Automatic Emotional Access of Unbalanced Bilinguals in Familiar Word Emotional Stroop

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Abstract

In this paper, the emotional Stroop paradigm was used to explore the automatic emotional access of bilinguals under L1 (the first language) and L2 (the second language) conditions in two different laguages. The experimental design was a within-subject design of 2 (language types: Chinese and English) × 2 (emotional vocabulary types: negative words and neutral words), recording the reaction time of 15 subjects to the word color. Results: (1)The language type did not affect automatic emotional access in emotional Stroop, that is, there was no significant difference in subjects' response time under L1 and L2 conditions (2) The opposite results were achievedin the paradigm of emotional Stroop: the types of emotional words (negative words and neutral words) affected the choice reaction time, and the choice reaction time of negative words was significantly shorter than that of neutral words. Conclusion: (1) Unbalanced bilinguals showed automatic emotional access in familiar words under L1 and L2 conditions, and the differences were not statistically significant.(2) The types of emotional words (negative words and neutral words) can affect the choice reaction time, but contrary to the previous conclusion, the choice reaction time of negative words wasshorter than that of neutral words.

Keywords

Familiar Emotional Word; Emotional Stroop; Choice Reaction Time; Bilingual.

1. Introduction

Bilinguals refer to people who can use two languages. The emotional connection of bilinguals when they use two different languages is one of the hot issues in psycholinguistics. The mother tongue (L1) of unbalanced bilinguals is acquired in the early family environment, while the second language (L2) is acquired in the school and social environment when biliguals enter their adolescence or adulthood. The emotional connection of L2 is different from that of L1, and L2 has lower emotional arousal than L1. Previous studies have found that early balanced bilinguals acquire both languages at the same time in their childhood, and the emotional connection of vocabulary content is the same in both languages.Empirical studiesaroused debates over"which language has stronger emotional connection" among bilinguals. In recent years, researches on automatic emotion processing of bilinguals under L1 and L2 conditions in emotional Stroop tasks were showed in Table 1 (Jiao Jiangli, 2017). The emotional Stroop paradigm took emotional words with color and neutral words as experimental materials, and required the subjects to respond to the colors by pressing the keys or naming them. The results showed that the subjects' reaction time to the color of emotional words was significantly longer than that of neutral words. The essence of this paradigm was that the emotional valence of emotional words unconsciously affected the subjects (Algom, chajut, & LEV, 2004; Li et al; Ben-David, Chajut, & Algom, 2012).

Early and late bilingual subjects were selected in the above typical studies on the emotional access of bilinguals, and it was found that the main factors affecting the automatic emotional accessof bilingualswere the frequency and proficiency of the language use. Differences in bilinguals' acquisition of a second language, such as the age at which they acquired L2, environment, familiarity, were the main reasons for the complexity of the definition of "bilinguals". In previous studies, researchers often controlled the proficiency of languages by dividing the level of the subjects' second language, whicn weredetermined by the scores of MHK (Minzu Hanyu Kaoshi) or CET (College English Test) (Jiao Jiang, 2017).However, these standards were not completely convincing, and it was difficult tocontrol the subjects' proficiency of words. Therefore, we started with the experimental materials and selected Chinese and English wordswith high proficiency and high frequency of use to explore whether there is a difference in the emotional Stroop effect of vocabularywith high familiarity in different languages. In addition, in the current research on emotional Stroop, the negative conclusions were relatively consistent, while the positive words were relatively few and the conclusions were inconsistent (Bai Xuejun, 2014).So we onlychose negative and neutral words. According to the actual situation of the subjects, Chinese was selected as L1 and English as L2.

2. Method

2.1. Experimental Materials

2.1.1. Basic Information and Statistical Tests of Vocabulary Materials

The choice of vocabulary materials came from the Chinese Affective WordsSystem (CAWS) and the English words learnt in primary schools. The neutral words and negative words with thepleasure degree of 5.0 ~ 5.5 and below 3 were selected respectively, and the corresponding, appropriate emotional arousal degree wasdetermined. Before the formal experiment, four students in the group evaluated the frequency and familiarity of vocabulary to further ensure the familiarity of vocabulary materials.

2.2. Subjects

(1) The subjects were 15 undergraduates majoring in Applied Psychology in Hebei University. Their mother tongue was Chinese and their second language was English. The age span was 18 ~ 21 years old, and the average age was unknown. There were 4 boys and 11 girls. (2) The subjects began to systematicallylearn Chinese from their kindergarten and English from the third grade of primary school.

2.3. Experimental Design

The experimental design was a within-subject design of 2 (language types: Chinese and English) × 2 (emotional vocabulary types: negative words and neutral words).

2.4. Experimental Procedure

According to the emotional Stroop paradigm, the negative and positive words of the two languages were presented in pseudo-random order, that is, Chinese and English, negative words and neutral words were presented at intervals.
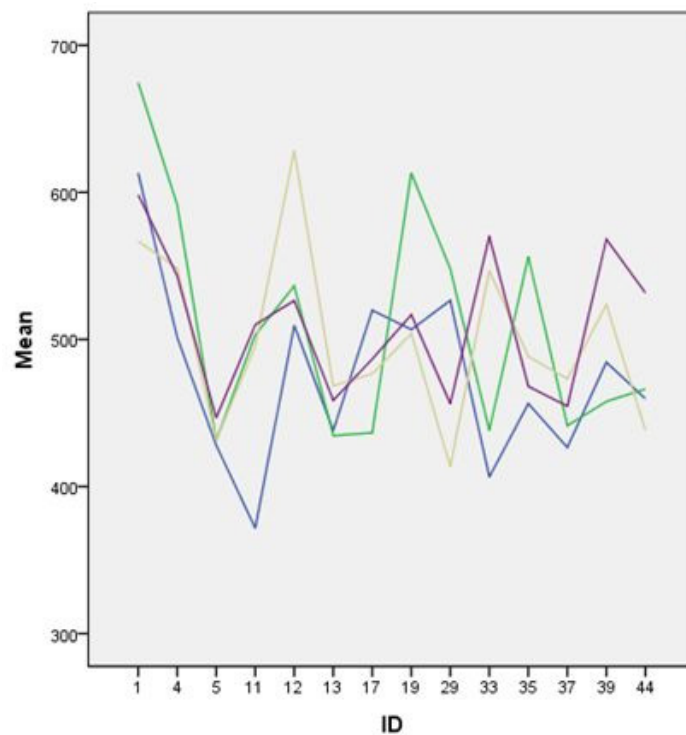
3. Results

The error rate of one subject was too high, so the data was eliminated. The final number of subjects was 14. The average age was unknown (4 boys and 10 girls). SPSS 18.0 was used to analyze the reaction time of the 14 subjects.

The two-way repeated measures ANOVA was used to analyze the average reaction time of negative and neutral words under the bilingual conditions.The results showed that the main

effect of language type was not significant, among which,$F(1,13)=0.621$, *p=0.445*>0.05, partial η^2=0.046.The main effect of emotional vocabulary type was significant, among which, $F(1,13)=$ 5.825, *p=0.031*<.05, partial η^2=0.309.The interaction effect of language types and emotional vocabulary types was not significant, among which, $F(1.13)=1.442$, *p=0.251*>0.05, partial η^2=0.1. LSD method was used to compare the main effects of emotional vocabulary types, and the results showed that the selective reaction time of negative words (M =487.571) was significantly shorter than that of neutral words (M = 509.464), among which, *p=0.031*<0.05.

Table 1. Averaged reaction time of subjects across the four conditions (M±SD)(ms)

Vocabulary types	M	SD	N
Chinese, negative	474.9143	61.13960	14
Chinese, neutral	509.2286	78.68358	14
English, negative	500.2286	58.41821	14
English, neutral	509.7000	49.30399	14

Green: Chinese, negative

Blue: Chinese, neutral

Purple: English, negative

Yellow: English, neutral

Fig 1. Averaged reaction time of subjects across the four conditions

4. Analysis and Discussion

It can be seen from the results that the automatic emotional access of the unbalanced bilingual subjects in the familiar word emotional Stroop was not affected by language types, that is, there was no significant difference in the average reaction time of the two familiar words (negative words and neutral words) under L1 and L2 conditions, which indicated that the automatic emotional access of unbalanced bilinguals in familiar word emotional Stroop was similar. This result was similar to that of foreign studies: there is no significant difference in the reaction time of fully proficient bilinguals under the bilingual conditions, that is, the unconscious access to emotional wordsis similar under the bilingual conditions (Grabovac&Pléh,2014;Winskel). In addition, the explanation for this result was that for college students, in the background of increasing internationalization, we are exposed to English more often through various social media, radios, newspapers, etc. In the immersive learning process, the connectedness of L2 is enhanced, especially in this experiment, familiar words wereselected, which were prone to unconscious processing. As a result, there was no significant difference in emotional Stroop effect on L1 and L2 familiar words.

In the emotional Stroop task,unbalanced bilinguals' reaction time of negative words was significantly shorter than that of neutral words in L1 and L2 familiar words. Contrary to the previous studies, the emotional valence of emotional words unconsciously accelerated the color naming of words by subjects. The explanation of this can be explained from the following aspects.

(1) It was the improper selection of vocabulary materials. In the selection of vocabulary materials, we only screened from the two dimensions of pleasure and arousal in CAWS, and then selected what four students in the group were familiar with, which was not tested by professional vocabulary reliability and validity. Moreover, the English word materials were negative words and neutral words learnt in the primary school. The degree of pleasure, arousal, frequency of use and familiarity were not evaluated professionally. As a result, the scientificity and accuracy of the materials were not up to the standard, which may lead to the low internal validity in the experiment.

(2) The processing of negative affective concepts activated the avoidance system, thus increasing the tendency to retreat from it (Roland Neumann & Fritz Strack, 2000). The evidence supporting the close relationship between the affective processing and approach or avoidance behavior came from the research on defensive reflex, which can be considered as the most primitive form of avoidance behavior (Lang et al., 1990). When the subjects saw the negative words, they activated the avoidance system and increased the tendency to withdraw. Although the subjects had automatic processing of word meaning in the reaction to word color in the experiment, compared with neutral words, more subjective efforts were made to make the negative words disappear than neutral words because the negative words increased the tendency to withdraw. So the reaction time of negative words was shorter than that of neutral words.

Given all that, based on the previous studies, we took familiar words in Chinese and English as materials to further explore the automatic emotional access of emotional Stroop in different languages. Unbalanced bilinguals showed automatic emotional access in familiar words under L1 and L2 conditions, and the differences were not statistically significant. The types of emotional words (negative words and neutral words) can affect the choice reaction time, but contrary to the previous conclusion, the choice reaction time of negative words was shorter than that of neutral words. So apart from vocabulary familiar materials, somethingcan be further discussed in the future, that is, whether listening and speaking familiar bilingual materials have an impact on the automatic emotional access of emotional Stroop effect.

5. Conclusion

(1) The results showed that unbalanced bilinguals showed automatic emotional access in familiar words under L1 and L2 conditions, and the difference was not statistically significant, that is, the automatic emotional access of the unbalanced bilinguals in familiar word emotional Stroop was not affected by the language type. (2) The types of emotional words (negative words and neutral words) can affect the choice reaction time, but contrary to the previous conclusion, the choice reaction time of negative words wasshorter than that of neutral words.

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