Impact of Bilingualism on Emotion Perception

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Abstract. Bilingualism can affect people's emotion perception and cognition. By assigning emotion priming tasks, emotion recognizing ability of bilingual people can be compared to monolingual people to indicate the difference of language dominance of the two populations. In our study, it is hypothesized that learning a second language can cause a shift of language dominance from the mother language (Chinese) to the second language (English). Also, we propose that bilingual speaker with a higher fluency or extrovert personalities in L2 will develop more ability in perceiving emotions in the second language. Moreover, defamiliarization of first language can also happen while switching language dominance.

Keywords: Bilingualism, recognizing ability, monolingual, Allocate emotions

1. Introduction

Multilingualism and especially second language acquisition provides many benefits in terms of enhancing memory, cognitive control, and emotion perception. Bialystok claims that there are positive effects on cognitive organization and learning a second language builds up protection against Alzheimer's disease. Since a particular executive control system is introduced when processing bilinguals, which is not found for monolinguals, bilingual people practice to become better at conflict solving or selection making. (Bialystok 2011) Language is an essential tool for communication, no matter in the form of text, body gestures, or speaking. Daily communications frequently convey emotional expressions. Barrett et al studies that language serves as a context of emotions. The author demonstrates the fact that people can quickly and easily detect emotion on another person's face, which makes them feel that emotion perception is predetermined and occurs independently. Barrett et al argue the opposite theory that language serves as a backdrop for emotional perception. The extent to which language shapes the sensory processing involved in recognizing emotion on another person's face is one of the intriguing and generative questions that can be raised after reviewing a variety of evidence supporting the language-as-context viewpoint. It has been found that emotional experience varies in different languages even with the identical context, this phenomenon is particularly evident in multilinguals. This is because of the difference of processing emotional words in their first languages (L1) and second languages (L2) or other languages and hence emotional memory can be experienced differently in two language contexts (Freeman et al, 2016). Besides, the brain pathway and networks are enhanced by the practice of bilingualism which reveals a tight relationship between cognition and emotional experience in different languages. Loretta and Dewaele (2015) conducted research on the level of emotion perception for bilinguals and monolinguals and found out that bilingual raised people tend to outperform monolingual raised people in their non-first language but score lower in their first language. This suggests a potential impact of language dominance and proficiency on emotional expression and perceptions in the first and second languages. People handle emotion in second language contexts if they grow up learning in another language while people who have less experience in multilingualism have a sign of emotion dominance in their first language. This also indicates the benefit of multilingualism in sensing emotions in another language contexts after approaching multiple languages in younger ages.

Besides finding the dominant language among all the languages learned by a multilingual population, the languages themselves also have inter-influence on each other according to the bilingual users. Park and Ziegler (2014) researched on the interaction and influence of bilingualism to observe the cognitive change of Korean-English bilingual adults compared to monolingual English

and Korean participants. This study demonstrated the difference in conceptualized space between bilinguals and monolinguals in the aspect of categorization patterns, suggesting an ongoing structuring change in bilingual minds. Neumann et al (2018) studied the impact of multilingualism on speech emotion recognition between English and French and found that multilingual classification of emotions in speech is possible and can even enhance emotional arousal prediction, thus suggesting that people are more able to perceive emotions accurately if they learn a second or third language.

The difference of emotional engagement in different languages might be caused by different grammar structures and cultural context. There is a distinctive difference between the western languages such as English and French, and Chinese regarding grammar structure, word use and cultural environment. Numerous low arousal words are used in Chinese to express emotions such as depression or grief. Due to the fact that in Chinese culture, people prefer to express themselves in a more euphemistic way. This leads to the fact that many phrases in Chinese do not have word to word translation to other languages, instead focusing on the imagery and context. For example, in Chinese, the word moonlight can represent the feeling of nostalgia. People usually use it as a context description to show a conception of missing families and friends. Even if they don't directly express their feelings, people are able to sense it through reading the text. On the other hand, western languages such as French, Spanish and English have more expressions in high arousal emotions. Particularly, they apply metaphors, symbolism and hyperbole in phrases or slangs to describe excitement, surprise or anger, which will be a more direct way. For example, when people try to tell a high frequency, they can say "I have told you a million times."

Understanding the inter-influence of languages on emotions can promote more people to see the benefit of a second language and analysis of this prevalent trend can provide more opportunities to explore the relationship between emotion and language as it is playing a huge role in human communication. Many obvious real-world advantages are suggested by Freeman et al (2000) such as prevention of Alzheimer's Disease of active bilinguals and age-related cognitive decline. However, nowadays research does not draw a final conclusion why and how L1 and L2 affect each other in terms of emotional perception for multilingual users. According to previous studies, there are two factors that might contribute to the difference: language dominance and the cultural and grammatical aspects of language itself. Language dominance is an essential factor in identifying emotions in valences and arousals. Language itself, including its cultural and grammatical aspects, is also critical for processing emotions. However, it is difficult to test language proficiency and dominance due to their complexity (Treffers-Daller, 2019). In addition, due to the various methods and interaction scenarios, researchers usually find it inconsistent and complicated to examine the mechanisms of cross-lingual.

It is hypothesized that higher fluency in L2 will be more likely to cause a language dominance in the second language, which means that the speaker feels more confident or more used to socializing with their L2 than L1. Other than that, defamiliarization of L1 may as well be a sign to switching language dominance.

2. Materials and Methods

2.1. Participants

We aimed to survey Chinese monolinguals and bilinguals with English as a second language between 18 and 60 years old with proper reading ability. N = 85 volunteers participated in our study, among which N = 17 participants were excluded for the following reasons: incomplete data, false answers, or out of the age limit. A total of N = 68 participants were included for further analysis (14 males, mean age = 34.07), with N = 26 monolinguals (4 males, mean age = 37.75) and N = 42 bilinguals (10 males, mean age = 32.60). All participants were informed of the purpose and procedure of the survey and attended this survey voluntarily. All answers were collected anonymously and participants were informed of their rights of quitting the survey at any time.

The mother language of both monolingual and bilingual participants was Chinese and the second language of bilingual participants was English. The least criteria for bilingual participants sufficient fluency in their second language that they were capable of daily communication.

2.2. Design and materials

For this study, we focused on investigating the difference of emotion perception and expression under L1 Chinese and L2 English contexts and defining to what extent L2 English impacts L1 Chinese on emotion perception and expression. To achieve our goal, we surveyed on their personalities for both monolingual and bilingual groups, and evaluated the L2 English proficiency of the bilingual group. Emotion priming tasks were also conducted for both groups to explore their abilities of emotion perception and expression. Specifically, bilingual populations were surveyed to illustrate scenarios in which they used L1/L2 to express their feelings or subjective perspectives. Whilst, the monolingual group was only surveyed with scenarios in the Chinese context.

For both groups, the survey was conducted in a form of online/offline questionnaire. Firstly, demographic information including education level, age, and gender were collected in simple questions. Then, N = 3 questions regarding their personalities (e.g. introvert or extrovert) and their social life were asked. After that, N = 4 questions evaluating their language proficiency, language environment and duration and frequency of their application of first and second language were presented only for bilingual participants. After that, they were asked to identify intensity of emotion from long and short fragments with positive or negative emotions in respective languages. A total of N = 8 Chinese scenarios and N = 8 English scenarios were presented. The purpose of these tests was to examine if participants were able to detect certain words or details accurately to decide the emotion arousals. Participants were asked to rate the emotion they perceived or they experienced under the context from 1 to 7. Score 1 meant very vague emotion that you could hardly feel or perceive and score 7 represented solid, clear emotions to spot or experience. The survey is attached in the appendix.

2.3. Procedure

The survey was conducted mostly on an online platform (Google form) and some questionnaires were collected offline in a paper sheet. Participants were encouraged to submit their answers as fast as possible and prevent second guessing themselves by looking back at their response. They were informed that there is no right or wrong answer due to the fact that some of the low arousal emotions could be ambiguous and defined in different terms. After filling out their demographic information, participants were guided to section 2, the Chinese section. Then, bilingual participants were guided to the test in their second language and the outcome associated with their self-reported language proficiency. Each section contained 8-10 questions and took 5-10 minutes to complete with their first instinct.

2.4. Analysis

To avoid the potential impact of personality on emotion perception and expression, we compared the questions regarding their personalities (Q6 to Q8) between monolingual and bilingual groups using a simple t-test. To investigate the difference of emotion perception and expression under mother language (i.e. Chinese) between monolinguals and bilinguals, we applied independent t tests on the emotion priming tasks with Chinese scenarios (i.e. Q10 to Q17). To understand how the emotion perception and expression differs from Chinese and English contexts for bilingualism, we paired Chinese and English scenarios according to the emotion types, arousals, and text length shown in texts. Specifically, 8 pairs were created: Q10 and Q18, short text with negative emotions in high arousal; Q16 and Q19, short text with positive high arousal emotions; Q11 and Q20, short text with positive low arousal emotions; Q12 and Q23, long text with negative high arousal emotions; Q15 and Q24, long text with positive low arousal emotions; Q13 and Q21, short text with negative low arousal emotions; Q14 and Q22, long text with positive high arousal emotions; Q17 and Q25, long text with

negative low arousal emotions. After that, paired-sample t-tests were employed to compare bilinguals' ratings of emotion perception and expression in these pairs.

Along with the experiment of interrelationship between L1 and L2, we also examined how language dominance and L2 (i.e. English) proficiency, as well as personalities, affected people's emotion perception and expression in both L1 and L2 using Pearson's correlation analysis. Specifically, we correlated the questions about language dominance, proficiency and personalities (Q26 to Q31, Q6 to Q8) and emotion priming scenarios (Q10 to Q17 in Chinese and Q18 to Q25 in English).

3. Results

The Chinese monolingual group and bilingual group shared the similar personalities according to statistical significance in questions 6, 7, 8. (Q6: t= -1.389,p= 0.169, d= 0.347; Q7: t = -0.618, P= 0.539, d= 0.154; Q8: t=1.46, P=0.149, d=0.364), diminishing the possibility of personality affecting emotion expression and perception, ensuring that data would only show the influence of learning a new language rather than personality differences.

By using independent samples t-test for the emotion priming tasks with Chinese context, only questions 11 and 13 revealed marginally significant difference between monolinguals and bilinguals (Q11: t= -1.721, P= 0.090, d=0.431; Q13: t= -1.679, P= 0.098, d= 0.421), which showed that under the Chinese language context, the Chinese monolingual group demonstrated a stronger ability to perceive low-arousal positive/negative emotions (mean score = 4.038 for Q11 and mean score = 3.769 for Q13) than bilinguals (mean score = 3.39 for Q11 and mean score = 3.049 for Q13). This proves that the bilingual group has a weaker perception of weak emotions in the Chinese context.

The paired-sample t-tests comparing the emotion perception and expression of the bilingual group under Chinese and English context showed that, under the stronger positive emotional conditions, the bilingual group will perceive stronger emotion for the English than Chinese texts. (t= -2.452, p=0.019, d= 0.388, mean score = 4.35 for Q16, and mean score = 4.925 for Q19). While in stronger negative emotions they tended to give a higher score/evaluated higher arousal to the Chinese texts. (t=2.923, P=0.006, d=0.462, mean score = 5.975 for Q12, and mean score = 5.25 for Q23). Moreover, towards the low arousal positive/negative texts, participants perceive stronger emotions in the English texts. (t= -5.526, P=0.001, d=0.874, mean score = 2.975 for Q13, and mean score = 4.325 for Q21). To sum up, the monolingual group performs slightly better under Chinese language context and the bilingual group performs better under English language context.

Other than t-test, we also ran correlation tests to determine whether the emotional perception related to language learning experience and personalities. For the bilingual group, low-arousal positive emotion texts (Q20vsQ31, P=0.030, Q22vsQ31 P=0.072) illustrate a negative correlation with question 31 about second language proficiency. This means the earlier people start studying English, the more accurately they perceive low-arousal emotion in an English context. For the bilingual group's performance in Chinese context, Question 7 showed negative marginal correlation with question 13 (Q7vsQ13, P=0.064), which suggested that people who were more engaged in socialization frequently will be more accurate on weak negative emotions. Extroverts score lower on the weak negative emotions. Also, there are positive marginal correlations between question 6 and question 10 (Q6vsQ10, P=0.100), meaning extroverts tend to score higher and feel the strong negative emotions. For the monolingual group correlation tests in the Chinese context, Q7 shows significant correlations with Q17 and Q12, and marginal correlations with Q11. (Q7vsQ17, P=0.041, Q7vsQ12, P=0.034, Q7vsQ11, P=0.071) Extroverts can perceive more high/low arousal negative emotions in Chinese context. Moreover, Q6 shows marginal correlations with Q10 (Q6vsQ10, P=0.020), meaning that monolingual participants with an extroverted personality will also score high in the strong negative emotions. Question 28, 31 negatively correlate with question 10, (Q28vsQ10, P=0.008 Q31vsQ10, P=0.008) stating that under the Chinese context, people who are more proficient in English are less likely to sense the negative high arousal emotions.

4. Discussion

The current study aimed to find out how bilingualism affects emotion perceptions in L1 and L2. We conducted a survey with an emotion priming experiment. The results revealed a difference between monolinguals and bilinguals, as well as the switch of language dominance after learning English as a second language. The impact of speaking the second language on emotion perception under L1 Context is that the bilingual group outperforms in the English context compared to the Chinese context. Some slight defamiliarization is shown as the monolingual group scored higher than the bilingual group in the Chinese context. This proves that the bilingual participants experience a shift of language dominance, but not necessarily that they unknow their mother tongue to achieve that.

Chinese monolinguals are better at perceiving emotions in Chinese context than bilinguals, this might be caused by the frequent use of English or immersion in a non-Chinese language environment. For example, most of the bilingual participants may be international students that study in the US. They use English to study, socialize, and other daily uses. The frequency of them speaking Chinese reduced so they might feel less drawn into an emotion when they read in a low arousal emotion text in Chinese. That shows that learning a second language weakens but not completely derives the ability to perceive emotions in the mother tongue. To interpret the outstanding performance of bilingual groups under high arousal negative emotions, we believe it can be due to the different ways of expressing strong negative emotions in the two language conditions. For example, Chinese version texts are more prone to convey anger or frustration by describing movements and environment. However, in English texts the author will be more likely to write a dialogue to show the character's fury.

Matched sample t-test put each Chinese and English emotion priming questions in pairs in terms of valence, arousals, and text length. Bilingual participants are better at answering questions in English than Chinese, and monolingual participants have stronger ability to perceive emotion in Chinese context. Wu et al (2022) conducted an experiment on how L2 can modify people's emotion perception by different word types. They found out that in the L2 context, people tend to sense the negative emotion-label words faster and more accurately. This also supports our results that L2 shapes people's emotion perception to make monolingual and bilingual perform differently. Increasing sensitivity in English and diminishing perception of emotion in Chinese might be the impact of learning a second language.

By running an independent sample t-test of the Chinese emotion priming question, we are able to reach the conclusion that bilingual groups are less able to perceive weak emotions in the Chinese context. But this does not affect emotions with high arousal for the reason that high emotions are more evident so even if there is a decline of ability in detecting emotion in mother language for bilingual people, they are still able to perceive the strong emotion precisely. However, in low arousal, there will be some vagueness and some of the bilingual people may perceive them as neutral emotions or unable to identify the valence of the emotions. Also, particularly in Chinese language, the way how low arousal emotion is addressed can be hard to identify for bilingual participants who live in an immersive second language environment.

For the correlation tests, we found that bilingual extroverts tended to experience higher levels of emotion perception in high arousal emotion and lower levels of emotion perception in low arousal emotion in the English version. This somehow indicates that extroverts will be more accurate in telling how strong the emotion is in English context and bilingual participants have more language dominance in their second language. Another set of data shows that extroverts in bilingual groups are less likely to perceive strong emotion in both high arousal conditions, which means they can perceive emotions but not too precisely. For monolingual participants, they generally rate higher scores in the Chinese version compared to bilingual groups, suggesting that they are more sensitive to the emotion in Chinese contexts than bilingual participants, thus presenting more significant language dominance in their mother tongue than those who study a second language.

Since there is more effective data in the bilingual group than in the monolingual group, the numbers will be more precise.

In summary, the current study revealed a significant effect of bilingualism (particularly English mastery) on both emotional perceptions under L1 (Chinese) and L2 (English) contexts. However, limitations should be mentioned. First, 68 samples present a certain level of gender disparity: most of the participants are female. The bilingual group outnumber the monolingual and in general the data is not sufficient, imbalanced due to the limited time and resources. Most of the data comes from people around and online volunteers; it was hard to evaluate their validity; Also, the designed scenarios cannot be perfectly paired since the Chinese and English version of texts are not directly translated from each other. The levels of emotion intensity and positivity are slightly different within a pair. Moreover, emotion perception and expression are subjective so it is impossible to verify methods to match Chinese and English scenarios. Direct translation should be avoided due to the fact that participants should give their answers by their first instinct instead of reading them over and over again in different language contexts.

Other than overcoming the limitations in the current study, future studies can also focus on including a third language. More and more people are learning a 3rd language and it may have effects on the L1 and L2. Real scenarios or more precise experiments can be used in a larger group of participants to ensure the accuracy and validity of the results; It is also suggested to conduct longitudinal studies such as observing a small group of people in their language training process. By looking at individual differences in details, we will be able to analyze people's cultural background, language experience, and other factors that may change their emotion recognition in different languages; This research uses quantitative methods to gather data on a scale of 1 to 7. The numerical data may display a result in general that multilingualism is beneficial in emotion perception in terms of identifying valences and arousals in fragments of texts. However, qualitative research such as interviews can be more efficient and effective in gathering information in multiple latitudes.

Appendix

Online Survey https://forms.gle/fCpMYU8ZUpVazXt86

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