistency with the original version.

Procedure

After providing their written informed consent to participate in the study, all participants were asked to complete the language background questionnaire in their native language (i.e., Chinese). Following this, participants in the L1_Chinese condition completed the Chinese version of the TAS, while individuals in the L2_English condition were given the version in English. Finally, participants in both conditions completed the Chinese version of the RER-LX.

Results

The FLE on TOA

In order to explore whether there was an effect of language on TOA, we performed a one-way analysis of variance (ANOVA), taking TOA as the dependent variable and language as a fixed factor. The results showed that the FLE was significant, $F(1, 230)=8.51$, $p=.004$, $\eta^2_p=.036$, indicating higher scores in the L2_English condition ($M=30.80$, $SD=4.08$) than L1_Chinese condition ($M=29.18$, $SD=4.40$; see Figure 1).

To further evaluate the effect of language on the dimensions of valuing diverse others, change, challenging perspectives, and unfamiliarity, a multivariate analysis of variance (MANOVA) was

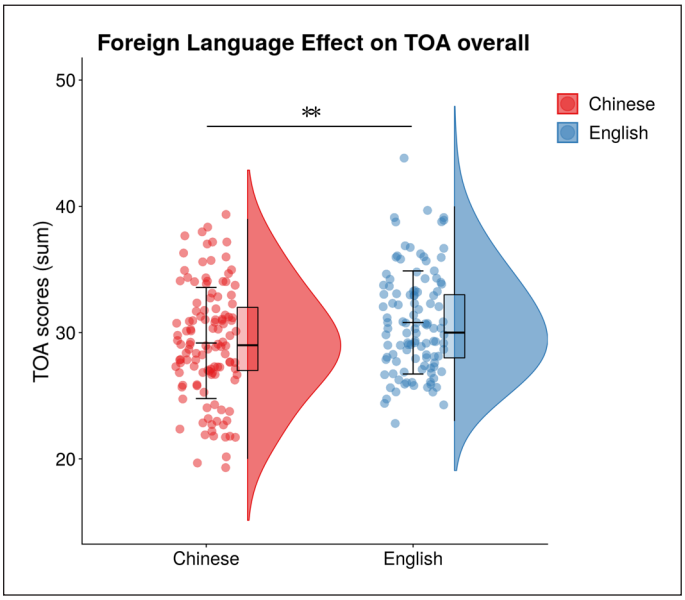

Figure 1. Half violin plots for the sum of TOA scores in both Chinese and English conditions.
Notes. The boxplots show interquartile ranges. Each dot corresponding to the TOA scores (sum) represents at least one participant. Vertical bars indicate standard deviations, while the center of black horizontal lines shows means.

carried out, with the four dimensions as dependent variables and language as a between-subjects variable. The results showed a significant main effect of language, $F(4, 227)=7.35$, $p<.001$, $\eta^2_p=.12$, suggesting the existence of an effect of language on the four TOA dimensions. In order to examine whether the FLE existed in all dimensions, we performed four separate one-way ANOVAs on each dimension. There was no significant effect of language on *valuing diverse others*, $F(1, 230)=2.195$, $p=.140$, or *change*, $F(1, 230)=.190$, $p=.663$. However, there was a significant effect of language on *challenging perspectives*, $F(1, 230)=11.17$, $p<.001$, $\eta^2_p=.05$, with higher scores in the L2_English condition ($M=3.78$, $SD=.83$) than the L1_Chinese condition ($M=3.42$, $SD=.79$). Moreover, the effect was also significant for *unfamiliarity*, $F(1, 230)=12.77$, $p<.001$, $\eta^2_p=.05$, suggesting that participants in the L2_English condition ($M=2.06$, $SD=.72$) scored higher than those in the L1_Chinese condition ($M=1.73$, $SD=.68$; see Figure 2).

The Role of Emotional Resonance Reduction in the FLE on TOA

To explore whether emotional resonance reduction is related to the FLE on TOA, a bivariate correlation analysis was conducted between TOA ($M=30.80$, $SD=4.08$) and emotional resonance reduction ($M=72.76$, $SD=7.25$) in the L2_English condition. However, no relation was found between the two variables ($r=-.12$, $p=.20$). Moreover, we examined whether the reported emotional resonance reduction (RER-LX scores) differed between the two experimental groups. An independent samples *t*-test revealed no significant difference between participants in the L1_Chinese condition ($M=71.11$, $SD=9.78$) and those in the L2_English condition ($M=72.76$, $SD=7.25$), $t(230)=-1.45$, $p=.16$. This confirms that the baseline emotional resonance reduction in the L2 was comparable across both groups and completing the preceding TOA task in either L1 or L2 did not significantly bias their self-reported emotional resonance.

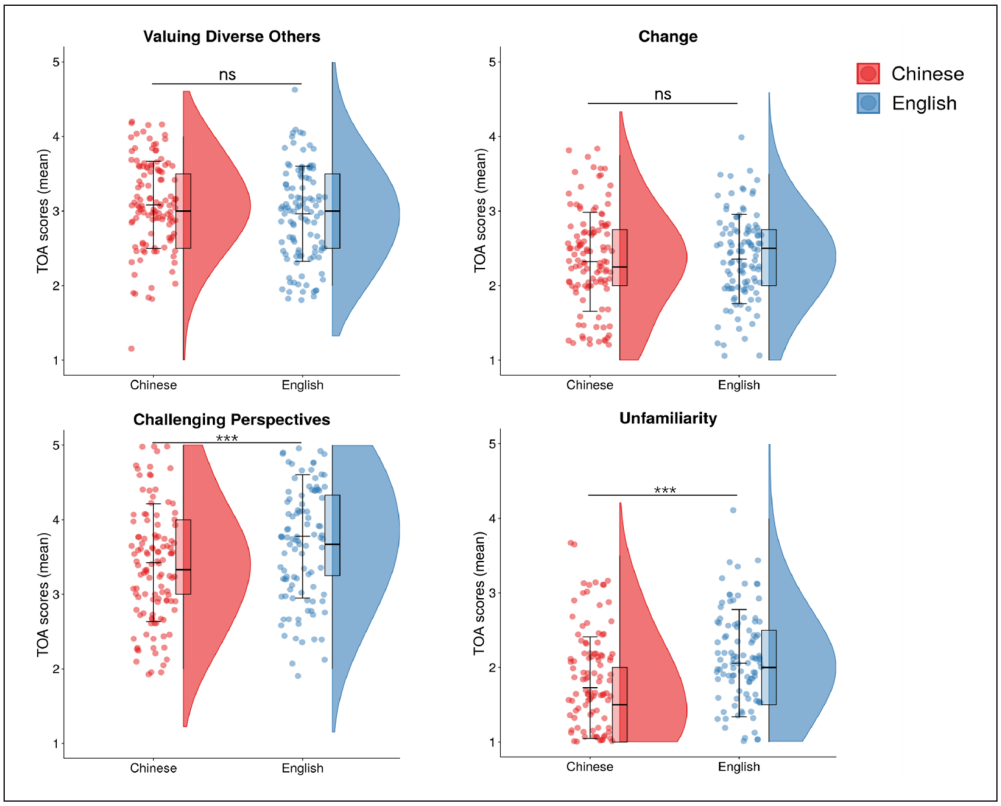

Figure 2. Half violin plots for TOA scores (mean) of the four dimensions, sorted by Chinese and English conditions.

Notes. The boxplots show interquartile ranges. Each dot corresponding to the TOA scores (mean) represents at least one participant. Vertical bars indicate standard deviations, while the center of black horizontal lines shows means.

The Role of L2 Exposure in TOA in an L2

In the L2_English condition, in which there was an FLE, bivariate correlation analyses were carried out to examine whether L2 proficiency (M=4.27, SD=1.12), years of L2 acquisition (M=8.38, SD=1.78), and years of L2 exposure (M=11.29, SD=2.10) correlated with TOA. The results revealed a marginally significant correlation between the years of L2 exposure and the TOA (r=.18, p=.06), suggesting that the longer participants were exposed to the L2, the more tolerant of ambiguity they were (see Figure 3). However, no relation was observed between TOA and the other two variables (L2 proficiency: r=.02, p=.81; years of L2 acquisition: r=−.07, p=.47) in the L2 condition. To confirm that this lack of relationship was not isolated to the English condition, we also conducted a bivariate correlation analysis between self-assessed L2 proficiency and TOA for participants in the L1_Chinese condition. Consistent with the L2 group, no significant correlation emerged (L2 proficiency: r=.13, p=.17; years of L2 acquisition: r=−.03, p=.71).

In addition, the present study has also examined whether social factors (i.e., age and gender) had effects on TOA. First, a one-way analysis of covariance (ANCOVA) was carried out to examine the role of age in TOA, with language condition as an independent variable, TOA as a dependent variable, and age as a covariate. The results revealed a significant effect of language, $F(1, 229)$=8.20,

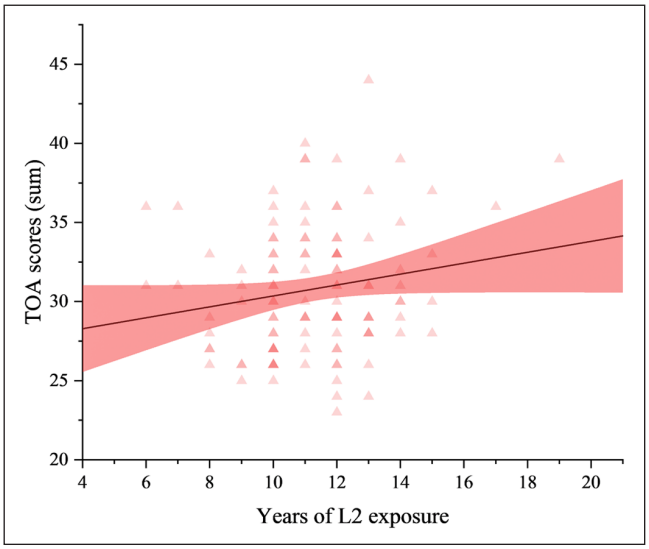

Figure 3. Correlation between years of L2 exposure and TOA scores (sum) in the English condition.
Notes. Each triangle represents at least one participant. The red shaded region indicates the 95% confidence interval.

$p = .005$, $\eta^2_p = .04$. However, Age did not result in a significant covariate, $F(1, 229) = .08$, $p = .88$. We then performed a two-way ANOVA, with language condition and gender as independent variables, and TOA as a dependent variable, to examine the role of gender in TOA. The results showed a significant main effect of language, $F(1, 228) = 7.54$, $p = .007$, $\eta^2_p = .03$. However, the main effect of gender, $F(1, 228) = .60$, $p = .44$, and the two-way interaction, $F(1, 228) = .25$, $p = .62$, did not reach significance.

Discussion

The present study explored the FLE on TOA in an Asian collectivist culture and examined the role of emotional resonance. Chinese-English bilinguals completed the TAS either in Chinese or English to measure their TOA, along with the RER-LX in Chinese. The results indicated that processing information in the L2 promoted tolerance to ambiguity, as evidenced by higher scores in the dimensions of *challenging perspectives* and *unfamiliarity* in the L2. Years of L2 exposure were positively correlated with TOA scores in the L2 condition. However, we failed to observe a predictive effect of emotional resonance reduction on TOA in the L2.

An FLE on TOA Exists Among Bilinguals in an Asian Collectivist Culture

A main finding of the present study is the presence of the FLE among Chinese-English bilinguals from an Asian collectivist culture, as evidenced by the significant effect of language (L1_Chinese condition vs. L2_English condition). Specifically, individuals in the L2_English condition exhibited higher TAS scores compared to those in the L1_Chinese condition, suggesting that processing information in a foreign language promotes TOA overall. This finding aligns with our hypothesis and prior work (Purpuri et al., 2024) that presenting information in a foreign language (as opposed to the native language) elicits more tolerance to ambiguity. Thus, it provides further evidence of the significant role played by the FLE on TOA.

More importantly, taken together, the findings from Purpuri et al. (2024) and the present study suggest that the FLE on TOA might be influenced by culture, in which the FLE on four dimensions of TOA in the Asian collectivist culture (i.e., our Chinese-English participants) was different from those in Western individualist culture (Purpuri et al.'s Italian-English bilinguals). Specifically, in the Asian collectivist culture, significant effects were only observed in challenging perspectives and unfamiliarity dimensions, whereas in the Western individualist culture, these effects were observed in challenging perspectives and change. These findings may imply that culture plays an important role in modulating the FLE on TOA (see also Chen et al., 2014). An additional observation further supports the hypothesis that individuals from Asian collectivist cultures generally exhibit lower tolerance for ambiguity: the overall TOA scores in our present sample (L1: M=29.18; L2: M=30.80) appear to be notably lower than those reported by Purpuri et al. (2024) (L1: M=36.72; L2: M=37.67). However, it is important to acknowledge that the sample in Purpuri et al. (2024) consisted exclusively of Italian participants, who may differ from other Western populations in some cultural aspects. Therefore, caution should be exercised when generalizing these cross-cultural comparisons to all Western individualist cultures.

Notably, the conceptualization of the four different factors of TOA provided by Herman et al. (2010) enables us to understand how and why each of these factors may or may not be associated with bilingualism and multilingualism in different cultures. Specifically, on one hand, in both the Italian sample (Purpuri et al., 2024) and the present Chinese sample, the FLE was observed on the *challenging perspectives* dimension, but not on the *valuing diverse others* dimension. With respect to *challenging perspectives*, in the context of global integration, both cultures are likely to exhibit a high degree of internationalization, characterized by openness toward other ideas. As a result, when presenting information in a foreign language, individuals in both cultures appear more inclined to engage with content or ideas that differ from their own. However, using a foreign language had no effect on *valuing diverse others*, a dimension that is consistent with extraversion (i.e., a personality trait that emphasizes social tendency; Vogt & Laher, 2009). This finding may possibly arise due to the stability of valuing diverseness (Sanderman & Ranchor, 1994), making it less susceptible to linguistic or cultural influences. This assumption is supported by previous work, which has shown no effects of cross-cultural differences on extraversion (Vogt & Laher).

On the other hand, the FLE on some dimensions in our Asian collectivist sample differed from Purpuri et al.'s (2024) findings. Specifically, the FLE on the *unfamiliarity* dimension was exclusive to the present Chinese sample, whereas the effect on the *change* dimension was only observed in their Italian sample. This discrepancy can be better understood through the interaction between cultural baselines and cognitive processing. Individuals in Asian collectivist cultures generally exhibit high uncertainty avoidance, possessing a strong, default heuristic for stability and familiarity (Hofstede et al., 2005; Papastylianou & Lampridis, 2016). When reasoning in an L2, the shift toward slower, more deliberate processing (Purpuri et al., 2025) likely allows Chinese participants to override their automatic aversion to novel situations, leading to a significant FLE on *unfamiliarity*. However, the concept of *change* may represent a more profound disruption to the collectivist need for harmony. Faced with such fundamental disruptions, Chinese participants may revert to their culturally ingrained intuitive processing even in an L2, thereby neutralizing the FLE on the *change* dimension. In contrast, the Italian participants in Purpuri et al. (2024) likely possess a higher baseline openness to novelty but different cultural attitudes toward structural change. Consequently, the cognitive shift induced by the L2 yields a different dimensional pattern, highlighting the role of cultural background in modulating the FLE.

An Emotional Resonance Reduction Effect Was Not Observed on TOA

The reduced emotionality hypothesis, emphasizing that individuals are less emotionally driven when reasoning in a foreign language than in a native language, is a widely accepted explanation

of the FLE (Caldwell-Harris, 2015; Pavlenko, 2012, 2017). The hypothesis has been used to explain the FLE in moral decision-making and risk-aversion tendencies (Costa et al., 2014; Keysar et al., 2012). However, interpretations have largely relied on subjective speculation (e.g., Keysar et al., 2012; Purpuri et al., 2024). In contrast, the present study used the RER-LX, a psychometrically validated measurement tool (Toivo et al., 2024), to examine whether emotional resonance reduction serves as the mechanism underlying the FLE on TOA. This tool enabled us to objectively quantify the reduction of emotional resonance in a foreign language. We failed to observe reduced emotional resonance in the FLE on TOA, with no significant relation between emotional resonance reduction and TOA. These results suggest that the mechanism underlying the FLE on TOA may not stem from reduced emotional resonance. This is not a surprising finding given that some previous studies have reported similar results (e.g., Geipel et al., 2015; Kyriakou & Mavrou, 2023). It may be because the direct factors promoting the levels of TOA are not the reduction in emotional resonance but rather the enhancement of cognitive control. The reduction in emotional resonance may only be one of the factors contributing to greater rationality (Keysar et al., 2012).

Since our data do not support the reduced emotionality hypothesis, the FLE on TOA must be driven by alternative mechanisms, likely cognitive in nature. As introduced earlier, this finding aligns well with the Increased Deliberation Hypothesis (Purpuri et al., 2025). Specifically, the "rationality" observed in L2 processing is not merely a reduction in emotion but a functional outcome of cognitive friction. Comprehending a foreign language inherently demands greater cognitive effort and increased reading time. This processing disfluency disrupts the fast, automatic, and intuitive cognitive system (System 1). Consequently, it forces a shift toward a slower, more deliberate, and analytic cognitive system (System 2) (Circi et al., 2021; Kahneman, 2003). Therefore, the increased cognitive load and slower processing speed associated with reading in an L2 afford individuals the time and cognitive resources to thoroughly evaluate ambiguous or unfamiliar situations, rather than instinctively rejecting them. Overall, these cognitive mechanisms underlying the FLE on TOA deserve more attention, underscoring the need for future work.

The Role of L2 Exposure on TOA in an L2

In line with our expectation, the present study found a significant relationship between years of L2 exposure and TOA. Specifically, when using a foreign language, the longer participants were exposed to their L2, the more tolerant they became to ambiguity. This phenomenon can be attributed to the close connection between language and culture (Shao, 2023). Specifically, native English-speaking countries (e.g., the United States) are predominantly individualistic, with high levels of TOA (Hu & Deng, 2004). In this case, learners who studied English as a foreign language were more likely to be influenced by its culture after longer exposure to the language, potentially enhancing levels of TOA to a certain extent.

However, we failed to observe effects of L2 proficiency, years of L2 acquisition, and other social factors (i.e., age and gender) on TOA. This phenomenon could potentially be attributed to the homogeneity of the participants in the study. Specifically, the present study recruited college students with a narrow age range, and most of them were female, thus making it difficult for differences to emerge in the present study. Moreover, they were exclusively experienced with the structure of the Chinese education system. These students typically begin to study English as a foreign language in the third grade of primary school (M_{age} = 8.38, SD = 1.78). As a result, they demonstrate a high level of homogeneity, with similar backgrounds in L2 proficiency and years of L2 acquisition.

Limitations

Although the present study offers new insights into the relationship between the FLE and TOA, several limitations should be addressed in future research. First, in order to explore the relationship between the FLE and TOA, we translated the two measures from their original English version into Chinese. Although we strived to maintain consistency between the two versions as much as possible, there may have been subtle differences between the two versions that could have affected the results. In further studies, it would be valuable to explore the impact of translation on the effectiveness of scales. Secondly, our assessment of L2 proficiency relied exclusively on a 7-point self-report Likert scale. As demonstrated by recent research (e.g., Purpuri et al., 2024), utilizing more granular and sensitive metrics may reveal correlations between L2 proficiency and TOA that simpler self-assessments fail to capture. The null result regarding the relationship between L2 proficiency and TOA in our sample might partly stem from this methodological limitation. Future studies should consider incorporating standardized, objective proficiency tests to better capture these nuanced relationships. Finally, cultures are intricate and diverse. The present study exclusively involved participants from an Asian collectivist culture (i.e., China) but did not make direct comparisons to individuals from a Western individualistic culture.

Conclusion

The present study has revealed an FLE on TOA among bilinguals from an Asian collectivist culture. This finding was evidenced by higher TOA scores in bilinguals' L2 compared to their L1. More importantly, the FLE was only observed in the dimensions of *challenging perspectives* and *unfamiliarity*, suggesting that in an Asian collectivist culture, individuals exhibit more tolerance to ambiguity linked to these two dimensions when using a foreign language. The present study also suggested that emotional resonance reduction may not serve as the mechanism underlying the FLE on TOA. Moreover, individuals with longer L2 exposure had higher levels of TOA when using their L2. Taken together, our findings contribute to a better understanding of the FLE by illustrating how an L2 influences TOA.

Acknowledgements

Cong Liu gratefully acknowledges the support of Professor Holly Branigan and the School of Philosophy, Psychology and Language Sciences (PPLS) at the University of Edinburgh during the research visit, which was funded by the China Scholarship Council (Grant No. 202608370094).

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Ethical Considerations

This study was approved and consented by the Ethics Committee of the Department of Psychology of Qingdao University.

Consent to Participate

Informed consent was obtained from all individual participants included in the study.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The study was supported by the National Social Science Fund of China (25BYY080), the Natural Science Foundation of Shandong Province (ZR2025QC350, ZR2026MS0451), and the Young Innovative Research Team in Shandong Higher Education Institutions (2025RWF001).

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

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Appendix A. Adapted Version of the Tolerance for Ambiguity Questionnaire (Based on Dewaele & Li, 2013).

English version	Chinese version
1. I avoid situations where people don't share my values. [Reverse Coded]	1. 我避免人们不认同我的价值观的情况 [反向编码]。
2. I would like to live in a foreign country for a while.	2. 我想在国外生活一段时间。
3. I like to surround myself with things that are familiar to me. [Reverse Coded]	3. 我喜欢让自己被熟悉的事物包围 [反向编码]。
4. The sooner we all acquire similar values and ideals, the better. [Reverse Coded]	4. 我们越早获得相似的价值观和理想越好 [反向编码]。
5. I can be comfortable with nearly all kinds of people.	5. 我几乎可以和各种各样的人相处融洽。
6. If given a choice, I would visit a foreign country rather than vacation at home.	6. 如果可以选择,我将前往国外参观而不是在家度假。
7. A good teacher is one who makes you think about/consider your way of looking at things.	7. 一个好的老师是让你思考/考虑你看待事物的方式的人。
8. A good job is one where what is to be done and how it is to be done are always clear. [Reverse Coded]	8. 一份好的工作是指做什么和怎样做总是清晰的 [反向编码]。
9. A person who leads an even, regular life in which few surprises or unexpected happenings arise really has a lot to be grateful for. [Reverse Coded]	9. 一个过着平淡、规律的生活,很少出现惊喜或意料之外事件的人,真的有许多值得感激的地方 [反向编码]。
10. What we are used to is always preferable to what is unfamiliar. [Reverse Coded]	10. 我们习惯做的总是比不熟悉的更可取 [反向编码]。
11. I like parties where I know most of the people more than ones where all or most of the people are complete strangers. [Reverse Coded]	11. 我喜欢大部分人我都了解的聚会,而不是所有或大部分人完全陌生的聚会 [反向编码]。
(1-strongly disagree, 2-disagree, 3-neither agree nor disagree, 4-agree, 5-strongly agree)	(1-非常不同意, 2-不同意, 3-一般, 4-同意, 5-非常同意)

Appendix B. Reduced Emotional Resonance Scale in Bilinguals' Later-Learnt Language (Based on Toivo et al., 2024).

English version	Chinese version
1. I feel less emotional when using my L2 than when using my L1.	1. 当使用二语时,我感到比使用母语时的情绪化更少。
2. When I'm really angry, I tend to use my L1 more than my L2.	2. 当我真的很生气时,我倾向于使用我的母语而不是我的二语。
3. Swear words affect me more in my L1 than in my L2.	3. 用母语说的脏话比用二语说的脏话对我的影响更多。
4. I find it easier to talk about sex in my L1 than in my L2. [Reverse Coded]	4. 我发现用母语谈论性比用二语更容易 [反向编码]。
5. Being criticized feels more unpleasant in my L1 than in my L2.	5. 被用母语批评比用二语更让我感到不愉快。
6. Saying the equivalent of "I love you" has more weight in my L1 than in my L2.	6. 用母语说我爱你比用外语更有分量。
7. Compared to L1, I feel like there is more of an emotional distance when I use my L2.	7. 与母语相比,当我使用二语时我感受到更远的情感距离。
8. Insults feel more hurtful in my L1 than in my L2.	8. 用母语侮辱我比用二语更能伤害我。
9. I prefer my L1 over my L2 when reading for pleasure.	9. 当我以阅读为乐时,我更喜欢使用我的母语而不是二语。
10. A sad film is more likely to make me cry when I watch it in my L1 than in my L2.	10. 比起二语,当我用母语观看一部悲伤的电影时更能让我哭泣。
11. When I want swear words to have real weight, I use my L1 rather than my L2.	11. 当我想让脏话更有分量时,我会使用我的母语而不是我的二语。
12. Poetry in my L2 has less of an effect on me than poetry in my L1.	12. 用二语表达的诗歌比用母语表达的诗歌对我的影响更少。
13. I emotionally connect with my conversation partner better and faster in my L1 than in my L2.	13. 与二语相比, 我在母语中能与对话伙伴更好、更快地建立联系。
14. I have a better sense of what my conversation partner is thinking or feeling when using my L1 than my L2.	14. 与二语相比, 我在使用母语时能够更好的理解对话伙伴的想法或感受。
15. Romantic songs feel more intense in my L1 than in my L2.	15. 比起二语, 我对浪漫歌曲的感受在母语中更强烈。
(1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly disagree*, 4 = *slightly agree*, 5 = *agree*, 6 = *strongly agree*)	(1-非常不同意, 2-不同意, 3-有点不同意, 4-有点同意, 5-同意,6-非常同意)