International Journal of Psychophysiology 71 (2009) 193–204

Contents lists available at ScienceDirect

International Journal of Psychophysiology

journal homepage: www.elsevier.com/locate/ijpsycho

Emotion and lying in a non-native language

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ARTICLE INFO

Article history:
Received 25 September 2007
Received in revised form 11 July 2008
Accepted 17 September 2008
Available online 30 September 2008

Keywords:
Emotional arousal
Skin conductance
Deception
Bilingualism
Foreign language learning

ABSTRACT

Bilingual speakers frequently report experiencing greater emotional resonance in their first language compared to their second. In Experiment 1, Turkish university students who had learned English as a foreign language had reduced skin conductance responses (SCRs) when listening to emotional phrases in English compared to Turkish, an effect which was most pronounced for childhood reprimands. A second type of emotional language, reading out loud true and false statements, was studied in Experiment 2. Larger SCRs were elicited by lies compared to true statements, and larger SCRs were evoked by English statements compared to Turkish statements. In contrast, ratings of how strongly participants felt they were lying showed that Turkish lies were more strongly felt than English lies. Results suggest that two factors influence the electrodermal activity elicited when bilingual speakers lie in their two languages: arousal due to emotions associated with lying, and arousal due to anxiety about managing speech production in non-native language. Anxiety and emotionality when speaking a non-naive language need to be better understood to inform practices ranging from bilingual psychotherapy to police interrogation of suspects and witnesses.

1. Introduction

Interviews, surveys, and studies of autobiographical memory indicate that bilingual speakers experience reduced emotion when speaking their second language (Altarriba and Santiago-Rivera, 1994; Bond and Lai, 1986; Dewaele, 2004, 2008; Gonzalez-Reigosa, 1976; Marian and Kaushanskaya, 2004; Pavlenko, 1998, 2002, 2005; Schrauf, 2000; Schrauf and Rubin, 1998). Altered emotional arousal in bilinguals has been increasingly investigated with the methods of experimental psychology, such as recall tasks (Anooshian and Hertel, 1994; Aycicegi and Harris, 2004) and Stroop tasks (Eilola et al., 2007; Sutton et al., 2007). Recently, self-reports have been confirmed by electrodermal monitoring, revealing that skin conductance amplitudes are reduced when bilinguals read or hear emotional words and phrases in their second language (Harris et al., 2003; Harris, 2004).

Surprisingly, a particular type of emotional language, lying, has not been well studied in bilingual populations. Bilingualism, non-native language skills, and related terms were not mentioned in the half dozen books on polygraph testing that have appeared in the last 18 years (Abrams, 1989; Gale, 1988; Lykken, 1998; National Academy of Sciences, 2002; National Research Council, 2003; Vrij, 2000). The Complete Polygraph Handbook devotes a chapter to "exclusionary conditions" (Abrams, 1989). Abrams discusses "types of individuals who can not be accurately examined" (p. 182), which includes children, participants with circumscribed amnesia, and psychopaths. Also provided is a summary of psychiatric conditions, such as anxiety disorders, which could render interpretation unclear. Neither language nor cultural background was mentioned in this handbook. The highly regarded monograph by the National Research Council (2003) mentions that polygraph tests may be less reliable when the examiner has a culturally sanctioned position of power or when the person being examined is a member of a stigmatized group, but does not mention bilingualism or non-native status.

News reports suggest that in the United States people who do not speak English may sometimes be examined through a translator. The Spanish speaker accused in 2002 of murdering Chandra Levy passed a polygraph test, but police decided to re-administer the test in Spanish, "rather than ask questions through a translator." A former FBI profiler commented, "It would seem to me that if he's a native Spanish speaker he should have been tested by a bilingual examiner to begin with..." (CNN Sunday, 2002). The many popular blogs on deception have links to academic papers but no mention of how lie detection may vary for bilinguals (e.g., "Deception Blog", http://deception.crimepsychblog.com/).

The popular and academic literature on lie detection is extensive. Researchers have identified specific brain regions that mediate deception, including orbitofrontal cortex and the amygdala, which are crucial for diverse types of emotional behavior (Abe et al., 2007; Mohamed et al., 2006). Lying may use more of the brain than truth

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doi:10.1016/j.ijpsycho.2008.09.006

telling (Kozel et al., 2004; Mohamed et al., 2006). Bilingual speakers with lower levels of second language (L2) proficiency also use a larger number of distinct brain areas and have more extensive cortical activation when speaking in their L2 (Perani and Abutalebi, 2005). This suggests that L2 speakers may be hit with a double stressor when lying in their L2.

While no journal articles have yet explicitly investigated emotional reactivity during lying in a first or second language, we located three articles that examined how cultural and language factors influence lie detection (Bond et al., 1990; Broadhurst and Cheng, 2005; Al-Simadi, 2000). Bond et al. (1990), reported that lies could not be detected between different cultures, while Al-Simadi (2000) found that when videotapes include sound, lies can be detected across cultures even when detectors cannot understand the language being spoken. Broadhurst and Cheng (2005) focused on deception detection, but also reported speakers' subjective emotional experiences when lying in their first vs. their second language. Their participants endorsed the statement, "It is easier to tell lies and avoid being detected when speaking in Cantonese" (the first language). Participants reported anxiety about being able to control their verbal and nonverbal indicators of deception when lying in their second language. Indeed, analysis of videotapes revealed that these indicators of deception were more common when deceivers spoke in their second language.

Bilinguals' experience of emotional language needs to be studied to improve forensic investigations involving bilingual suspects. For those bilinguals who report feeling fewer emotional associations when using their first language, if they are interrogated about a criminal offense in their second language, they may experience less emotional involvement compared to an interview conducted in their first language (see Marmolejo et al., in press). This can prompt false confessions, apathy, or manipulation of the interview situation. Both the media and law professionals have raised concern about the polygraph-induced false confession of Egyptian student Abdallah Higazy, who had asked for a polygraph to prove his innocence when he was alleged to have an aviator's radio in his hotel room in New York City on 9/11 (Lee, 2002). Higazy falsely confessed after being informed that his polygraph indicated he was lying; he was set free when it was discovered that the aviator's radio had been planted in his hotel room by a hotel security guard. No commentators mentioned Higazy's non-native English status as a problematic factor in his hours-long interrogation by the FBI. Given the diverse situational factors that are known to make individuals vulnerable to false confessions (e.g., Kassin and Gudjonsson, 2004), it is likely that confessions and polygraph tests may be particularly unreliable when interrogation is conducted in suspects' second language. The phenomenon of altered emotional psychophysiological responding in a second language needs to be further documented and brought to the attention of forensic psychologists.

The current paper situates the topic of deception in the broader context of bilinguals' general emotional responsiveness to language. Researchers describe different types of bilingual speakers (Grosjean, 1982). The major categories are growing up with two languages from birth (simultaneous bilinguals), learning a second language in an immersion environment, typically via immigration, (often called sequential bilinguals or second-language learners), and learning a foreign language in a classroom setting (foreign-language learners). In determining outcomes in adulthood, age of acquisition of the second language is generally more important than the simultaneous vs. sequential dichotomy, given that learners who immigrate as children by ages 5–8 frequently acquire their second language to native-like levels (Birdsong and Molis, 2001; Johnson and Newport, 1989).

The participants studied in the current paper were English foreign language (EFL) learners who were Turkish university students residing in Istanbul. These students had sufficient English ability to take classes in English, read for pleasure, chat with friends, and work at international organizations. They were thus the type of young adults who would use their English in overseas settings such as work or graduate school. We do not assume that findings from foreign language learners will generalize to simultaneous bilinguals or to immigrants learning via immersion. Those groups need to be independently studied, and our laboratory has begun to study deceptive language and the subjective experience of lying in Spanish–English simultaneous bilinguals (Caldwell-Harris et al., 2007a). However, foreign language learners are an important group in their own right. Foreign nationals can be questioned by police and despite being identifiable as non-native speakers, may appear to have fluency sufficient for formal interrogation and polygraph testing.

We report two experiments that analyzed how skin conductance varies when students who acquired English as a foreign language hear and speak their two languages. The first experiment used the Emotional Phrases Task, in which bilingual speakers listen to insults, endearments, reprimands, and neutral expressions in their first and second languages (Harris, 2004). For the second experiment we developed the True and False Statements Task, which required respondents to read prepared true or false statements. The same individuals participated in both studies. Below we review prior work on the Emotional Phrases Task to motivate the specific research questions asked here.

1.1. Prior work on bilinguals' responses to emotional phrases

An earlier version of this task was used with Turkish immigrants residing in Boston (Harris et al., 2003). Averaging across the stimuli, L1-Turkish stimuli elicited larger skin conductance responses (SCRs) than did L2-English stimuli. The advantage for Turkish was strongest for the category of reprimands of the type that parents use in admonishing children (e.g., "Shame on you" and "Go to your room"; Gleason, 1985). Turkish and English taboo words both evoked high SCRs, indicating that words in a second language are not always experienced as unemotional. Follow-up studies investigated whether a first language elicits larger SCRs for all bilingual speakers, even those who learned a second language to greater proficiency. Spanish–English bilinguals who had acquired both languages from birth produced comparable electrodermal responses in their two languages. Bilinguals who had immigrated to the U.S. during their teen years or later had higher SCRs to Spanish reprimands (Harris, 2004) but not to other stimuli. The generalization thus appears to be that proficiency and contexts of use are more important in determining psychophysiological reaction than is age of acquisition (Harris et al., 2006), although for most speakers, proficiency and age of acquisition are correlated (Moyer, 1999).

Additional illustrations of the importance of learning contexts are worth noting. In the Turkish study, immigrants who learned English as a foreign language had lower SCRs to English reprimands and taboo terms, compared to Turkish reprimands and taboo words (Harris et al., 2003). In the Spanish study, bilingual college students who immigrated in their teens had high responses to taboo phrases in English and Spanish and only differed in their responses to childhood reprimands (Harris, 2004). Harris et al. (2006) interpreted this in the framework of "emotional contexts of learning." Drawing on past research in developmental psychology and language acquisition, this theoretical framework proposes that language comes to be experienced as emotional to the extent that it is learned and used in emotional contexts. The Spanish–English bilinguals who immigrated in their teens had peer socialization in high school to acquire the emotional resonance of English taboo phrases, and thus responded to English taboo phrases in a similar manner as their monolingual English peers despite English being their second language.

2. Experiment 1: Emotional phrases task

To evaluate the "first language more emotional" finding for immigrants, it would be useful to investigate the robustness of the finding of greater SCRs to a first language across different contexts. Could heightened SCRs to Turkish stimuli be caused, at least in part, by nostalgia for L1-Turkish? The novelty of hearing one's native tongue in a laboratory room, when living in an English speaking country, could increase the emotional salience of these stimuli. To refute this "nostalgia" explanation for heightened SCRs to a first language, we studied bilingual speakers residing in the country of their first language rather than immigrants.

A second question concerns the range of emotional stimuli that elicit stronger responding in a first compared to a second language. Would positive emotional phrases, such as compliments and endearments, show this effect? Endearments were included in the Spanish study, but they elicited SCRs that were barely larger than neutral stimuli (Harris, 2004). This could indicate a limitation of electrodermal monitoring, since SCRs are classically viewed as most sensitive to threatening stimuli (Dawson et al., 2000). But SCRs have also been described as broadly sensitive to the relevance of stimuli, and an index of attention and orienting (Critchley, 2002). It is possible that SCRs can be elicited by emotionally positive phrases, but that taboo words, if included in the experimental session, are so powerful that they "reset" participants' expectations so that less powerful stimuli elicit only weak responses. To test this hypothesis, we included endearments and insults, but omitted taboo phrases.

Our primary prediction was that electrodermal responses would be strongest to stimuli presented in L1-Turkish, thus refuting the "nostalgia" explanation for the findings of Harris et al. (2003). We furthermore predicted that childhood reprimands would show the strongest difference between a first and second language. This prediction is based on the prior findings and is explained by the emotional contexts of learning theory: childhood reprimands are learned and heard during childhood and thus for late learners of a second language, these phrases in L2 will not have accrued the emotional connotations of lived experience. We predicted that endearments would elicit elevated SCRs (larger than neutral), although possibly smaller than reprimands and insults, given that SCRs and the sympathetic nervous system may be more sensitive to threatening than to positive stimuli.

2.1. Method

Participants

Seventy psychology majors (61 female, 9 male) at Istanbul University participated for course credit (preponderance of females reflects gender ratio of psychology majors). Participants were recommended for the study by their psychology professor on the basis of having good English language skills. All participants learned English as a foreign language in a classroom setting, beginning in elementary school. They began intensive English education at age 12 ($N=42$), age 15 ($N=11$), or age 18 ($N=17$). In the age 12 and 15 year-old age groups, "intensive English education" meant that they enrolled at either age 12 or 15 in an English-language high school. In these schools, most coursework is carried out in English as preparation for attending English-language universities, with the exception of Turkish language, culture, and regional history classes. For the age 18 group, these students completed a special year-long intensive preparation where all courses are in English, designed for students who will attend Istanbul University but who did not finish English-language high school.

Participants rated their own English and Turkish ability in conversational fluency, reading, understanding, and writing on a 7-point scale (1=almost none, 2=poor, 3=fair, 4=fair, 5=good, 6=very good, 7=native speaker ability) (see means in Table 1). Most respondents judged their comprehension of English to be between "fair" and "good" (mean=4.7, SD=1.0), but judged their comprehension and reading skills to be superior to their writing and speaking ability.

The word fluency task (Delis et al., 2001) was administered as a performance measure of proficiency. In this task, participants produce as many words as possible beginning with F, A, and S in a specific language in a limited time. The score is the sum of words produced for the three letters. Participants reliably produced more words in Turkish, 34.4 (SD 8.1) than in English, 25.8 (SD 7.9), $t(29)=5.8$, $p<.001$. The rationale for the inclusion of this task in the present study is that the number of words produced in a limited time depends on proficiency (Rosselli and Ardila, 2002) and thus the task is an efficient index of verbal proficiency.

A second measure was a short grammaticality test that we developed of 10 items, 5 acceptable sentences, and 5 with subjacency violations (i.e., incorrect question word extraction, such as those used in the grammaticality test of Johnson and Newport, 1989). These ten sentences had been selected to maximize the difference between native speakers and EFL learners, thus only native speakers obtain high scores. An example violation sentence is "What did Ellen dance until Justin brought?" In the current sample, the mean percent correct of 57% indicates that the current sample of participants has only some sensitivity to difficult grammatical constructions such as question-word extraction, consistent with their status as EFL classroom learners.

The literature on second-language and foreign-language learning emphasizes age of learning as the most important factor in ultimate ability (e.g., Birdsong and Molis, 2001; Moyer, 1999; Johnson and Newport, 1989). This suggests that because students in our sample differed in their age of onset of intensive English learning, they may differ in English ability. However, no significant differences emerged in self-reported English, English grammatical ability, or English word fluency between the students who started intensive English learning at age 12, 15, or 18. Although variability in English ability exists in our sample, it appears to reflect individual differences in motivation and academic skills, not year of enrollment in English-language high school/university. Enrolling a child at age 12 in English-language high school is frequently a family decision, while opting for an English-language track in college is more likely to be a personal decision, and one that probably reflects prior positive English-language experiences. These students may have inferred or decided they have the aptitude and motivation for English, and may

Table 1
Mean values for language history and performance variables for 70 participants

Total number of participants: 70	Age: 20.5 years (1.5)[a]	
Age of intensive exposure to English	12 years old: 42 (60% of total)	
	15 years old: 11 (15% of total)	
	18 years old: 17 (24% of total)	
English grammaticality test average: 57% (10%)	93% characteristic of native speaker	
Measures of relative English/Turkish ability		
	Turkish	English
Word fluency total score	34 (8.8)	26 (7.4)
Self-ratings (1=poor; 7=native speaker)		
Spoken (conversation)	6.8 (0.6)	4.7 (1.0)*
Understanding	6.6 (0.7)	3.9 (1.1)*
Reading	6.8 (0.5)	4.9 (1.0)*
Writing	6.6 (1.0)	4.1 (1.2)*
Judgments of emotional responsiveness	Turkish	English
Positive topics	4.8 (0.4)	3.5 (0.8)*
Negative topics	4.9 (0.9)	3.9 (0.9)*
Taboo topics	4.5 (0.8)	3.2 (1.1)*
Lying	4.5 (0.8)	3.1 (1.1)*
Lie preference: 62% Turkish, 38% English		

[a] Standard deviation given in parentheses.
* $p<.001$.

have pursued English tutoring and experiences (reading English books for pleasure, working at international organizations), with these factors plausibly compensating for not attending English-language high school.

Design and materials

Design

The design of the task was 4×2: Four emotional categories, two languages. Participants heard 30 items, following 3 practice trials: six endearments (e.g., "I've missed you so much!"), six insults (e.g., "You are so ugly!"), six reprimands of the type commonly spoken to children (e.g., "Don't be a baby!"), and 12 neutral words (e.g., door). The language and emotional category trials were presented in pseudo-random order, with neutral items appearing between emotional stimuli. Participants encountered stimuli in all conditions of the design but heard each phrase in either Turkish or English, and thus did not hear the same stimulus in more than one language.

Decisions about stimulus categories and presentation were made based on insights from two prior studies. In Harris et al. (2003) and Harris (2004), taboo stimuli elicited the highest SCRs, with SCRs to stimuli in some emotional categories not reliably greater than SCRs to neutral stimuli. We wondered if taboo phrases are so evocative that once participants encounter a taboo phrase, they reset their expectations such that non-taboo emotional phrases have less impact on arousal. To explore this possibility, we excluded taboo phrases from the current study. The neutral category was single words instead of neutral words embedded in phrases, because single words are less likely to be interpreted in an arousing manner (Harris, 2004). Only thirty trials were planned because skin conductance responses undergo rapid habituation. In prior studies with close to 90 trials, many of the participants had greatly reduced responses after the first 30 trials. The current study used exclusively auditory presentation, given that auditory trials revealed a larger difference in SCRs between a native language and a second language (Harris et al., 2003).

Selection and norming of stimuli

Stimuli were subjected to an extensive cross-national norming procedure. Stimuli from Harris (2004) and Tong and Caldwell-Harris (2007) were translated into Turkish by A.A-D. with translations verified by two Turkish–English bilinguals. These were combined with the Turkish stimuli from Harris et al. (2003) to create a list of 64 items. These were rated for emotional intensity and familiarity on a 7-point scale, by adapting the familiarity instructions from Toglia and Battig (1978). English stimuli were rated by 36 monolingual English speakers and 43 Turkish university students. Participants were instructed to generate new emotionally arousing phrases that were not on the original list. After completing this preliminary analysis, we selected items from the original list and added new items. This process was repeated in a second norming study. Three professors at Istanbul University, all native speakers of Turkish, verified that the childhood reprimands were indeed the types of phrases that parents would say to their children. The new list consisted of 78 items, including single words of various emotional categories and a variety of emotion-laden phrases. This list was rated by 110 Turkish students and 31 American students using 7-point scales to assess the emotionality and familiarity of each item. Turkish students were additionally asked to indicate whether a phrase or word seemed odd or incorrect.

Surprisingly, emotional words and phrases were given higher ratings by the Turkish students than by the American students. Cross-cultural researchers have discussed the problem of ensuring that values on a Likert scale have the same meaning in different cultures (Poortinga, 1989). In data from three marketing surveys, members of "Mediterranean" cultures (Greece, Italy, and Spain) demonstrated extreme response style compared to respondents from the U.S. and Northwestern Europe (van Herk et al., 2004). Our Turkish respondents could be seen as fitting this pattern, except that higher ratings by the Turkish respondents did not occur for ratings of familiarity, nor were higher intensity ratings obtained for the neutral single words. Higher emotional intensity ratings were most marked, in comparison to American respondents, for single negative words such as the Turkish translations of *disease* (Turks 5.7, Americans 4.3), *fight* (5.7, 4.4), *war* (6.4, 4.8), *grave* (6.1, 4.0), and *crime* (5.1, 3.8). It remains possible that these words actually do have stronger emotional associations for the Turkish students than for the American students. A standard method for minimizing extreme response bias is to reduce the number of possible responses (Poortinga, 1989). We administered a third rating study to a new set of Turkish and American students, using the same items but on a 5-point scale. The tendency for Turks to have higher mean scores was reduced in this rating, but still present. Because we had a large number of items, we were able to select words and phrases that were approximately matched in emotional intensity and familiarity. These are listed, with their ratings, in Appendix A.

Stimuli were recorded by a Turkish native speaker who immigrated to Boston in childhood and thus was able to produce the words and phrases with minimal foreign accent in either language. She read each phrase in a conversational tone appropriate to the meaning of the phrase. Conversational tone was employed rather than monotone because the latter was judged by bilingual speakers to sound anomalous or even amusing for many emotional phrases (Caldwell-Harris et al., 2007b).

Procedure

Written materials appeared in Turkish except when English was used as part of a specific task. The session began with the language learning history, word fluency and English grammaticality tasks. Participants also provided ratings for the strength of emotional responding in Turkish versus English, including their perception of lying. Electrodes were attached and participants were given instructions to minimize hand and body movements. During the Emotional Phrases Task, participants were instructed to rate the emotional intensity of each word or phrase. Electrodermal activity (EDA) was recorded for a 10-second period, beginning with auditory presentation of the stimulus. A 4-second buffer zone was inserted between trials in minimize carry-over of the EDA signal from the previous trial.

Electrodermal monitoring and evaluation

Gold-plated electrodes were attached to the tip of the index and middle fingers of the non-dominant hand. Participants used their dominant hand for writing their emotional intensity ratings on a score sheet. Electrodermal activity (tonic and phasic) was recorded in micromhos using the Davicon C2A Custom Skin Conductance Monitor (NeuroDyne Medical Corporation). Phasic responses were computed by NeuroDyne's Neusoft software as the derivative of skin conductance levels. The derivative of the SCL is a natural choice for reporting change in the SCL, because the derivative will be 0 when level is unchanging over time, and will increase in proportion to the rate of change in the SCL signal. Because participants' mean scores are near zero, the measurement disadvantages accompanying individual differences in SCL are reduced (Ben-Shakhar, 1985).

The derivative of the skin conductance level across the recording window results in a wave form which we refer to as the skin conductance response (SCR). Multiple SCR components can in principle be analyzed, including mean value across the trial, amplitude, latency, rise time and recovery time (Dawson et al., 2000). The NeuroDyne Neusoft software provided per-trial values for the two values which are most frequently used to estimate strength of autonomic response, the mean and amplitude (maximum–minimum values in a trial). We thus restricted analysis to these values. The amplitude ignores any smaller phasic responses within the recording window. This can be

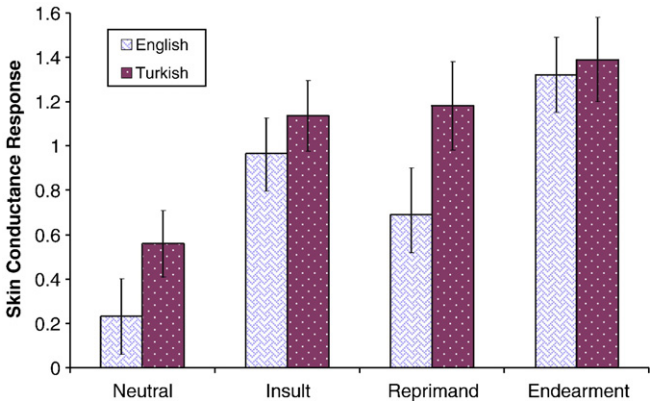

Fig. 1. SCRs elicited by emotional phrases (Experiment 1).

seen as either a drawback or an advantage depending on one's goals. However, our goal of measuring overall arousal means that secondary responses within a recording window provide useful information. Preliminary analysis revealed that both measures generated broadly similar patterns across the conditions in our task, but the SCR trial means led to a distribution with smaller variance than did amplitudes. For these reasons, we selected the SCR mean as the dependent measure.

SCR distributions generally have a positive skew (Dawson et al., 2000), as many trials (between one-third and one-half) have responses close to 0 (signaling no change), while only a few responses tend to be quite large. The distribution of SCRs in our two tasks thus had a mean above 0.

Data exclusion

Participants were asked to give a rating of 0 on any trial in which they were unsure of the meaning of the word or phrase (32 trials out of 900, or 3.5%). All trials that received a rating of 0 were excluded from analysis. Ninety percent of "don't know" trials were English trials. The 32 "don't know" responses spanned 10 unique items, but the English word "column" and the English phrase "Do you want a spanking?" generated seven "don't know" responses each. All participants' trials on these items were thus excluded from analysis, leaving 28 trials to be analyzed. Following recommendations by Hugdahl (1995) and Dawson et al. (2000), we examined trials for electrodermal artifacts, which include unusual hand movement or laughing/sneezing. An additional 49 trials were excluded due to artifacts during recording or for being statistical outliers.

Additional self-report ratings

Participants additionally answered the following questions about the perceived emotional strength of using Turkish and English.

Rate the strength of your emotional response for each type of language use. Use a 5-point scale with 5 indicating "strong emotional feelings" and 1 indicating "no emotional feelings".

When speaking about positive topics in English (Turkish)_____
When speaking about negative topics in English (Turkish)_____
When speaking using taboo words in English (Turkish)_____
When telling a lie in English (Turkish)_____
If you could choose to tell a lie in either English or Turkish, which language would you choose?_____

2.2. Results

Skin conductance

Fig. 1 graphs skin conductance responses according to language and emotional category, revealing overall larger responses for L1-Turkish compared to L2-English, and lower responses for neutral compared to emotional stimuli. A 2×4 (Turkish/English×4 emotion categories) repeated measures ANOVA with SCRs as the dependent variable revealed main effects for language, $F(1,69)=6.3$ and emotion category, $F(3,207)=11.7$, both $ps<.01$. The three emotion categories each differed from the neutral (all $F>10$, $ps<.001$), but did not differ from each other, except for a weak tendency for endearments to elicit slightly higher SCRs than insults, $F(1,69)=3.1$, $p=0.083$. This trend is noteworthy because our expectation had been the opposite: that SCRs would be stronger for negative stimuli such as insults and reprimands than for the endearments. While no language×emotion interaction was obtained ($F<1$), planned comparisons for the reprimands revealed larger SCRs elicited by Turkish reprimands than by English reprimands, $F(1, 69)=3.8$, $p<.05$, confirming our prior finding (Harris et al., 2003). Measures of English ability revealed no significant effects or interactions when entered as covariates in ANCOVA, suggesting that SCRs for this sample of participants were not influenced by variations in ability.

Including gender as a factor in the ANOVA revealed a trend for a gender×language×emotion interaction, $F(1,68)=2.7$, $p=.10$. This borderline p-value is likely a consequence of the few number of male participants. Inspecting cell means indicated that females and males differed in their response to English insults and reprimands, but did not differ in their responses to other categories (including all Turkish stimuli). For males, English insults but not English endearments elicited above-average SCRs, while the opposite occurred for females, who had high responses to English endearments but not to English insults.

Ratings of emotional intensity of phrases

During electrodermal monitoring, participants rated each phrase for emotional intensity while they listened to phrases. Ratings are plotted in Fig. 2, where one can observe that the pattern generally resembled those of the SCRs, although less variability occurred for ratings compared to SCRs. The 2×4 ANOVA conducted on ratings revealed main effects of language, $F(1,69)=23.4$ and emotion category, $F(3,207)=219.5$, both $ps<.0001$. An interaction of language and emotion was also obtained, $F(3,207)=2.7$, $p<.05$. The locus of the interaction was identified by conducting pair wise comparisons. While Turkish phrases were rated as more intense than English phrases for each emotion category, this difference was strong for reprimands and endearments ($Fs>10$, p values $<.001$), but weak for insults ($p=.08$). No gender main effects or interactions were obtained for ratings, $Fs<1$.

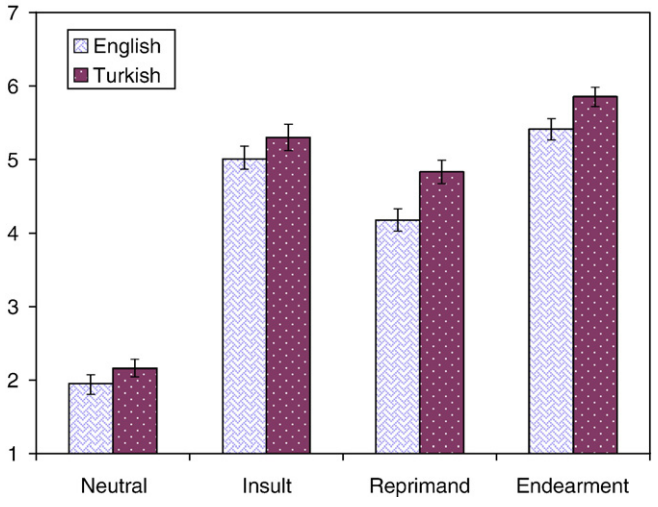

Fig. 2. Ratings of the subjective emotional intensity of phrases (Experiment 1).

2.3. Discussion

The main finding in the Emotional Phrases Task was the overall stronger autonomic responding in the first language, with the L1–L2 difference strongest for reprimands. This replicates the main finding in Harris et al. (2003), of greater SCRs elicited by the first language. We thus conclude that the "first language more emotional" finding is not simply an artifact of nostalgia for the first language for sojourners and immigrants, and can be extended to bilinguals who are residing in an environment where their first language is dominant. Stimuli were carefully matched for emotional intensity and familiarity, indicating that stimulus strength differences are not influencing the between-language findings, thus supporting our prior study, in which the stimuli had not been normed.

This study also extended the reprimand effect to insults and endearments. Positive statements in a second language could have been expected to show a weaker effect of emotional distancing than negative statements, given that as people age they pay more attention to positive stimuli (Mather and Carstensen, 2005) and even young adults have the ability to try to protect themselves from the impact of negative stimuli. Indeed, for simultaneous bilinguals who spoke Mandarin (Tong and Caldwell-Harris, 2007) and Russian (Caldwell-Harris et al., 2007b), endearments elicited stronger SCRs in English than in the first language. However, with the current group of EFL learners, the L2 reduction for SCRs and ratings did not differ between endearments and insults. As anticipated, eliminating taboo words as stimuli was useful because large and roughly equal SCRs were elicited by the other emotional stimuli.

Because only 12% of participants were male, an important question is whether the current findings should be viewed as limited to females. The males' SCRs resembled females in the theoretically motivated questions of this study: their SCRs were stronger to L1-Turkish than to L2-English. This effect was largest for the reprimands for both males and females, and positive stimuli (the endearments) elicited elevated SCRs in both males and females. Thus, the conclusions discussed above hold broadly for males and females. A trend for males to be more reactive to L2 insults and females to respond stronger to L2 endearments could be examined in future research.

Future work with the Emotional Phrases Task could examine how different groups of bilinguals may show different patterns of results. In the prior study of Turkish immigrants to Boston, the strongest between-language difference occurred for reprimands. The effect size for reprimands was strong, eta2 = .26, while in the current study, it was much weaker, eta2 = .05. A weaker effect size may mean there is some validity to the "nostalgia" proposal: the novelty of hearing one's mother tongue spoken in a laboratory environment may increase SCRs, particularly for unexpected phrases like childhood reprimands. Another explanation for a reduced reprimand effect is that the current study used college students, while participants in the Boston study were older students and working professionals, age 20–47. Older participants might have been reared with more authoritarian parenting, given that childrearing methods have undergone substantial change with rapid modernization in Turkey (Kagıtçıbası, 1996).

3. Experiment 2: True and false statements task

To motivate task methodology and specific hypotheses, we report findings from exploratory interviews with Turkish–English bilinguals who had similar demographic and language learning histories as our target participant group.

Interviews about lying in a first or second language

In an exploratory study, we interviewed 45 psychology majors and graduate students at Istanbul University who were identified by their professors as having superior English abilities. They had a mean age of 21, mean education of 14 years, and their average age of beginning intensive English exposure (meaning schooling with content taught in English) was 13 (range: 7–18). The participants evaluated whether they preferred to use Turkish or English for discussing positive or negative topics, and which language they preferred for telling a lie, and why (see Table 2 for summary).

A majority of respondents (55%) preferred to lie in their first language, Turkish. Respondents said that in Turkish they would have less anxiety about finding the best words and could concentrate on self-presentation rather than grammar and pronunciation. One respondent said, "I worry about using an incorrect gesture or facial expression when I tell a lie in English because I do not speak English as well as Turkish." (Interviews were conducted in Turkish by A.A.-D. and. respondents' comments were translated by A.A.-D.)

It might seem natural to readers that learners of English as a foreign language would prefer to lie in their native language. However, 10 of the 45 respondents (22%) reported having no preference, and another 10 said they preferred to lie in English. Justifications included the following:

- People may not understand if I am telling a lie. When they realize my English level is poor they may forgive me.
- I prefer to tell a lie in English because I do not have as many feelings when I speak in English.
- Since my English is not good, I do not have to speak more, and so people may not catch my lie.
- Since Turkish is my native language, my face may become red if I lie in Turkish.
- Since my feelings are not involved in the conversation when speaking English, I can more easily tell a lie in English.

The foregoing indicates that interviewees are aware of two broad factors involved in lying in a first versus a second, less proficient language:

1. Lowered proficiency means that more cognitive resources are required for producing and monitoring the language. This is consistent with recent functional imaging studies of bilingual language comprehension (Perani and Abutalebi, 2005). But successful lying requires presentation management, and recruits more brain areas, including emotional and executive function areas (Kozel et al., 2004; Mohamed et al., 2006). It appears that many foreign language learners are aware of the "double stressor" involved in lying in a foreign language.
2. A less proficient, later learned language generates less emotion. Facial expressions, vocal-quality and body movements that derive from anxiety about lying may thus be less apparent to interrogators.

The two factors were also identified in interviews with Spanish–English bilingual students at Boston University. That sample included

Table 2
Responses to exploratory interview with Istanbul University psychology students

When you can choose to use either of your languages, in which do you prefer to talk about…	English	Turkish	Both or no preference
… positive feelings?	2	43	0
… negative feelings?	3	41	1
When you compare both languages, in which language do you prefer to express your feelings?	1	42	2
	Yes	No	Uncertain
To tell a lie, which language do you prefer?	10	25	10
When you talk about your feelings, do English and Turkish generate the same emotion?	14	28	3

international students from Latin America and students who had immigrated to the U.S. as teenagers (Caldwell-Harris et al., 2007a,b). Drawing on these two factors, we can envision two electrodermal monitoring outcomes:

The "double stressor" of lying in an L2 will result in elevated SCRs. On this account, SCRs will be larger for L2-English than for L1-Turkish.

"Blunted emotional response." The reduced SCRs elicited by L2-English will be carried over to the special case of lying. This predicts that SCRs will be larger for L1-Turkish than for L2-English.

Given that lying in a foreign language is likely to be a double stressor, we decided to avoid deception tasks which use free (unconstrained) language production, such as the false opinion paradigm (Mehrabian, 1971) or the "friends like/dislike task" (DePaulo and Rosenthal, 1979), or a mock-crime task. Skin conductance is likely to be elevated because of the stress of planning and producing sentences in a second language. We thus designed the True and False Statements Task, where participants prepared statements in advance of SCR monitoring by filling in blanks in templates such as "I am a _____ person," with instructions to create a true or false statement.

3.1. Method

Participants

The same individuals from Experiment 1 participated.

Design and materials

To compare SCRs elicited by low emotional and high emotional statements, we crossed the lie/truth condition with two levels of emotional gravity: morally deep statements (e.g., beliefs in religion, feelings about family members) and those with little moral relevance (favorite beverage or travel destination). The design was 2×2×2: English/Turkish×True/False×two levels of moral depth. While skin conductance was monitored, participants read aloud statements, written in either English or Turkish, that had been previously established to be true or false. To prepare the true/false statements, participants were asked to look at a sheet of paper containing two columns of statements with blanks and a third column which was to remain hidden by a fold in the paper (see sample sheet in Appendix B). The same statement, e.g., "I used to want to be a _____when I grew up" was repeated in adjacent columns, one under the heading "True statement" and again under the heading "False statement." Participants were asked to fill in the blanks so that the statements would match the column header (i.e., would be true or false). They were told that they would later be asked to read aloud one of these statements. The first eight statements appeared in one language and the second eight appeared in the other. Participants were instructed to write their answer in the same language as the statement.

Selection and norming of statements

Selecting the statements for this task began with a pilot study in which a mixed group of students (American, international and Turkish students from both Boston University and Istanbul University) listed topics that would be easy to lie about, and topics that would be difficult to lie about (e.g., belief in God). The suggestions were compiled into a list and a new group of students from Istanbul University rated the difficulty of lying about each of the items. No mention was made of bilingualism or lying in a first versus second language. We selected a final set of 16 lies which had been frequently mentioned and were rated consistently as being either "easy" or "hard" to lie about (see Appendix B). Many of the "hard to lie about" statements have a moral or religious component, such as being afraid of death, affectionate feelings about a family member, or being concerned about a specific world problem. The "easy to lie about" statements lacked a strong moral dimension and were concerned with personal preferences, such as favorite food, sport, travel destination, beverage, clothing, or reason for being late. We can thus consider the two types of statements as differing in emotional gravity or moral depth.

Procedure

The task began when participants were asked to unfold the final column and note whether "Lie" or "Truth" was indicated for each statement pair, and to circle the statement that matched the condition indicated by the final column. Prior research on lying has tried to ensure that participants feel the emotional weight of their lie by having them lie directly to another person, with that person not being aware of whether the statement is a lie (e.g., Broadhurst and Cheng, 2005; Newman et al., 2003). Participants were told that their interlocutor would be trying to determine the veracity of their statements. We incorporated this method with the following instructions, which were read to participants in Turkish.

"The questionnaire you completed is part of a game that we will now play. The purpose of the game is to investigate the relation between facial expressions and the reading of true and false statements. The sheet you filled out was randomly selected from a stack, with the final column being different on every sheet. I thus do not know whether your sheet instructed you to circle the true or false statement. I will try to determine, from scrutinizing your facial expressions, whether you are reading the true or false statement, so please look at my face after reading your circled answer. I will then ask you the question that corresponds to the next item on your sheet. I will ask it to you in the same language as on the sheet, and please answer in that language."

Participants were given a chance to ask any questions. They were then reminded that on each trial they should read the entire sentence because three-seconds had been programmed for the reading sentence phase. When reading aloud their prepared statement, they were asked to ponder the meaning of their answers or "think about" the sentence until the experimenter presented the next item, and not to read the sentences that followed the target sentence until asked to do so. They were reassured that they would not be required to memorize the next circled answer but would be able to read the answer that they had previously circled. Four versions of the sheets were prepared so that each statement could appear in one of the two languages and in one of the truth conditions.

After completion of the task, the experimenter instructed participants to review their sheet, focusing on the false statements. For each false statement, they were asked to rate how they felt when uttering the statement, using a 5-point emotionality scale:

1 = When I read the untruthful sentence, I did not feel I was telling a lie

5 = When I read the untruthful sentence, I really felt that I was lying.

Electrodermal monitoring and data exclusion

The same equipment was used as in Experiment 1 and participants were run following a short break after the first experiment. The data from one participant was excluded as excessive errors were made (not reading from the circled column on the score sheet), leaving 69 participants for data analysis. Across all 69 participants with (32 trials for each participant), data

from 30 statements were excluded due to participant errors (misreading the statement and starting over, $N=12$) or movements/coughing ($N=18$).

3.2. Results

Skin conductance responses

The 2×2×2 ANOVA conducted on SCRs yielded main effects for language, $F(1,68)=7.8$, and for lie/truth, $F(1,68)=7.3$, both $ps<.01$, but no reliable effect of the easy/hard statement type, $F(1,68)=1.9$, $p=.17$. No interactions were significant, all $ps>.15$. As shown in Fig. 3, stimuli in L2-English elicited larger SCRs than L1-Turkish, and lies elicited larger SCRs than truthful statements. When participants' gender was added as a factor to the ANOVA, no main effect or interactions with gender were obtained ($Fs<1$). Exploratory regression was conducted using learning history variables. Self-rated English proficiency correlated with SCRs for English hard lies, $r=.33$, $p<.01$, and more weakly with other English stimuli, r-values ranged from .23 to .28, indicating that participants who reported greater English proficiency had slightly higher SCRs when producing the English statements.

Subjective ratings of lie strength

Fig. 4 depicts participants' post-task ratings (5-point scale) of how strongly they felt they were telling a lie while they were reading their statements. A 2×2 ANOVA on ratings revealed strong main effects of language, $F(1,68)=7.6$, and easy/hard statement type, $F(1,68)=7.6$, both $ps<.01$. There was a weak trend for an interaction, $F(1,69)=2.6$, $p=.10$, with participants being less sensitive to the easy/hard lie-type in making their English statement ratings. English proficiency and gender did not influence ratings.

Ratings did not correlate with SCRs across data points or when examined separately according to language or statement type, all r-values <0.12, $ps>.05$.

3.3. Discussion

The two main results for the True and False Statements Task were that lies elicited larger SCRs than did true statements, and SCRs were higher for L2-English than for L1-Turkish, for both true and false statements. The "blunted emotion" hypothesis (reduced SCRs for lying, similar to reduced SCRs during listening to emotional phrases) was thus not supported. Instead, elevated SCRs for lying in English was consistent with the "double stressor" account: lying requires additional cognitive resources to monitor lie production, and speaking a second language requires more effort than a first language. However, it is worth noting that participants who reported greater English proficiency had slightly higher SCRs ($r=.27$, $p<.05$) when producing English lies. Future work will need to determine the meaning of this association. Participants with greater proficiency may feel more stress when speaking in English, because they care more about their English performance. Alternatively, more proficient English speakers may be more sensitive to the emotional resonances of their English speech and increased SCRs may reflect this emotional reactivity.

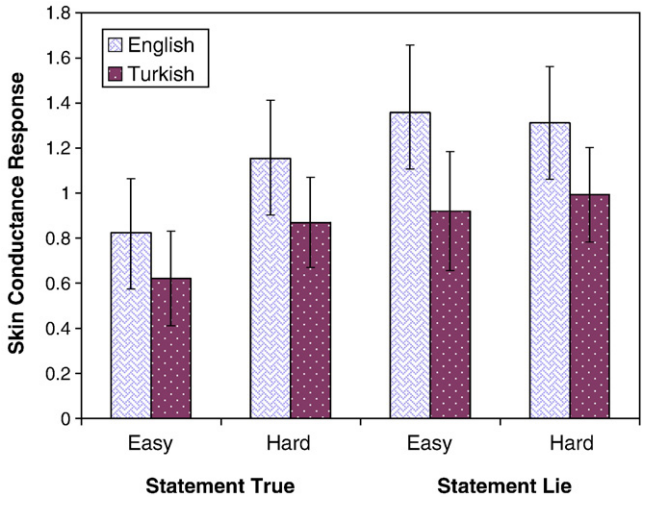

Fig. 3. SCRs elicited by true and false statements (Experiment 2).

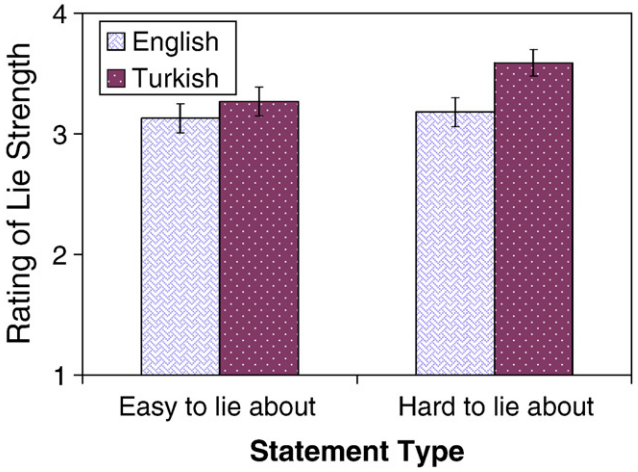

Fig. 4. Participants' post-task evaluations of how strongly they had felt they were lying (1 = minimal, 5 = strong).

Participants' ratings of how strongly they felt they were lying did not correlate with skin conductance. Participants judged that they had felt Turkish lies more strongly than English lies, yet English lies elicited larger SCRs. Ratings were influenced by the easy/hard lie type, a factor that did not reliably influence SCRs. Participants' ratings may not have been sensitive to their physiological emotional responses but instead reflected the conventional wisdom that lying in a first language will evoke more emotion than lying in a second language. The ratings may also suggest that different factors contributed to elevated SCRs in Turkish and English. SCRs elicited by Turkish lies may reflect the emotion associated with lying, but SCRs for English lies may reflect the stress of using a less fluent language. Note that English lies evoked larger SCRs than truthful statements, as occurred in Turkish, indicating that their status as lies is likely responsible for at least a portion of the observed skin conductance amplitudes.

In our exploratory interviews we identified two factors, lowered proficiency and reduced emotionality, that could influence subjective response and physiological reactivity to lying in a second language. The results of this study suggest that both factors were operative. Lowered proficiency in L2-English led to anxiety and elevated SCRs. Reduced emotionality in L2-English led participants to rate themselves as not feelings their lies as strongly in English as in Turkish.

4. General discussion

In our exploratory interviews, participants described two factors that influenced their impressions of lying in a second language. Some participants commented that reduced emotional resonances associated with speaking a second language could make lying easier, since they wouldn't experience the full

emotional force of their lie. Other participants worried that poorer proficiency would make them more anxious about lying in a second language.

Our first goal was to investigate the phenomenon of experiencing fewer emotional resonances in a later-learned and/or a less proficient language (Dewaele, 2004; Pavlenko, 2002, 2005). Do these reports of reduced emotionality have a measurable physiological correlate? Prior work found that a second language elicited reduced skin conductance responses (SCRs) for bilinguals who immigrated as adults, but not for those exposed to both languages during childhood (Harris et al., 2003). Experiment 1 extended this finding to non-immigrants who acquired English as a foreign language during intensive English study in their home country, Turkey. The Emotional Phrases Task revealed reduced SCRs when listening to both positive and negative emotional phrases in a second language. Subjective emotional intensity ratings mirrored the reduced SCRs.

Reduced emotional responsiveness to L2-English phrases suggests that this "emotional blunting" would extend to lying in a second language. However, most of our interviewees had said they would prefer to lie in their first language, out of concern for the "double stressor" of lying in a second language: monitoring lie production while juggling the demands of speaking in a less proficient language. The "double stressor" account predicted that SCRs would be elevated for lying in a second language.

Experiment 2 revealed larger SCRs for reading false statements compared to true statements, and larger SCRs elicited by statements in L2-English compared to L1-Turkish, supporting the "double stressor" account. However, participants rated themselves as feeling their lies more strongly in Turkish. The two factors we had identified, lowered proficiency and reduced emotionality (but not reduced anxiety), appear to have both been operative. Lowered proficiency in L2-English led to anxiety and elevated SCRs. Reduced emotionality in L2-English led participants to rate themselves as not feeling their lies as strongly in English as in Turkish. Our findings thus support the intuitions from our pilot interviewees, who mentioned wanting to avoid the emotionality of Turkish, thus preferring to lie in English, or wanting to avoid the stress that comes from lower English proficiency, thus preferring to lie in Turkish.

4.1. Broader significance

The two factors we identified, reduced emotional response and increased performance anxiety, are likely to operate in many situations requiring emotional responding in the lives of bilingual speakers. If a non-native language routinely elicits weaker autonomic responses, this has implications for theories of language acquisition and applied settings such as psychotherapy and police interrogations.

4.1.1. Second language and foreign language teaching

If emotion can be demonstrated to be an integral part of second language acquisition (SLA), this raises the question of whether limitations in SLA are due in part to the reduced emotional significance of the typical SLA learning context. These findings provide a rationale for bilingual educators to emphasize affective connections and social relevance in their curricula (following Schank and Cleary, 1995; Vail, 1994). This bears upon the current educational climate, since educators are being pressured to emphasize preparation for test-taking and quantifiable achievement, rather than socially- and emotionally-relevant activities.

4.1.2. General theories of learning

While it is intuitive that being emotionally invested in a subject facilitates learning, both lay people and educators continue to equate learning with memorization and believe that if one is listening, material will "enter" the brain (Schank and Cleary, 1995). In order to retire this view, lay people and scientists alike may need to see repeated demonstrations, in diverse domains, of how an emotional connection to material facilitates acquisition.

4.1.3. Psychotherapy

Recent research has found that bilingual and bicultural individuals present different personality features when asked for self-descriptions in their different languages. For example, Ross et al. (2002) report that Chinese-American college students, when asked to take self-report scales in Chinese, showed a modesty bias, and described their self-concept in collectivist terms, but had a self-enhancing bias, and described themselves in individualist terms, when they completed the scales in English (participants were randomly assigned to language condition). Researchers have observed that benefits accrue when the therapist can employ both of a bilingual client's languages. Gonzalez-Reigosa (1976) described Spanish–English bilingual patients who employed English when demonstrating self- confidence and emotional reserve. Altarriba and Santiago-Rivera (1994) noted that clients discuss more personal topics in their first language (see also Schrauf, 2000). What remains unclear is whether carrying out therapy in both languages yields optimal outcomes. That is, if the second language generates less physiological arousal for emotional topics, then emotional topics may receive different treatment in the second than in the first language, depending on whether the emotional arousal facilitates or inhibits useful discussion.

4.1.4. Forensic investigations involving bilingual suspects

If suspects are questioned in their second language, they may feel less emotionally involved in the questioning (Marmolejo et al., in press). This can prompt false confessions, lying, or manipulation of the interview situation. Furthermore, polygraph tests may be particularly unreliable when administered in a suspect's second language. The phenomenon of decreased psychophysiological responding in a second language, if it proves to be reliable, needs to be brought to the attention of forensic psychologists. Accused individuals, when interviewed in their second language, may not appreciate the gravity of the accusations or the nuances in interrogators' advice or threats. Words that would trigger alarm in a first language may lose urgency in translation. The mental health and human rights of interviewees, and particularly juvenile suspects, who are especially vulnerable, may be better protected when the interview is carried out in the suspect's first language.

4.2. Future research

4.2.1. Investigating specific emotional context or production anxiety

An issue to be clarified in future research is whether electrodermal monitoring can be employed to distinguish the stress of speaking in a less proficient language from emotion generated by the meaning of statements. In the Emotional Phrases Task, SCRs were *reduced* in a second language when listening was required. This supports the interpretation that elevated SCRs in the True and False Statements Task reflected anxiety about speaking a less proficient language. It would be useful to vary the syntactic complexity of statements together with emotional gravity (such as the easy/hard lie distinction). We suggest that elevated electrodermal activity for "hard lies" will reflect responsiveness to emotional meaning. Increased activity for syntactically complex statements will reflect anxiety about language proficiency. Obtaining ratings of speaking anxiety and the experience of emotional depth on each trial would be helpful to aid interpretation.

4.2.2. Identifying mechanisms

As noted in the Introduction, we have proposed a developmental mechanism for why emotional responding is reduced in a second,

less proficient language. According to the "emotional contexts of learning" hypothesis, phrases in a language gain emotional associations when they are learned and used in emotional contexts (Harris et al., 2006). This theory stands in contrast to traditional theories of first- and second-language acquisition which assume that non-linguistic correlates are stripped away during learning, allowing the abstraction of linguistic meaning and context-independent grammatical rules (Chomsky, 1965). In contrast to this view, our emotional context of learning hypothesis proposes that language forms are stored along with extralinguistic aspects of their contexts of acquisition and use.

Measuring emotional responsiveness via skin conductance cannot identify precise brain mechanisms, although it is a useful methodology because it may be more sensitive to emotional reactivity than event-related potentials and is less labor intensive than neuroimaging. However, an important direction for future research is to employ neuroimaging technology to distinguish between reactivity to emotional context vs. anxiety about speaking. Neuroimaging could help identify the brain mechanisms that mediate emotional reactions to language. A proposed brain mechanism for the heightened emotional responsiveness to a first language is amygdala-mediated learning: when phrases are learned in emotional contexts, the contexts activate the amygdala and other brain regions involved in emotion. Neural patterns of activation representing phrase meaning may become emotionally laden due to interconnectivity with pathways through emotional brain areas. Neuroimaging could be employed to identify differential amygdala involvement when listening to different types of emotional language.

4.2.3. Contexts of emotion language use and lying

Our interviewees were asked broadly about lying preference without distinguishing context of lying (i.e., what is the setting, reasons for lying and discourse participants). Future research needs to identify contextual subtleties. It will be important to distinguish speaking to authority figures from speaking to peers. Prior research has proposed that bilinguals prefer to use the first language (or more emotionally powerful language) when they want to feel the full emotional impact of what is being communicated, but use the second language (or emotionally blunted language) when they want to establish emotional distance with the topic (Bond and Lai, 1986; Dewaele, 2004, 2008; Schrauf, 2000). This predicts that bilinguals will prefer to use the language which promotes emotional closeness when speaking to sympathetic authority figures (e.g., a psychotherapist) but the language of emotional distance when speaking to less sympathetic authorities (e.g., police).

4.2.4. Comparison with polygraph testing

We used only electrodermal monitoring while polygraph testing employs multiple psychophysiological channels, including heart-rate and respiration. Polygraph examiners ask specific questions depending on whether the goal is employee screening or criminal investigation, and the conclusion rests on the subjective judgment of the human examiner (National Research Council, 2003). Our findings provide a rationale for including bilingualism in future tests of polygraph reliability, although advocating this could be seen as accepting the validity of polygraphs. Many researchers consider polygraph testing a pseudoscience (Furedy, 1991). The National Research Council (2003) concluded that there is "… little basis for the expectation that a polygraph test could have extremely high accuracy" (p. 2).

5. Conclusions

In many areas of experimental and physiological psychology, a monolingual bias has prevailed (Pavlenko, 2005). While bilingualism is important in its own right, and especially in regions with high levels of multilingualism, studying bilinguals can be a method for studying subjective and physiological emotional response. Bilingual speakers experience different levels of emotionality in their two languages, and the current paper confirmed this using both self-report and electrodermal monitoring. Ratings and skin conductance responses (SCRs) were attenuated for hearing emotional stimuli presented in a second language. This paper extended the study of bilinguals' varied emotional responsiveness to deceptive language. We introduced the True and False Statements Task where participants read prepared statements that were either true or false. SCRs elicited by L2-English statements were overall higher than SCRs elicited by L1-Turkish statements, even though participants rated themselves as feeling the Turkish lies more strongly. Our study highlights the need for researchers to analyze the two factors, in addition to lie/truth status, that can influence anxiety during deceptive tasks: the inherent emotional gravity of utterances, and the production/planning needed for speech output.

Bilingual speakers, like all individuals, may be subjected to interrogation and polygraph testing. However, no systematic body of research exists on how non-native speaker status influences interrogation or polygraph outcome. The current study indicates that skin conductance is influenced by which language is spoken and by language proficiency. These results are thus a call to researchers and professionals who work with bilingual individuals, such as psychotherapists and forensic psychologists, to include multilingualism and language proficiency as a studied variable.

Acknowledgements

The authors thank Bruce Mehler for technical advice regarding electrodermal measurement, and NeuroDyne Medical Corporation for supporting the current research via an equipment grant to Dr. Aycicegi-Dinn's laboratory at Istanbul University.

Appendix A

Stimuli in the emotional phrases task with emotional intensity ratings provided by native speakers using a 5-point Likert scale. Items that are significantly different between groups are marked by *, $p<.05$.

English	Boston raters	Turkish	Istanbul raters
Endearments			
You are everything to me!	4.4	Sen benim her şeyimsin!	4.1
I don't want to lose you!	4.1*	Seni kaybetmek istemiyorum!	4.6*
I can't wait to see you!	3.8	görmek için sabırsızlanıyorum!	4.2
I love you more than anything!	4.8	Seni her şeyden çok seviyorum!	4.4
When can I see you again?	3.2	Seni bir daha ne zaman görebilirim!	3.5
I've missed you so much!	4.3	Seni çok özledim!	4.5

Appendix A (*continued*)

English	Boston raters	Turkish	Istanbul raters
Insults			
You are so ugly!	4.0	Çok çirkinsin!	3.9
I am sick of you!	4.0	Midemi bulandırıyorsun!	4.0
I hate you!	4.7	Senden nefret ediyorum!	4.7
I never want to see you again!	4.5	Seni asla bir daha görmek istemiyorum!	4.3
You are so fat!	3.8	Çok şişmansın!	4.1
You are so stupid!	3.9	Çok aptalsın!	3.9
Reprimands			
Be good!	2.7	Cici çocuk ol!	3.1
Do you want a spanking?	3.1	Beş kardeş geliyor!	3.3
Don't be a baby!	2.7*	Bebek gibi davranma!	3.2*
Pay attention!	2.4	Dikkatini ver!	2.9
Don't talk back!	3.2	Bana cevap verme!	3.7
That's not nice!	2.6*	Bu hoş bir şey değil	3.1*
Neutral (single words)			
Box	1.0	Kutu	1.2
Branch	1.0	Şube	1.2
Chair	1.0	Sandalye	1.3
Column	1.0	Kolon	1.3
Door	1.1	Kapı	1.4
Envelope	1.0*	Zarf	1.5*
Finger	1.2	Parmak	1.4
Name	1.3*	İsim	2.1*
Number	1.0*	Sayı	1.5*
Part	1.0	Kısım	1.3
Street	1.0*	Cadde	1.4*
Table	1.0	Masa	1.2

Appendix B. Sample sheet for the true and false statements task

Category	True statement	False statement	(Folded over)
Favorite sport *easy*	I like _____ very much.	I like _____ very much.	Untrue
Political event *hard*	I am out-raged about _____	I am out-raged about _____	Untrue
Favorite travel destination *easy*	I would like to visit _____	I would like to visit _____	True
World problems *hard*	I care strongly about _____	I care strongly about _____	True
Favorite food *easy*	My favorite food is _____.	My favorite food is _____.	True
Belief in God *hard*	I believe that there is _____.	I believe that there is _____.	True
Favorite beverage *easy*	I enjoy drinking _____	I enjoy drinking _____	Untrue
Fear of death *hard*	I am _____	I am _____	Untrue
Favorite clothing *easy*	I like wearing _____	I like wearing _____	True
Favorite family relation *hard*	In my family, I love _____ the most	In my family, I love _____ the most	True
Favorite entertainment *easy*	I enjoy watching _____	I enjoy watching _____	Untrue
Self-description *easy*	I am a _____ person	I am a _____ person	Untrue
Childhood goals *hard*	I used to want to be a _____ when I grew up.	I used to want to be a _____ when I grew up.	True
Mother's behavior *hard*	I would be angry if my mother _____	I would be angry if my mother _____	True
Reason for being late *easy*	When I am late, the main reason is _____	When I am late, the main reason is _____	Untrue
Political leader *hard*	I very much admire _____	I very much admire _____	Untrue

Appendix B Notes. Sheets shown to participants contained first or second half of items in Turkish. Easy/Hard category labels did not appear on participants' sheets.

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