

Emotional Sentiment Analysis of Bilingual Responses

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ABSTRACT

This study investigates emotional sentiment processing in bilingual individuals, focusing on how native and second languages influence emotional expression. The research utilized a survey evaluating emotional reactions to words and phrases in Chinese (L1) and English (L2) among 22 participants. Results revealed that language proficiency significantly impacts emotional intensity, with stronger emotional responses observed in participants' native language, especially for negative words. Cross-cultural consistency was noted for universally positive concepts like "Gratitude" and "Relaxation," while terms such as "Contentment" elicited mixed reactions. Additionally, functional and technical terms were predominantly rated as neutral, highlighting their low emotional intensity. Sentences with clear emotional cues evoked similar responses across languages, whereas ambiguous phrases showed variability based on linguistic context. The findings underscore the interplay between language, culture, and emotion, offering insights for education, marketing, and cross-cultural communication. Future research should expand participant demographics and explore additional languages to deepen understanding.

KEYWORDS

Bilingual; Emotional expression; Cross-cultural consistency

1 Introduction

Language is more than a means of communication—it shapes our identity, influences our cognition, and colors our emotional experiences. For bilingual and multilingual speakers, the dynamics of language acquisition and usage become even more intricate, affecting not only how they think but also how they feel. The intersection of bilingualism, affective processing, and cognitive development has long fascinated researchers, as it provides unique insights into the ways our brains navigate multiple languages and the emotions tied to them.

1.1 Defining a bilingual speaker

The concept of bilingualism is multifaceted. In everyday understanding, bilinguals are often seen as individuals possessing similar levels of proficiency in two languages, typically acquired from birth. However, researchers adopt a more nuanced perspective, defining bilinguals and multilinguals based on the use of multiple languages in daily life. Bilingual speakers can be categorized into two main groups: simultaneous bilinguals, who acquire two languages concurrently (e.g., children raised in bilingual families), and sequential bilinguals, who learn an additional language later in life, often for purposes such as immigration or education abroad (De Groot, 2011; Grosjean, 2008). Furthermore, distinctions among bilinguals can be drawn based on variables such as age, gender, and nationality.

1.2 Bilingualism and cognitive development

The impact of bilingualism on cognitive and academic development, particularly literacy, has been a subject of enduring interest. Key terminologies in this field are outlined in Table 1. To explain language acquisition sequences, scholars often employ an orderly framework encompassing the first language (L1), second language (L2), third language (L3), and so forth (Dewaele, 2010). For languages learned later in life, the term "second language" (L2) is commonly used, with any additional language referred to as LX. The age at which L2 learning begins is designated as the age of acquisition (Abrahamsson, N, 2012). Based on the age of acquisition, bilinguals are further classified as simultaneous, childhood, or late bilinguals.

In the context of a target language, the age of acquisition should not be conflated with the age of arrival. Some individuals begin learning an L2 in a classroom setting before entering a TL environment, while others initially rely on their L1 before formally studying the L2. These processes may overlap or diverge, necessitating separate analyses of their effects.

1.3 Contexts of language acquisition

The "context of acquisition" (CoA) refers to the environment in which a language is learned, broadly categorized into three settings: mixed environments, naturalistic L2 contexts, and foreign language or instructional settings. Language proficiency encompasses overall mastery of a language and specific skills such as speaking or writing, often measured through self-reports and standardized tests. Balanced bilinguals exhibit comparable proficiency in their languages, while dominant bilinguals demonstrate greater fluency in one language (Grosjean, 2008). However, dominance may vary across

linguistic domains. For instance, a late Russian-German bilingual in Germany might retain overall dominance in L1 Russian but exhibit professional dominance in L2 German. Similarly, a childhood Spanish-English bilingual in the U.S. might show dominance in L2 English due to environmental and educational influences. Language dominance reflects frequency of use, ease of access, and linguistic activation.

1.4 Language attrition and influence

Changes in language dominance can lead to L1 attrition, characterized by dysfluency, reduced vocabulary, structural simplification, and even L2-influenced accents in L1 (Schmid, 2011). The phenomenon of L2 influence on L1 highlights how even limited L2 proficiency can affect L1 competence and performance (Cook, 2003; Jarvis & Pavlenko, 2008; Schmid, 2011). This complexity challenges the notion of bilinguals as equivalent to monolingual native speakers in L1.

Moreover, treating bilinguals and multilinguals with diverse language-learning histories as a homogeneous population can obscure meaningful differences. Such aggregation may yield noisy data, making it difficult to draw valid conclusions. A common methodological error is generalizing findings from a limited number of bilingual populations to all bilinguals. While the diversity of bilingual experiences complicates theoretical development, it also provides unique opportunities to explore the interplay between affective and cognitive dimensions. Variables linked to additional language acquisition offer insights into affective processing that are less pronounced in monolingual individuals.

1.5 Affective and cognitive processing

Imagine entering a bustling party and immediately sensing the presence of someone who embodies your aspirations and desires. Your heart races, your stomach churns with a fluttering sensation, perspiration dots your skin, and words fail you. These visceral reactions are familiar to many, reflecting emotional processing triggered by stimuli that elevate arousal—whether it is fear, such as encountering a mouse in the closet, or affection, as when faced with a beloved person. Despite the intuitive nature of identifying such responses, researchers have consistently struggled to delineate affective from cognitive processing, both theoretically and empirically (Eder, Hommel, & De Houwer, 2007). As a result, a comprehensive academic definition of affective processing remains elusive.

The theoretical landscape of emotion research reveals significant debate regarding the relationship between affect and cognition. Basic emotion theories conceptualize primary affective processing as innate, discrete responses that are pre-cognitive and independent of linguistic constructs. These responses are considered evolutionary mechanisms designed to handle fundamental survival challenges (Ekman & Cordaro, 2011; Izard, 2011; Panksepp & Watt, 2011). For instance, a sudden loud noise may trigger an immediate startle response before one has the opportunity to analyze its source cognitively.

In contrast, appraisal theories argue that affective processing is not independent of cognition but is instead a subjective evaluation of stimuli based on their relevance to an individual's goals, values, and needs. These evaluations produce physiological changes within the somatic, autonomic, and endocrine systems, which can manifest as conscious experiences labeled through linguistic constructs (Scherer, 2009). For example, recognizing a stimulus as a threat may involve both an automatic physiological response and a reflective appraisal of its implications for one's safety or well-being.

Constructionist theories further complicate this discourse by proposing that affect is fundamentally intertwined with cognition. These theories posit that affective experiences are the result of interpreting neurophysiological and somatovisceral states (referred to as core affect) within a cultural and linguistic framework (Barrett, 2009). Thus, emotions are socially constructed phenomena, with the labels we assign—such as "fear" or "joy"—arising from the integration of bodily sensations with context-specific meanings. Proponents of this perspective reject the existence of non-affective cognition, asserting instead that all cognitive processes are imbued with affective elements (Duncan & Barrett, 2007).

From a practical standpoint, the challenges of distinguishing affective from cognitive processing are further exacerbated by methodological limitations. Much of the existing research relies on tools and techniques originally developed for studying cognitive processes, which may not be well-suited to isolating affective phenomena. This methodological dependency raises questions about whether affective processing can be meaningfully separated from cognitive processes or whether it represents a specialized subset of cognition (Cacioppo & Berntson, 2007).

For the purposes of this discussion, affective processing will be operationally defined as somatovisceral reactions triggered by the automatic evaluation of stimuli. These reactions may or may not be consciously experienced as feelings within higher-order cognitive processes. This definition draws upon appraisal theory (Scherer, 2009), which provides a framework for analyzing the subjective and context-dependent nature of affective experiences. By employing this perspective, it becomes possible to investigate how bilingual individuals process emotional stimuli in their respective languages, as well as how linguistic and cultural factors influence their emotional experiences.

The distinction between affective and cognitive processing is particularly valuable when comparing the emotional responses elicited by different languages. For bilinguals, the emotional salience of words and expressions often varies depending on the language in use, reflecting differences in cultural norms, personal experiences, and levels of linguistic

fluency. Understanding these variations requires a nuanced approach that considers both the shared and distinct elements of affective and cognitive processes. From this vantage point, one can explore how subjective emotionality arises from the interplay between individual needs, goals, and the linguistic and cultural categories through which emotions are interpreted.

Throughout this analysis, the terms "affect," "emotions," and "feelings" will be used interchangeably, reflecting their overlapping but contextually nuanced meanings. Although English provides three distinct terms for these phenomena, this linguistic distinction will not be emphasized, as the focus remains on the underlying processes rather than their specific labels.

2 Methodology

Laboratory studies of language development, linguistic autobiographies and memoirs have provided important insights into the processes of language acquisition and loss. Although some patterns have emerged, it is difficult to draw more precise generalisations because the questions are not well targeted. It is better to use comparable data derived from directed questions for statistical and qualitative analyses (by setting different types of questions to ask). A large amount of bilingual self-reported data can be collected through an online questionnaire. By combining quantitative data from Likert scale type responses with qualitative data from multiple-choice questions, it is possible to draw a fairly comprehensive picture of self-reported verbal behaviour and perceptions of Chinese and English bilingual speakers.

2.1 Participants

A total of 22 bilingual individuals (13 females and 9 males) contributed to the database. All participants were native Chinese speakers who also spoke English as their second language (L2). Regarding the age of L2 acquisition, 18 participants began learning English at age 6 or 7 (when they first entered school), which represented the largest proportion, while 9 participants started at age 10. The majority of participants were highly educated: all held a bachelor's degree, 15 had a master's degree, and 1 held a doctorate. Their ages ranged from 18 to 32, with most clustered around 23 or 24 years old. Nine participants were male and thirteen were female. Most participants worked in fields unrelated to language, though a minority reported language-related occupations. Because the sample consisted largely of young adults ($n = 21$) aged 19–25 with higher education, it cannot be considered representative of the broader Chinese-speaking community. In terms of language use, 9 participants reported using English monthly and 6 used it daily, but overall, L2 was not used frequently, and English proficiency had not reached native-like levels. Based on this participant profile, the present study addresses the research question: How do bilingual individuals process emotional sentiment in their native (Chinese, L1) and second (English, L2) languages, and how does language proficiency influence the intensity and perception of emotional expression? Given the small sample size, however, the results cannot be taken as statistically significant or fully reliable (Dörnyei, 2003; Martin J. Koch, Kristin Kersten, & Werner Greve, 2024).

2.2 Research design

To collect data from native English learners and long-term users in China, we developed an online web questionnaire on multilingualism and emotions (Dewaele & Pavlenko 2001). Gender, age, education level, occupation, languages used by participants, primary language, chronological order of language acquisition, age at which language learning began, and frequency of use are the sociobiographical details collected. From this information, we can learn some specific information about people learning a second language, which helps us analyze its details. The language selection includes both emotional and non-emotional speech, as well as emotional words and emotion label words (Altarriba, J., & Basnight-Brown, D, 2011). Participants select some words for their emotional attributes (Friida, N. H. 1986). We asked participants about their first reactions to the words, their judgments of emotional tendencies, their inner speech, and the latter's mental calculations to compare participants' different sensitivities to words of different emotion categories in different languages. Data based on the comparison of different languages can show bilinguals' emotional sensitivity to different emotion words. At the same time, some sentences with different emotional tendencies were selected, including sentences describing some scenes and sentences expressing emotions directly, especially some common speech habits, swear words, etc., to let the subjects judge the degree of emotional stimulation they received. A 5-point Likert scale was used to test the specific perception of various language emotional words. This is a further supplement to the first multiple-choice question. We also asked about the language used for swearing and the emotional impact that people think swear words will have (Dewaele Forthc. 2004). It recalls unpleasant or challenging events and participates in debates. In these questions, we focus on the perceived utility, richness, color, poetry and emotional depth of language.

By comparing the subjects' answers to the first language to be learned and the main language when completing the questionnaire, two types of subjects can be identified: the first type of subjects are not very familiar with the second language, do not use the second foreign language in daily learning and life, and still use the first language as the main language. The second type of subjects use English more frequently (almost every day) and can speak the second

language more fluently than the first type. The second one is more fluent in L2. The test questions also test the subjects' responses to emotional words in different languages from three different levels. The first question is to test the ability to judge basic emotional words. The second question is to test the ability to read long sentences and commonly used spoken language and the ability to perceive the emotions hidden in them. The question types include multiple choice questions and chart questions. The third question is to test the subject's ability to write about emotions. If these quantitative statistics are supported by other kinds of data, they can offer good baseline data. In Dewaele and Pavlenko (2002), we made the case for triangulation in bilingualism research. For this reason, we also collected brief narratives using different types of question about mood and communication style in our web questionnaire.

2.3 Results

Overall, the results reveal clear patterns in how bilingual participants process emotional sentiment across Chinese (L1) and English (L2). Words with obvious positive or negative valence tended to receive consistent evaluations in both languages, while neutral or ambiguous terms showed greater variability, particularly in English. In general, participants displayed stronger emotional intensity when responding in their native language, especially for negative words, whereas L2 responses more often leaned toward neutrality. Sentence-level items with clear emotional cues produced similar responses across both languages, but ambiguous or metaphorical phrases revealed differences depending on linguistic context. Finally, ratings of emotional intensity on the Likert scale indicated that swear words and strongly negative terms elicited the highest activation, while general or functional terms such as "Computer" or "Light" were consistently perceived as neutral.

In the multiple choices, the Chinese word (Gratitude) received an overwhelmingly positive evaluation, with 95.45% of participants marking it as positive. The English word "Relaxation" was also rated as positive by 81.82% of participants. But the attribution of English word "contentment" is disagreed by many people. 36.36% think about it is positive, but 54.55% think about it is neutral. On the other hand, the Chinese word (Melancholy) was rated as negative by 81.82% of participants, indicating its strong negative emotional attribute. The English word "Anxiety" was rated as negative by 86.36% of participants, showcasing accurate recognition of negative emotional vocabulary. In English, "loneliness" received relatively less negative evaluation than anxiety, with only 77.27% of people choosing negative. Words such as "lights", "computers" and (classes) are mainly considered neutral, and the frequency of neutral evaluations received by both English and Chinese words is relatively balanced, about 80%. Words like (Lighting) and "Computer" were primarily considered neutral. For example, 86.36% of participants rated "Computer" as neutral.

In the question about word-laden, the word (Punishment) had a starkly negative perception, with 77.27% categorizing it as negative. Similarly, "Disaster" was overwhelmingly perceived as negative (68.18%), consistent with its use to describe catastrophic events. The term (Earthquake) followed a comparable trend, with 54.55% viewing it negatively, though a notable 40.91% saw it as neutral.

The word Light predominantly elicited neutral responses (86.36%), with only 9.09% associating it with positivity and 4.55% with negativity. Similarly, the word "Wedding" was largely neutral (50%), though it showed a significant positive association (31.82%). The word "Chaos" revealed an almost even split between negative (50%) and neutral (45.45%) responses, with minimal positive associations (4.55%). Words like "Sunshine" leaned heavily toward positive connotations (63.64%), reflecting its universal association with warmth, happiness, and vitality.

Sentences like "Her smile was a beacon of hope in the darkest times" were rated positively by 81.82% of participants, indicating cross-cultural recognition of positive imagery. Sentences such as "The battlefield lay silent, echoes of war lingering in the air" were rated negatively by 68.18% of participants, highlighting emotional resonance in negative scenarios. "Love is a sweet torment" demonstrated a blend of positive and negative emotions but was still rated positively by 77.27% of participants.

2.4 Discussion

Analyses showed that language proficiency significantly affected emotional intensity. Participants showed stronger emotional reactions in their native language (Chinese) compared to their second language (English), especially for negative words (Jean-Marc Dewaele, 2004). When judging words with clear emotional tendencies, native language and second foreign language had no significant effect on Chinese-English bilinguals. For instance, the Chinese word (Gratitude) received 95.45% positive responses, while its English counterpart "Relaxation" also received a high positive evaluation (81.82%), showing cross-cultural consistency for universally positive concepts. Strong negative words such as (Melancholy) and "Anxiety" were consistently rated as highly negative, with 81.82% and 86.36% negative responses, respectively. Words like "Relaxation" and "Gratitude" strongly resonate as positive, while terms like "Anxiety" and "Loneliness" are heavily skewed toward negativity. This polarity highlights the emotional weight certain words carry. However, disagreement arose with the English word "Contentment" where 54.55% marked it as neutral. According to our discussion with the respondents, the reason is that some respondents are not familiar with the meaning of the words. Therefore, the level of mastery of the second foreign language will also affect the experimental results (Wei Yi, Haitao Xu

and Kaiwen Man, 2013).

In analyzing the data presented by the second question, we observe an intriguing exploration of how individuals associate emotional attributes—positive, negative, and neutral—with specific emotion-laden words. The results provide insight into the collective perception of words across different contexts, reflecting a spectrum of emotional responses that can inform linguistic and psychological studies. Words like “Light” and “Computer” have a significant proportion of neutral responses, suggesting that some concepts are viewed as functional or situationally dependent rather than inherently emotional.

The data also underscores the influence of cultural and emotional contexts on word interpretation (Puntoni, S., De Langhe, B., & Van Osselaer, S, 2009). For instance, the word “Wedding” “Sunshine” evoked both positive and neutral responses, perhaps reflecting its dual nature as both a joyous event and a formal institution. Meanwhile, words tied to natural disasters or societal disruptions, such as “Earthquake” and “Disaster” elicited predominantly negative responses, underscoring their association with harm and instability. The emotional attributes of words in different languages reflect the interplay between their inherent meanings and the contexts in which they are interpreted. This analysis reveals the complexity of language perception and the factors influencing emotional associations with words. Words are not static in their meanings; they are shaped by context, culture, and individual experience. Understanding these trends has practical applications in fields such as marketing, education, and mental health, where word choice can significantly impact messaging and emotional engagement (Peiyao Chen, Ashley Chung–Fat-Yim and Viorica Marian, 2022).

In the third type of question, the long sentences stimulated the subjects to the same degree of emotion as the emotional words. In the third type of question, the long sentences stimulated the subjects to the same degree of emotion as the emotional words. The subjects responded to the sentences with direct emotion orientation in the same way, regardless of the language. However, when there was ambiguity or complex emotional words in the sentences, the subjects reacted differently to the sentences written in a second language. “Love is a sweet torment” had a significant percentage of positive responses (77.27%) but also some neutral (13.64%) and negative (9.09%) responses.

The comparison between Chinese (L1) and English (L2) revealed clear asymmetries in emotional processing. Overall, participants showed stronger emotional intensity in their native language, particularly for negative words. For example, the Chinese word (Melancholy) was rated negative by 81.82% of participants, while its English counterpart “Anxiety” also drew strong negativity (86.36%) but with a slightly different distribution of responses, suggesting a nuanced gap in perception. However, ambiguous or abstract L2 words tended to elicit more neutral ratings. The English word “Contentment” illustrates this point: more than half of participants (54.55%) rated it as neutral, compared to the overwhelmingly positive rating of its Chinese equivalent (Gratitude) (95.45% positive).

When evaluating neutral or functional terms, both languages showed similar trends (e.g., “Computer” and (Light) were rated neutral by over 80% of participants). Yet, when it came to sentence-level interpretation, participants responded consistently across languages when emotional cues were explicit (e.g., “Her smile was a beacon of hope...” received 81.82% positive ratings in English and its Chinese equivalents showed similar responses). In contrast, ambiguous or metaphorical phrases led to greater divergence in L2, as seen with “Love is a sweet torment,” where responses were more mixed compared to the more unified evaluations in Chinese.

Within the framework of constructionist theories of emotion, the findings of this study can be meaningfully interpreted. According to this perspective, emotions are not fixed biological modules but rather the result of individuals interpreting core affective states (e.g., arousal and valence) through the conceptual system provided by language and culture (Barrett, 2006, 2017). Consequently, the granularity and intensity of emotional experiences largely depend on the availability and clarity of linguistic labels. In one’s native language (L1), individuals typically possess a richer and more nuanced repertoire of emotional vocabulary, enabling them to differentiate similar bodily sensations and assign them culturally specific meanings, which leads to stronger and more precise emotional experiences. In contrast, in a second language (L2), limited lexical knowledge or blurred semantic boundaries may hinder this process, resulting in more frequent “neutral” evaluations or attenuated emotional responses. The divergent judgments observed in this study regarding the English word Contentment illustrate this dynamic: while some participants classified it as positive, more than half rated it as neutral. This suggests that participants lacked sufficient mastery of the semantic boundaries and cultural connotations of this L2 term, preventing them from converging on a shared emotional interpretation as they would in their native language. These findings not only support the constructionist view that language plays a central role in the categorization of emotion but also highlight the importance of L2 proficiency and cultural embedding in bilingual emotional processing.

2.5 Limitations and recommendations

The study presents valuable insights into bilingual emotional perceptions; however, several limitations must be addressed to enhance the robustness and applicability of its findings. Firstly, the small sample size of 22 participants limits the generalizability of the results. A larger sample size would improve the reliability of the data, particularly in capturing

variations across different demographics and cultural backgrounds. Additionally, the demographic homogeneity of the participants—predominantly young adults aged 18 – 32 with higher education levels—further restricts the representativeness of the findings.

To address these limitations, future research should consider several recommendations. Expanding the sample size and including participants from diverse demographics would provide a more comprehensive understanding of bilingual emotional perceptions. Incorporating participants from varied socio-economic backgrounds, age groups, and education levels could uncover broader patterns of emotional language processing. To control for language proficiency, future studies should stratify participants by their fluency levels and analyze responses within each group. This would help differentiate between the effects of linguistic mastery and genuine emotional interpretation.

3 Conclusion

This study underscores the intricate interplay between language, culture, and emotion in bilingual individuals. Positive and negative emotional words exhibit universal trends, while neutral and ambiguous terms highlight cultural and linguistic variability. By exploring bilingual emotional perceptions, this research provides valuable insights for fields such as education, marketing, and cross-cultural communication. Future studies could expand sample sizes and explore additional languages to build on these findings.

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