

Bilinguals' Recall and Recognition of Emotion Words

Ayşe Ayçiçeği, Istanbul University

Catherine L. Harris, Boston University

Address for Correspondence

Catherine L. Harris

Psychology Department

Boston University

64 Cummington St.

Boston, MA 02215

USA

Email: charris@bu.edu and aycicegi1966@hotmail.com

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Abstract

Recall of emotion words is superior to neutral words. Prior work reported in this journal (Anooshian & Hertel, 1994) found that this effect was absent in a second language. Words in a second language may thus lack the emotional associations of words acquired in childhood. To determine whether memory probes may be generally useful for assessing emotionality effects in a first vs. a second language, Anooshian and Hertel's paradigm was extended in several ways. Recall was compared to recognition, and a variety of types of emotion words were studied, including taboo terms, and phrases likely to be learned in childhood (reprimands). Superior memory for emotion words was obtained in both the recall and recognition tasks, but this occurred in both the first and second language and indeed was stronger, for some stimuli, in the second language. This suggests that, even for bilingual speakers who acquire their second late (after age 12), words in the second language retain rich emotional associations.

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Diverse reports over the last century support the idea that the first language is bilingual speakers' choice for expressing positive emotions (Javier, Barroso & Muñoz, 1993). Sechrest, Flores and Arellano (1968) reported that married Filipinos used Tagalog for intimate expression, even though English was habitually spoken at home. Anooshian and Hertel (1994) noted that age of acquisition appears more important than proficiency in emotional expression, citing the example of a woman who grew up in a Spanish-speaking home and learned English after 8 years. Although English was her dominant language, she prayed in Spanish, because praying in English never "felt right." These authors suggest that language learned in childhood may have greater emotional expressiveness. This is compatible with the view that emotional systems co-develop with early language use (Bloom & Beckwith, 1989).

If the first language is the language of emotional expressiveness, the second language may be the language of emotional distance (Dewaele & Foth, 2002; Dewaele & Pavlenko, 2002; Marcos, 1976). Bilingual speakers feel freer to discuss embarrassing topics in their second language (Bond & Lai, 1986). Studies of code-switching describe how using a second language often serves a distancing function (Gumperz & Hernandez, 1971; Javier & Marcos, 1989). Gonzalez-Reigosa (1976) discussed psychotherapy with Spanish-English bilinguals. Patients retreated into English to discuss anxiety-arousing topics, and used English for portraying a persona of self-confidence, calm, and emotional reserve. Second language users commonly acknowledge that obscene and taboo words generate less anxiety when pronounced in a foreign language. Spanish-English bilinguals reported more anxiety after reading a list of 10 Spanish taboo words compared to reading a list of 10 English taboo words (Gonzalez-Regiosa, 1976).

The current study investigated differences in emotional resonance of a first vs. a second language by adopting the methodology of Anooshian and Hertel (1994). These authors compared recall of emotion and neutral words which had been presented, in a rating task, in either a first vs. a second language. Recall of words is known to be influenced by emotionality (Rubin & Friendly,

1986). Anoshian and Hertel (1994) hypothesized that emotion words in the second language lack the emotional connotations which enhance recall. This hypothesis was confirmed with their study of bilingual speakers of Spanish and English, who differed in whether English or Spanish was the native language, and who acquired their second language after age 8. These authors found that emotional words presented in the first language were recalled more frequently than neutral words, but in the second language, emotion and neutral words were equally recalled. If the enhancing effect of emotion is language-specific, then words may be represented differently in different languages, as proposed by several researchers (Kollers & Roediger, 1984; Watkins & Peñaricioglu, 1983).

The current paper investigates the generality of Anoshian and Hertel's results by using a more diverse set of emotion terms and varying the procedure. Anoshian and Hertel (1994) only compared emotional words and neutral words, and 13 of their 18 emotion words were positive (see Appendix A). Positive emotion may be more connected to early language learning, and thus the emotion-word advantage may be restricted to positive words in the first language. Indeed, not all theorists agree that a first language, but not the second language, shows enhanced recall of emotional words. Overall better memory for neutral words compared to anger words was observed in a recent study by Martins, Oliveira, and de Sousa (2003). These authors also found greater recall of anger words by bilingual speakers compared to monolingual speakers. This is a very different result from the superior recall of emotion words in L1 found by Anoshian and Hertel (1994), but the authors still attribute their results to heightened emotional processing of L1 compared to L2. They note that processing anxiety-provoking stimuli may induce a mood change. To avoid experiencing negative feelings, participants may minimize processing of aversive stimuli (Foa & Kozak, 1986; Mathews et al., 1989). If unpleasant stimuli are given less elaborate processing, they will be less accurately recalled, meaning a memory disadvantage for negative words compared to neutral words. If the emotional connotations of words in a second language are weaker than in the first, then the memory disadvantage for negative words will be weaker in the second language.

Integrating the results of Anoshian and Hertel (1994) and Martins et al. (2003) suggests that L1 vs. L2 effects may differ for positive and negative words. We thus differentiated emotional words into separate categories of positive words (*joy, mother*) and negative words (*anger, pain*), and compared these to neutral words (*table, column*). We predicted that we would find a greater

emotion-memory advantage for positive words in the first language, but that negative words would have superior recall in the second language.

Two additional emotion categories were included for exploratory purposes: childhood reprimands and taboo words (sexual and socially stigmatized terms). Both categories are anxiety-arousing. Childhood reprimands are phrases customarily used by parents to control children's behavior, such as "Don't do that" and "Shame on you!" Although Bloom and Beckwith (1989) have emphasized the connection between positive affect and very early language learning, childhood is of course also a time of negative emotion, particularly apprehension of parental censure. If a childhood context of emotion learning is the important factor for the recall advantage of emotion words, then childhood reprimands should show a recall advantage in the first, but not the second language.

We included taboo words because these items typically generate a strong visceral response (Jay, 2000). They can be considered "super-emotion" words in terms of the diversity and strength of associated contexts and emotions. Indeed, researchers interested in the brain systems which mediate emotion have employed taboo words because of their ability to activate the amygdala, known to be a key subcortical structure for threat-detection (LaBar & Phelps, 1998). Prior work with monolinguals has found that taboo words are recalled better than neutral words. MacKay et al. (2002) argued that the superiority of recall for taboo words occurs because emotional reactions during encoding facilitate binding of the taboo words to its context. The current study extended that of MacKay et al (2002) by comparing recall of taboo words in a first vs. a second language. It could also be useful to compare childhood reprimands to taboo words. Many taboo terms are learned in middle childhood or adolescence. The concepts of sexual stigma and interpersonal slurs are highly relevant to adolescents and young adults, and may thus be equally relevant when learning a first vs. a second language.

The procedure used by Anoshian and Hertel (1994) was varied in several ways beyond our examination of additional stimulus types. Half the participants received a recognition task instead of a recall task. For monolingual speakers, recall and recognition tests are influenced similarly by emotionality, with emotion words showing an advantage compared to neutral words (Rubin & Friendly, 1986). We thus expected similar emotionality effects for both recognition and recall tasks. However, the pattern may vary because recognition tasks benefit from familiarity, and

recall and recognition tests are impacted differently by frequency and distinctiveness (MacLeod & Kampe, 1996).

Anooshian and Hertel (1994) presented words visually to subjects, via printed lists. Auditory presentation may lead to greater elaborative encoding, and may bring to mind more emotional associations because the interpersonal contexts of speech are plausibly more emotional than print. It thus seems worthwhile to determine if memory effects are the same regardless of modality. We thus varied auditory and visual presentation, using a mixed format for this factor as well as the factor of first/second language.

Method

Design and Materials

The positive, negative and neutral items (16 in each category) were selected from the *Handbook of Semantic Word Norms* (Toglia and Battig, 1978) using the pleasantness scale, which ranges from 1 to 5. Positive words had pleasantness ratings of 3.5 or higher; negative words had ratings of 2.0 or lower, and neutral words had ratings from 2.5 to 3.5. These three categories of items were selected to have comparable familiarity, as measured by Toglia and Battig's ratings. The nine taboo words were modified from the list used by Gonzalez-Regiosa (1976), deleting English words which may not be known to the Turkish speakers (hymen, tampon). Items were translated into their Turkish equivalents by the first author (A.A.) and verified by a second native speaker of Turkish. Translation equivalents did not exist for all the reprimands or taboo words, and thus we substituted items which had similar meaning and emotional connotation, based on a list of suggestions made by three faculty members at Istanbul University. The seven reprimands were selected to be ones that parents would frequently say to children, although many of these are used in adult contexts as well.

A modified latin-squares crossing was used to implement a within-participant and within-item design, so that all participants saw similar numbers of items in all categories, in both languages, and in both modalities. Four stimulus lists were constructed around the three main categories of positive, negative and neutral items. Participants were randomly assigned to a stimulus list, so that any given word was presented (to different participants) in L1 or L2, and each word was presented (to different participants) in the auditory and visual modality. The

taboo words and reprimands were then randomly distributed among the four stimulus lists, such that in one stimulus list, the taboo word appeared visually in Turkish, and in another stimulus list, that word was presented auditorially in English. The exception to random distribution was that the overall number of items in each language and each modality was approximately equal across the stimulus lists.

Stimuli were presented on a Power Macintosh G3 using PsyScope, experimental control software developed by Cohen, MacWhinney, Flatt, and Provost (1993). Participants responded to stimuli by typing on the computer's keyboard.

Participants

The forty-two participants were native speakers of Turkish (25 female, 17 male) and were students at Boston University or working in the Boston metropolitan area. The average age of participants was 28 years (range 17-47 years). Participants were relatively late learners of English. Twelve subjects acquired English by enrolling in an English-language high school in Turkey at age 12. For the remaining participants, the first intensive experience with English occurred when they enrolled in an English-language university in Turkey at age 18, or arrived in the US. The mean age of arrival in the US was 22 years (range 17-46 years). Their mean length of residence in the US was 2.1 years (range .5 to 6 years). Participants rated their English fluency in conversation, reading, understanding and writing on a 1 to 5 scale (1 indicating native-like fluency, 5 indicating poor fluency). Participants judged themselves most fluent in reading (mean 1.8, range 1-4) and understanding (mean 2.1, range 1-5), and slightly less fluent in conversation and writing (mean 2.4, range 1-5).

Procedure

The protocol was administered individually to participants. Participants were instructed to rate each word for unpleasantness on a 1 to 7 scale (7 maximally unpleasant) by typing in the corresponding key on a standard computer keyboard. Items were presented in a semi-random order. Taboo words, phrases and negative items were distributed through the list to be maximally distant from other items in their category. In particular, these word types were always separated from each other by either a positive or neutral word. No factors were blocked, meaning that participants could predict neither the language nor the modality of the next item. Each trial lasted

10 seconds; participants were instructed to think about the meaning of the word for the entire trial.

The word-rating phase of the experiment, including instructions, took less than 15 minutes. Immediately afterwards 21 participants were given a surprise recall test and 21 participants were given a surprise recognition test. Instructions for the recall test were to write down as many words as were remembered from the computerized presentation. For the recognition test, participants were given a sheet of paper containing 128 words and asked to circle the items they recognized from those they had just rated. Half of these were the complete set of 64 stimuli, appearing in the same language, which that participant had been asked to rate. The other half were foil words (half in English, half in Turkish) which were semantically similar to words which had appeared during the word-rating session.

Following Anoshian and Hertel (1994), we administered word fluency tasks. These required participants to generate, successively in each language, as many words as they could beginning with the letters F, A and S. Number of words generated in English was 29 (range 17-43), and in Turkish, 37 (range 17-56), a statistically significant difference, $t(80)=4.3$, $p < .001$. This difference supports bilinguals' report that they were more fluent in Turkish than English.

Results

The factor of modality was not significant in any analysis and thus we will confine our report to the two-factor analysis of variance (language x 5 stimulus categories), performed on recall and recognition percentages.

Recall data. Table 1 presents the percentage of words recalled in the five stimulus categories. The interaction of language and stimulus type was significant, $F(4,80)=2.59$, $p < .05$. Across all stimuli, percentage of items recalled was similar for L1 (29%) and L2 (32%). To identify an advantage of emotion words, the neutral score was subtracted from mean recall of the emotion words, yielding an emotion-word advantage. We conducted t -tests between languages for each stimulus category, and within languages between emotion words and the neutral condition. In L1, only taboo words showed an emotion advantage, while negative words were recalled more poorly. The emotion advantage was stronger in the second language, where all categories except for negative words showed a recall advantage. L2 superiority scores were computed by subtracting the L1 emotion advantage means from the L2 means. The emotion-memory effect

was stronger in L2 for words carrying negative associations, while recall of positive words was similar in L1 and L2.

Recognition data. Percent correct is an imprecise measure of recognition accuracy, since participants can correctly recognize most items simply by circling a large number of items. For these reasons, researchers generally employ a measure of measure recognition sensitivity such as d' , which combines information from correct recognition and false alarms to foils (Macmillan & Creelman, 1991). In the current study, slightly more L2 words, 82% than L1 words, 74%, were correctly recognized. Fewer L2 foil items produced false alarms (2% vs. 7%), resulting in higher d' scores for L2 items in each stimulus category (e.g., d' for L2 Taboo words was 4.2, and for L1, 3.56).

To determine statistical significance for between-language comparisons, d' could not be used, since many participants had no false alarms in some of the stimulus categories (d' is not defined when hit rates or false alarms have values of 100% or 0%). Thus, the non-parametric measure of recognition sensitivity A' was used (Grier, 1971). A' is calculated by subtracting the probability of obtaining a false alarm from 1, and adding this value to the probability of obtaining a hit, and dividing the result by 2. This yields a statistic which varies from 1 (all hits, no false alarms) to 0 (all false alarms, not hits).

Participants' scores for recognition sensitivity (as measured by A') were entered into a 2 x 5 ANOVA. Main effects were obtained for language, $F(1,20)=13.6$, $p < .001$, with sensitivity being greater in English (L2), and for stimulus type, $F(4,80)=6.0$, $p < .001$. The language X stimulus type interaction was also significant, $F(4,80)=2.82$, $p < .05$. Following the analysis performed on recall scores, t-tests were performed to determine if each emotion-word category differed from the neutral condition in that language. In L2, positive, negative and taboo words had an emotion-memory advantage. For L1, a strong emotion-memory advantage appeared only for taboo words (see Table 2).

Discussion

Our goal was to test the generality of Anoshian and Hertel's intriguing results. We replicated the basic emotion-memory effect (Rubin & Friendly, 1986): emotion words were better recalled than neutral words. Our data extends this to tests of recognition memory. The novel

finding is that emotionality effects were present not just in the first language (L1) but in the second language (L2). Our findings differed strikingly from those of Anoshian and Hertel (1994) in that the emotion advantage was stronger in L2 for both recall and recognition.

We had predicted that a larger emotion-memory advantage would occur for negative words in L2, but that the emotion-memory advantage would be stronger for positive words in L2, based on an extrapolation from Anoshian and Hertel (1994) and Martins et al. (2003). Part of this pattern was found. The emotionality effect in L2 was stronger than in L1 for words with negative connotations (see difference scores in Table 1). This supports the proposal that bilingual speakers process negative words more deeply in their second language, because the unpleasant mood which accompanies negative words is weaker in L2 than in L1, and thus more easily tolerated (Martins et al., 2003). However, this was found most clearly for the recall data, as recognition sensitivity scores were higher in L2 for both positive words and negatively valenced items (observe the higher A' values for L2 in Table 2).

For recall of positive words, L2 and L1 showed only minimal differences in the size of the emotion-memory advantage, but recognition was stronger in L2 for both positive and negative words. Taboo words also showed an advantage in both a first and a second language, for both recognition and recall. This finding extends to bilingual participants the finding of MacKay et al (2002) of superior recall for taboo words compared to neutral words.

The finding of superior recall and recognition memory for taboo words in both languages, and good recall of reprimands in a second language, may be the key to extracting conclusions from the current data. We propose that novelty and unusualness of the stimuli were the main factors influencing the recall and recognition, rather than the status of the words as occurring in the first or second language. Taboo words certainly stood out as striking and unexpected against the backdrop of the other words in the list. The reprimands in a second language could also have been interpreted as more unusual and less expected than reprimands in a first language. Several participants laughed when they encountered the English reprimands, commenting on the unusualness of hearing (in English, L2) a reprimand like "Shame on you!" and "Go to your room!" In contrast, participants reported a greater deal of familiarity with the Turkish reprimands, and said these brought to mind childhood memories of a parent uttering a reprimand.

Anoshian and Hertel (1994) studied Spanish-English bilinguals who reported nearly equal

proficiency in Spanish and English, and who lived in the bicultural community of Southern California. Our participants were quite different: late learners of English who reported better proficiency in their first language, Turkish. Our expectation in designing this study was that the emotion advantage would be even stronger for late learners compared to more balanced bilinguals, yet as just discussed, the overall finding was stronger emotion-memory effects for the second language than for the first. It is worth keeping in mind that emotion-memory effects are calculated by subtracting memory for neutral words. The very low recall of neutral words in L2 (see Table 1) meant that large emotion-memory effects were found in L2 by subtracting the recall of neutral words. Yet Anooshian and Hertel (1994) did not find low recall of neutral words in L2. This difference could be because half of Anooshian and Hertel's words were neutral, while only 25% of our words were neutral. Given that a higher percentage of our words were emotionally charged, recall of the neutral category would be lower. In addition, participants may have used category labels as cues. As reprimands came to mind during the recall and recognition tests, they may have been reminded that reprimands were a category, thus aiding their memory of further reprimands.

Another procedural difference from Anooshian and Hertel's study is that those authors used blocked presentation: participants rated 18 words in one language followed by 18 words in the other language. In our procedure, languages were mixed, and thus the unexpectedness and novelty of the English (L2) items could have facilitated elaborative processing of these items. It has been noted that idiosyncratic factors of stimuli and procedure, combined with the different processing mechanisms involved in recall and recognition, can lead to varying findings across studies of bilingual populations (e.g., Oh, Jun, Knightly, Au, 2003).

Conclusions

Contrary to Anooshian and Hertel (1984), emotion-memory effects were found in both a first and second language, and indeed were stronger in the second language. Future research on emotion memory effects in bilinguals should take note of how specific pattern of results may depend on the types of stimuli used and the extent to which some words are novel or unexpected. Even if procedural differences underlie the inconsistency in findings across studies, this does not mean that generalizations can not be extracted. Emotion words, and especially taboo words, showed a recall and recognition advantage in both languages. The current data should prompt

researchers to question the intuitively appealing notion that words are invariably experienced as more emotional in a first language than in a second.

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Appendix A: Stimulus List from Anooshian & Hertel (1994)

13 positive words: bed breast father warmth laugh music friend home kiss mother bride party girl

5 negative words: fight danger death anger war

Appendix B: English and Turkish Stimuli

| <u>English</u> | <u>Turkish</u> |
|----------------|----------------|
| Negative words | |
| anger | öfke |
| cancer | kanser |
| crime | suç |
| cruel | zalim |
| danger | tehlike |
| death | ölüm |
| disease | hastalık |
| fight | kavga |
| grave | mezar |
| kill | öldürmek |
| murder | katletmek |
| pain | ağrı |
| poison | zehir |
| sick | hasta |
| slavery | kölelik |
| war | savaş |
| Neutral words | |
| box | kutu |
| branch | şube |
| chair | sandalye |
| column | kolon |
| door | kapı |
| envelope | zarf |

| | |
|--------|---------|
| finger | parmak |
| foot | ayak |
| job | iş |
| name | isim |
| number | sayı |
| part | kısım |
| street | cadde |
| table | masa |
| tree | ağaç |
| window | pencere |

Positive words

| | |
|----------|------------|
| bride | gelin |
| father | baba |
| freedom | özgürlük |
| friend | arkadaş |
| fruit | meyva |
| happy | mutluluk |
| home | ev |
| honey | canım |
| joy | sevinç |
| kiss | öpücük |
| laugh | gülmek |
| love | aşk |
| mother | anne |
| mountain | dağ |
| smile | gülümsemek |
| sunset | gündoğuşu |

Reprimands

| | |
|------------------|------------------|
| don't do that! | yapma! |
| go to your room! | yıkıl karşımdan! |
| no | hayır |
| shame on you! | seni utanmaz! |

| | |
|-------------|-------------------------|
| shut up! | kes sesini! |
| stop that! | dur! |
| I hate you! | Senden nefret ediyorum! |

Taboo words

| | |
|----------|---------------|
| asshole | sevişmek |
| bitch | kahpe |
| breast | meme |
| oral sex | masturubasyon |
| shit | gerdek |
| raped | tecavüz |
| pee | fuhuş |
| vagina | bekaret |
| whore | kilot |

Table 1: Percentage Recall and L2 Superiority Scores

| | Recall | | Emotion Advantage | | L2 Superiority |
|------------|--------|------|-------------------|-----|----------------|
| | L1 | L2 | L1 | L2 | |
| Positive | 34 | 29** | 7 | 11* | 4 |
| Negative | 16* | 23 | -11* | 5 | 16* |
| Taboo | 41* | 44* | 14* | 26* | 12* |
| Reprimands | 29 | 44* | 2 | 26* | 24* |
| Neutral | 27 | 18 | -- | -- | |

Table Notes. * indicates that this category is different from neutral, or from 0, in the case of the emotion advantage and L2 superiority calculations, $p < .05$, ** $p < .01$

Only reprimands and neutral words differed significantly between L1 and L2, $p < .05$.

Table 2: Recognition Sensitivity (A') and L2 Superiority

| | Sensitivity | | Emotion Advantage | | L2 Superiority |
|------------|-------------|------|-------------------|-----|----------------|
| | L1 | L2 | L1 | L2 | |
| Positive | 84 | 91** | 3 | 7* | 3 |
| Negative | 78 | 90* | -3 | 6* | 9 |
| Taboo | 95** | 94** | 14** | 10* | -4 |
| Reprimands | 80 | 89 | -1 | 5 | 6 |
| Neutral | 81 | 84 | -- | -- | |

Table Notes. * indicates that this category is different from neutral, or from 0, in the case of the emotion advantage and L2 superiority calculations, $p < .05$, ** $p < .01$

Only positive and negative words differed significantly between L1 and L2, $p < .05$.