Legal and Criminological Psychology (2013), 18, 115–127
© 2011 The British Psychological Society

The British Psychological Society

www.wileyonlinelibrary.com

Detecting deception in second-language speakers

Cayla S. Da Silva* and Amy-May Leach

University of Ontario Institute of Technology, Oshawa, Ontario, Canada

Purpose. We examined whether language proficiency had an impact on lie detection.

Methods. We collected video footage of 30 targets who spoke English as their native or second language and who lied or told the truth about a transgression. Undergraduate students ($N = 51$) then judged the veracity of these 30 clips and indicated how confident they were in their ratings.

Results. Participants were more confident when judging native-language truth-tellers than second-language truth-tellers. In addition, participants were more likely to exhibit a truth-bias when observing native-language speakers, whereas they were more likely to exhibit a lie-bias when viewing second-language speakers.

Conclusions. Given the difficulties and biases associated with second-language lie detection, further research is needed.

Generally, people are only able to detect lying slightly better than they would be able to predict heads or tails when tossing a coin (Bond & DePaulo, 2006). Thus, it may be problematic for people to rely upon their lie detection skills in forensic settings. Researchers have extensively examined whether detection is affected by the type or magnitude of the lie (e.g., see Granhag & Strömwall, 2004 and Vrij, 2008 for discussions). However, very little research has explored the implications of communication barriers for interrogations. Specifically, it is unknown how lie detection accuracy is affected when someone is speaking in his or her second language.

Lie detection accuracy

Across the majority of studies, individuals' ability to accurately identify deception is near chance levels (i.e., 50%). A meta-analysis revealed that the average lie detection accuracy rate for laypersons was 54%: 61% of truths and 47% of lies were correctly identified (Bond & DePaulo, 2006). The majority of law enforcement officials (e.g., police officers) are also unable to detect deception above chance levels (e.g., Ekman & O'Sullivan, 1991). A few researchers argue that certain groups are able to detect deception. Ekman and O'Sullivan (1991) found that Secret Service agents' accuracy was

*Correspondence should be addressed to Cayla S. Da Silva, Faculty of Social Science and Humanities, University of Ontario Institute of Technology, 2000 Simcoe Street N., Oshawa, ON, L1H 7K4, Canada (e-mail: cayla.dasilva@uoit.ca).

DOI:10.1111/j.2044-8333.2011.02030.x

significantly higher than 50%. Ekman, O'Sullivan, and Frank (1999) also identified several groups – including sheriffs, federal officials, and clinical psychologists – that were able to detect deception at a level greater than chance. Recently, O'Sullivan, Frank, Hurley, and Tiwana (2009) found that the stakes associated with the lie scenario could account for officers' low accuracy rates in past studies (i.e., law enforcement officials would outperform laypersons if they were judging high-stakes scenarios). However, generally, accuracy rates have consistently been fairly low, such that expertise does not appear to affect accuracy.

Lie detection confidence

Researchers have also examined observers' confidence in their lie detection judgments. Law enforcement officials have been found to be more confident in their decisions than laypersons (e.g., DePaulo & Pfeifer, 1986). In fact, police officers estimate that their lie detection accuracy is 77% (Kassin *et al*., 2007). This confidence may be due to training that they have received or the knowledge that they have obtained through experience (e.g., Meissner & Kassin, 2002). Regardless, there is no direct link between accuracy and confidence (DePaulo, Charlton, Cooper, Lindsay, & Muhlenbruck, 1997).

The role of cognitive load in lie detection

Recently, researchers have begun to apply a cognitive load approach to the study of deception (Vrij, Fisher, Mann, & Leal, 2008). fMRI researchers have argued that lying requires more cognitive resources than truth-telling (e.g., Kozel, Padgett, & George, 2004). Creating a lie requires memory (e.g., remembering the lie and its chronological development) and other cognitive resources related to executive function (e.g., planning the lie, inhibiting behavioural responses indicative of deception, monitoring performance). Thus, when individuals lie, cognitive load increases (Vrij, Fisher *et al*., 2008). In fact, lie-tellers exhibit signs of impaired cognitive resources (e.g., slower speech, increased speech errors and hesitations), particularly when cognitive demands are high (De Paulo *et al*., 2003; Vrij, Mann *et al.*, 2008). Lie-tellers also look like they are thinking harder than truth-tellers (Vrij, Fisher *et al*., 2008). Thus, the multiple factors taxing cognition may make the visual and auditory differences between lie-tellers and truth-tellers more distinguishable (Vrij, Fisher *et al*., 2008; Vrij, Mann *et al*., 2008). If more demand is placed upon individuals' cognitive resources (e.g., working memory) when they are attempting to lie, then they will be less able to monitor and inhibit their own behaviours and their lie-telling may be easier to detect (McCornack, 1997; Vrij, Fisher *et al*., 2008a; Warren, Schertler, & Bull, 2009).

Second-language speakers and lie detection

Speaking in a second language may also increase cognitive load. Research has shown that speaking in a second language places demands on neural processing because it requires the use of additional motor neurons that are involved in both the temporal and the sequential organization of words (Perani & Abutalebi, 2005). These increase in neural activity are directly linked to declarative memory processes in second-language speakers; thus, it is more difficult for them to engage in word and event recall (Ullman, 2001).

Thus, speaking in a second language in conjunction with lie-telling will likely create large increases in cognitive load. Broadbent (1957) suggested that cognitive load

increases when attention must be divided during the simultaneous performance of two tasks. When one task requires a lot of working memory and input to create a solution, it creates a lag in attention-switching; in turn, the second task does not receive as much attention (Kahneman, 1973). Presumably, having an individual lie in a second language would significantly increase cognitive load and performance of one of the tasks should suffer. In particular, second-language speakers may compromise their ability to control the leakage of deception and their lies may be easier to detect.

Many of the cues that are thought to be predictors of deception may also be present when individuals attempt to communicate in a second language. Overall, individuals have many incorrect beliefs about the cues to deception (Granhag & Strömwall, 2004; Vrij, 2008). For example, lie-tellers are commonly thought to avert eye gaze, fidget, groom or self-manipulate (e.g., adjust clothing), and cover their mouths (Akehurst, Kohnken, Vrij, & Bull, 1996; DePaulo *et al.*, 1985; Vrij, 1991, 2008). However, second-language speakers are more likely to avert eye gaze, self-manipulate, and appear nervous – especially when they are feeling anxious (Gregerson, 2005). Thus, second-language speakers might naturally display non-verbal cues that are associated with deception when simply communicating. It is unknown whether these linguistic cues create additional confusion during deception detection.

Recent research has found that individuals may be sensitive to a few of the difficulties associated with speaking in a second language. Da Silva, Leach, Vrantsidis, Meissner, and Kassin (2010) examined people's perceptions of native- versus second-language lie-tellers. They found that both undergraduate students and police officers reported using the same cues to detect deception, regardless of speakers' language proficiencies. However, there were a few significant differences in terms of their perceptions of native- and second-language speakers. Both groups thought that, compared to native speakers, second-language speakers would be less likely to understand the differences between telling the truth and lying or to understand the questions being asked. It is unclear whether these insights affect lie detection performance.

To our knowledge, only one study has focused on the impact of second-language speaking on lie detection. Cheng and Broadhurst (2005) randomly assigned individuals to lie or tell the truth in either their first language (Cantonese) or second language (English). Postgraduate students watched video clips of these individuals and judged each person's veracity. However, observers were no more accurate in their identification of second-language (vs. native-language) deception.

Despite the advances made by Cheng and Broadhurst (2005), there are several concerns about the internal and external validity of their study. First, throughout the study, the researchers allowed participants to code-switch. That is, participants were able to alternate between speaking Cantonese and English. Allowing code-switching may have affected the findings because the participants were not speaking exclusively in their stronger, native language (Cantonese) or in their weaker, second language (English). Code-switching may have been a way for second-language speakers to decrease cognitive load. In turn, there may not have been significant differences between native- and second-language speakers because cognitive demands were the same in both groups. Second, the researchers experimentally manipulated deception: individuals were instructed to lie or tell the truth about their opinions. Participants may not have been behaving as they would in a real-life setting. Naturalistic lie-telling (in which the individual freely chooses to lie or tell the truth) would be more applicable to the real world. Third, the authors noted that they invoked high-stakes deception because participants lied or told the truth about a controversial topic (i.e., capital punishment). However, it was impossible to establish

ground truth. That is, researchers could not be entirely certain of the actual veracity – or magnitude – of individuals' statements. Finally, individuals' language proficiencies were determined using participants' self-reports. Participants were excluded from the study only if they reported English proficiency levels below 3 on a seven-point Likert scale (1 = Very Poor English; 7 = Very Good English). The accuracy of these self-reports (i.e., the actual fluency of each participant) is unknown; participants may have misreported their proficiency levels. Without standardized tests of actual fluency, language proficiency effects are difficult to gauge.

Purpose

In this experiment, we examined undergraduate students' ability to detect lie-telling and truth-telling in native- and second-language speakers. Unlike in Cheng and Broadhurst's (2005) study, code-switching was not permitted. This approach maximized cognitive load and ensured clear differences between the language groups. Ground truth was established by recording the participants' actions using a hidden video camera.

This experiment involved naturalistic, high-stakes lie-telling. Students were placed in a situation in which they would or would not commit a transgression (i.e., cheat on a test). They were instructed to refrain from discussing answers with another participant during this test; whether they decided to share answers was their decision. Then, they were questioned about this transgression in English, which was either their first or second language. Students were not instructed to lie or tell the truth (i.e., their responses were volitional). Video footage of their answers was then shown to undergraduate student observers. They were asked to detect deception and rate their confidence in each judgment.

Hypotheses

Signal Detection Theory (SDT), as created by Green and Swets (1966), has been used to reveal decision making in situations in which observers may be uncertain about their judgments. For example, Meissner and Kassin (2002) have used SDT to provide clearer explanations of the decisions individuals make during lie detection tasks. In this study, SDT was used to understand performance of observers in a more thorough way than is afforded by typical analyses of accuracy. We tested two, independent, components of performance: discrimination and bias. Discrimination referred to how well observers differentiated between lie-tellers and truth-tellers (i.e., d'), whereas bias examined whether observers were more likely to choose one response option, such as indicating that most individuals were lying (i.e., β).

Discrimination

Observers were expected to have less difficulty discriminating between lie- and truth-tellers who were speaking in their second languages as compared to their native languages. Detection of second-language speakers' veracity was hypothesized to be easier because of the increased cognitive load associated with lie-telling *and* speaking in a second language.

Bias

We hypothesized that observers would be more likely to label second-language speakers as lie-tellers than native-language speakers. This expectation was based on second-language speakers' tendency to display more cues associated with lie-telling simply when speaking.

Confidence

In keeping with previous results, confidence and accuracy were not expected to be related. For exploratory purposes, we examined the effect of language on confidence. We did not have a specific hypothesis; however, we speculated that observers might be significantly less confident about their judgments when viewing second-language speakers as compared to native-language speakers because it could be more challenging to interpret second-language speakers' behaviours. Thus, observers' confidence could decrease with the language proficiency of the speaker.

Method

Participants

Fifty-one undergraduate students (20 males and 31 females) were asked to be lie detection judges. They were recruited from the Introductory Psychology participant pool in a Canadian university. The average age of students was 20.37 years ($SD = 2.79$). Participants from nine different self-classified ethnic groups were included: Arab/West Asian ($n = 4$), Black ($n = 5$), White ($n = 15$), Hispanic ($n = 1$), Latin American ($n = 1$), South Asian ($n = 19$), South East Asian ($n = 2$), 'Other' ($n = 4$). Students participated in the study in exchange for extra credit.

Materials

Video clips

Video footage was obtained using a modified Russano, Meissner, Narchet, and Kassin (2005) cheating paradigm. Targets were recruited to participate in a problem-solving study called Puzzler. All sessions were conducted in a small psychology laboratory on campus. Individually, targets waited outside the laboratory doors with another 'participant' (i.e., a confederate posing as another student) until being greeted by a female experimenter. Upon entering the laboratory, targets were informed that they would be completing a series of logic problems. Targets were provided with Puzzler tests and specifically told not to share or discuss individual problems. Then, they were left alone in the room – with the confederate – for 15 min to complete the questions. The confederate asked half of the targets for help with one of the questions; the remaining targets were not asked for help. The experimenter was always blind to condition (i.e., she did not know whether or not the target chose to cheat on the test).

After the Puzzler tests were completed, the experimenter re-entered the room and collected the tests. Before leaving the room again, she gave the pair demographics questionnaires to complete. When the experimenter returned to collect the questionnaires, she looked worried and said, '*I have to check on something. I'll be back in a moment*'. Again, the experimenter left the pair alone in the test room. During this period, the confederate commented that the experimenter looked upset and asked the target what he or she thought was wrong. If the confederate had attempted to induce the target to cheat, she also mentioned that he or she should not tell the experimenter about being asked for help or sharing answers.

After approximately 1 min, the experimenter returned to the room. The experimenter said that there may be a problem with the tests because both individuals had the same wrong answers. The confederate was asked to wait outside the room in the reception area until it was her turn to be interviewed. Then, once they were alone in the room, the experimenter told the target that she believed that the pair had shared their answers throughout the experiment. She explained that she had contacted her professor and that

this may be considered a case of cheating. The experimenter then asked the participant the following questions, 'What do you think the problem is?'; 'I left the room. I was gone for fifteen minutes. Can you describe everything that happened from the minute that I left until I returned?'; 'Can you be more specific? I really need to know what happened.'; 'Did you ask her (the other student) for help?'; 'Did she ask you for help?'; 'Did you share answers?'; 'What do you think I should do about this?'

The interview was conducted in English, which is the language predominantly spoken in the country where the experiment took place. Code-switching was not possible because the experimenter did not speak any other language. The entire procedure was videotaped using a hidden camera. Targets' upper bodies and faces were visible throughout the session.

In total, we compiled clips of 30 targets – 20 truth-tellers and 10 lie-tellers – being interrogated (M length per clip = 92.73 s, SD = 32.17). Fifteen of these video clips featured native-language English speakers who had been recruited from the Introductory Psychology course (10 truth-tellers and five lie-tellers). The other 15 video clips were of second-language speakers who had been recruited from an on-campus English as a Second-Language learning centre (10 truth-tellers and five lie-tellers). Their English language proficiency had been assessed by the centre using standardized measures of reading, writing, speaking, and comprehension abilities. Following assessment, they were assigned a proficiency level within the on-campus programme; according to the Canadian Language Benchmarks, they were classified as 'Beginners'. Cheating and lying base rates were the same for native- and second-language truth- and lie-tellers – all participants cheated when asked for help by the confederate. Within the native- and second-language conditions, respectively, 23% and 34% of targets confessed. Confessors were excluded from both conditions as they were not pure truth- or lie-tellers.

In addition, all targets were asked to fill out a *Language and Sharing Questionnaire* about their perceptions of the interrogation. Using a five-point scale (1 = strongly disagree; 5 = strongly agree), they were asked to indicate their agreement with 11 statements: 'How hard were the Puzzler problems?'; 'How nervous were you when you were answering the Puzzler problems?'; 'I wanted the experimenter to believe my answers.'; 'It was hard to understand the questions.'; 'It was hard to answer the questions.'; 'I understood more than I told the experimenter.'; 'It was hard to come up with my answers.'; 'I intentionally misunderstood questions.'; 'I was nervous.'; 'I was frustrated.'; 'The experimenter believed me'.

Lie detection decisions

Participants were asked to indicate whether the target in the video clip was lying or telling the truth about sharing his or her answers on the test.

Confidence

Participants were asked to indicate how confident they were in each lie detection decision on a scale from 0 (not at all confident) to 100% (extremely confident).

Procedure

Individually, participants were tested in a small, quiet room. The entire study was conducted on a computer using MediaLab (Jarvis, 2006). Participants were told that they would view 30 randomized video clips of targets lying or telling the truth about

cheating on the logic test. Further, they were informed that each target had a 50–50 likelihood of telling the truth (or lying). Following each clip, participants were asked to indicate whether the individual in the video clip was lying or telling the truth and their confidence in their judgment. After viewing all clips, participants were asked to complete demographics questions. The duration of the experiment was one and a half hours.

Results

A preliminary examination of the data indicated that 59% of participants self-identified themselves as speaking more than one language, however, analyses revealed no significant effects of bilingualism. Thus, all subsequent analyses are collapsed across observer bilingualism.

Language and sharing questionnaire

Language (native language vs. second language) × Veracity (lie vs. truth) ANOVAs were conducted on targets' perceptions during the interrogation. There were several main effects of language. Compared to native-language speakers ($M = 1.65$, $SD = 1.01$) 95% CI (0.97, 2.33), second-language speakers ($M = 2.70$, $SD = 1.23$) 95% CI (2.02, 3.38) were more likely to report that it *was hard to understand the questions*, $F(1, 26) = 5.07$, $p = .033$, $\eta_p^2 = .16$. In addition, second-language speakers ($M = 2.83$, $SD = 1.39$) 95% CI (2.09, 3.56) were more likely to report that they *intentionally misunderstood the experimenter's questions* compared to native-language speakers ($M = 1.50$, $SD = 1.11$) 95% CI (0.82, 2.18), $F(1, 26) = 7.49$, $p = .011$, $\eta_p^2 = .23$. There were no differences between second- and native-language speakers in terms of how hard they found the problems, how nervous they were when they were answering the problems, wanting the experimenter to believe their answers, understanding more than they told the experimenter, finding it hard to answer the questions, finding it hard to come up with their answers, feeling nervous, feeling frustrated, or thinking that the experimenter believed them, all ps $> .05$. There was only one main effect of veracity: lie-tellers ($M = 2.78$, $SD = 1.64$) 95% CI (1.95, 3.61) were more likely than truth-tellers ($M = 1.55$, $SD = 1.55$) 95% CI (1.00, 2.10) to report that they *intentionally misunderstood the experimenter's questions*, $F(1, 26) = 6.40$, $p = .018$, $\eta_p^2 = .20$. There were no other significant main effects or interactions.

Signal detection analyses[1]

Discrimination

We conducted a paired samples *t*-test, with Language as the independent variable, on d′. Participants were better able to discriminate between truth- and lie-telling native-language speakers ($M = 0.31$, $SD = 0.41$), 95% CI (0.19, 0.42) than second-language speakers ($M = -0.03$, $SD = 0.53$), 95% CI (−0.18, 0.12) $t(50) = 4.45$, $p < .001$, 95% CI (0.18, 0.48), $d = 1.26$ Using a one sample *t*-test, we then examined participants' ability to discriminate between truth- and lie-tellers by comparing their d′ values to zero

[1] *Formulas for calculating d′ and β: http://psy2.ucsd.edu/~kang/sdt.sdt.htm*

(indicative of no sensitivity). Participants could discriminate between truth- and lie-telling native-language speakers, $t(50) = 5.38$, $p < .001$, 95% CI (0.19, 0.42), but not second-language speakers, $t(50) = -0.35$, $p = .728$, 95% CI (−0.18, 0.12), $d = .10$.

Response bias

We conducted a paired samples *t*-test, with Language as the independent variable, on β. There were significant differences in terms of participants' biases towards native-language speakers ($M = 0.86$, $SD = 0.29$), 95% CI (−0.22, −0.06) and second-language speakers ($M = 1.12$, $SD = 0.37$), 95% CI (−0.02, −0.23), $t(50) = -4.31$, $p < .001$, 95% CI (−0.39, −0.14), $d = -1.22$. Using a one sample *t*-test, we then examined participants' bias by comparing β values to a score of one (indicative of no bias). Participants were more likely to call native-language speakers truth-tellers than lie-tellers (i.e., exhibit a truth-bias), $t(50) = -3.44$, $p = .001$, 95% CI (−0.22, −0.06), $d = -.97$. However, they were significantly more likely to call second-language speakers lie-tellers (i.e., display a lie-bias), $t(50) = 2.37$, $p = .022$, 95% CI (0.02, 0.23), $d = .67$.

Relationships between accuracy and confidence

There was a significant correlation between accuracy and confidence when participants viewed native-language truth-tellers, $r(50) = .40$, $p = .004$. However, there were no significant correlations between accuracy and confidence when participants viewed native-language lie-tellers, $r(50) = -.18$, $p = .208$, second-language truth-tellers, $r(50) = .05$, $p = .724$, or second-language lie-tellers, $r(50) = .08$, $p = .585$.

Lie detection confidence

A Language × Veracity within-participants ANOVA was conducted on participants' confidence in their decisions. Participants were significantly more confident when viewing native-language speakers ($M = 78.73$, $SD = 13.41$), 95% CI (75.10, 82.35) than second-language speakers ($M = 74.95$, $SD = 16.97$), 95% CI (70.35, 79.55), $F(1, 50) = 13.49$, $p = .001$, $d = .25$. There was no significant main effect of veracity, $F(1, 50) = 2.23$, $p = .141$, $d = .04$. There was, however, an interaction between Language and Veracity, $F(1, 50) = 10.82$, $p = .020$, $\eta_p^2 = .18$. *Post hoc* analyses, using paired samples *t*-tests, revealed that participants were significantly more confident when viewing native-language truth-tellers ($M = 80.68$, $SD = 12.26$), 95% CI (77.23, 84.13) than second-language truth-tellers ($M = 74.28$, $SD = 16.49$), 95% CI (69.64, 78.92), $t(50) = 5.48$, $p < .001$, 95% CI (4.05, 8.74), $d = 1.55$. However, participants were equally confident when viewing native-language lie-tellers ($M = 76.78$, $SD = 14.56$), 95% CI (72.68, 80.87) and second-language lie-tellers ($M = 75.62$, $SD = 17.43$), 95% CI (70.72, 80.52), $t(50) = 0.81$, $p = .420$, 95% CI (−1.70, 4.01), $d = .23$.

Discussion

We examined whether language proficiency had an impact on lie detection accuracy, confidence, and bias. Results were consistent with the lie detection literature in terms of observers' performance when judging native-language speakers (e.g., Bond & DePaulo, 2006). However, there were several differences between how observers classified native- versus second-language truth- and lie-tellers.

We expected that participants would be better able to discriminate between truth- and lie-telling second-language speakers (than native-language speakers) because of increases in cognitive load. However, this hypothesis was not supported. Participants were actually better at discriminating between truth- and lie-telling native-language speakers. They were unable to discriminate between truth- and lie-tellers who spoke in their second languages. There are several explanations for these findings. First, there may have been greater variability in observers' outgroup judgments. Observers exhibit much lower levels of agreement when detecting the deception of members of another culture as opposed to those from their own culture (Bond & Rao, 2004). Similarly, second-language speakers may have been perceived as members of an unfamiliar outgroup and elicited less consistent deception detection. Second, speaking in a second language may have affected emotionality. Researchers have found that second-language speakers can display less emotion (Bond & Lai, 1986). More importantly, they report feeling less arousal when reading deceptive statements (Caldwell-Harris & Ayçiçegi-Dinn, 2009). In fact, many individuals actually choose to speak in their second languages to distance themselves from an event, especially when they are faced with anxiety-provoking or embarrassing situations (Altarriba & Santiago-Rivera, 1994; Dewaele & Pavlenko, 2002). This perception of reduced emotionality may embolden second-language speakers and confuse observers. Paradoxically, individuals may actually experience greater physiological arousal when lying in a second language (e.g., Caldwell-Harris & Ayçiçegi-Dinn, 2009). Further research is required to determine whether there are overt behavioural differences in the emotional displays of native and second-language speakers.

We also examined whether there was a response bias present when participants viewed native- and second-language speakers. Consistent with our hypothesis, and previous research (e.g., Bond & DePaulo, 2006), we found that participants were more likely to label native-language speakers truth-tellers. As expected, these participants also exhibited a lie-bias towards second-language speakers. Second-language speakers tend to display more non-verbal and verbal cues that have been linked to deception simply when communicating (Bialystok, Craik, Green, & Gollan, 2009; Gregersen, 2005; Vrij, 2000). For example, second-language speakers provide less detailed accounts of events because they must actively inhibit the neural control mechanisms that would otherwise automatically have them respond in their first languages (Wang, Xue, Chen, Xue, & Dong, 2007). In addition, second-language speakers must rely heavily on temporal lobe structures that can hinder their lexicons; if the lexicon system is not well developed, speakers have much more difficulty with expressions of memory for events (Ullman, 2001). Given the extra effort that must be exerted by second-language speakers, and the resulting changes in cues that are normally associated with deception, it is not surprising that observers labelled them as lie-tellers.

There may also be innate biases within observers. Smith and Bond (1994) have noted that, when individuals provide statements that are challenging to comprehend, observers attempt to determine the source of their difficulties. Bond and Atoum (2000) suggested that some observers externalize blame when they cannot understand foreign accents. Individuals who speak with an accent are also viewed as 'different' and – most importantly – untrustworthy (Brennan & Brennan, 1981; Munro, 2003). When the negative judgments associated with accents are compounded by intuitive misinformation about the targets emotion, Porter and ten Brinke's (2009) Dangerous Decisions Theory predicts that individuals' decisions about credibility and honesty may become skewed. Thus, it is possible that observers had more negative overall impressions of second-language speakers and these impressions affected judgments of veracity.

Although observers tended to have a lot of confidence in their judgments, we suggested that they would be more confident when viewing native- compared to second-language speakers. This notion was supported. Because individuals were not as familiar with second-language speakers, it may have been more difficult for observers to interpret their behaviours. In turn, observers may have been less confident when making their judgments.

Future directions

It is difficult to determine the ecological validity associated with a cheating paradigm. We were able to establish ground truth within a deception scenario that was relevant to university students. Accusations of cheating, and the threat of repercussions associated with academic dishonesty, likely created high-stakes lying. However, being asked about cheating on a test might not be comparable to being interrogated about a murder. Thus, the generalizability of these findings to forensic contexts can only be suggested. Further research should examine videotaped, real-life interrogations of native- and second-language speakers.

Follow-up studies should also address the generalizability of our results to different populations. Specifically, researchers may wish to examine whether the findings extend to law enforcement officials who have had training or experience with second-language speakers. Customs officers, particularly those who are at airports, are constantly interacting with passengers who are speaking in their second languages. They may, as a result, have different biases. The deception detection performance of these law enforcement officials would have policy implications. For example, if it is determined that customs officers are better able to detect deception in less proficient speakers, then these findings would support their current practice of interrogating individuals in their second languages. Alternatively, if officers are less able to detect deception in second-language speakers, then there may be evidence to suggest that individuals should never be interrogated in their second languages. In that case, it might be best to employ an interrogator who speaks the suspect's native language.

In addition, it would be interesting to examine whether there are differences in observer judgments across the spectrum of language proficiency. In our study, we examined individuals with low levels of English proficiency in terms of Canadian Language Benchmarks. Yet, second-language participants exhibited high enough English proficiency to be placed into a pre-university ESL programme. It would be important to examine the boundary conditions of our discrimination, bias, and confidence findings. That is, we are interested in examining what occurs when observers watch video clips of individuals who exhibit lower or higher proficiency in English. Specifically, it is important to determine whether there is a decrease in accuracy and confidence as proficiency decreases and vice versa. It would also be important to determine whether there was a positive relationship between bias and proficiency. If so, we might have reason to suggest new procedures for interrogation based on the proficiencies of the individuals being interrogated.

Finally, future studies could delineate the source of differences in assessments of native- and second-language speakers. For example, researchers could track the cues that judges utilize while making their lie detection decisions and compare them to second-language speakers' actual cues to deception. Moreover, a modality study – in which only audio versus only visual versus audiovisual portions of interrogations were presented – could reveal whether demeanour or cultural aspects of speech (e.g., accent) influenced lie-detection decisions.

Conclusions

Our study is among the first to examine lie-telling in second-language speakers. We found that participants were better able to discriminate between truth- and lie-tellers when they were viewing native-language speakers than second-language speakers. Participants were also more likely to label native-language speakers as truth-tellers and second-language speakers as lie-tellers. Given the potential implications for law enforcement personnel and for second-language speakers, the difficulties and biases associated with second-language lie detection require further attention.

Acknowledgement

This project was supported by a grant from the American Psychology-Law Society.

References

Akehurst, L., Kohnken, G., Vrij, A., & Bull, R. (1996). Lay persons' and police officers' beliefs regarding deceptive behavior. *Applied Cognitive Psychology*, *10*, 461–471. doi:10.1002/(SICI)1099-0720(199612)10:6<461::AID-ACP413>3.0.CO;2-2

Altarriba, J., & Santiago-Rivera, A. L. (1994). Current perspectives on using linguistic and cultural factors in counseling the Hispanic client. *Professional Psychology: Research and Practice*, *23*(4), 388–397. doi:10.1037//0735-7028.25.4.388

Bialystok, E., Craik, F. I. M., Green, D. W., & Gollan, T. H. (2009). Bilingual minds. *Psychological Sciences*, *10*(3), 89–129. doi:10.1177152910061038708 4

Bond, C. F., & Atoum, A. O. (2000). International deception. *Personality and Social Psychology Bulletin*, *26*(3), 385–395. doi:10.1177/0146167200265010

Bond, C. F., & DePaulo, B. M. (2006). Individual differences in judging: Accuracy and bias. *Psychological Bulletin*, *134*, 477–492. doi:10.1007/s10979-007-9110-z

Bond, M. & Lai, T.-M. (1986). Embarrassment and code-switching into a second language. *Journal of Social Psychology*, *126*(2), 179–186.

Bond, C. F., & Rao, S. R. (2004). Lies travel: Mendacity in a mobile world. In P. A. Granhag & L. A. Stromwall (Eds.), *The detection of deception in forensic contexts* (pp. 127–147). Cambridge, UK: Cambridge University Press.

Brennan, E., & Brennan, J. (1981). Accent scaling and language attitudes: Reactions to Mexican American English speech. *Language and Speech*, *24*, 207–221.

Broadbent, D. E. (1957). A mechanical model for human attention and immediate memory. *Psychological Review*, *64*, 205–215. doi:10.1037/h0047313

Caldwell-Harris, C. L., & Ayçiçegi-Dinn, A. (2009). Emotion and lying in a non-native-language. *International Journal of Psychophysiology*, *71*, 193–204. doi:10.1016/j.ijpsycho.2008.09.006

Cheng, K. H., & Broadhurst, R. G. (2005). Detection of deception: The effects of language on detection ability among Hong Kong Chinese. *Psychiatry, Psychology and Law*, *12*, 107–118. doi:10.1375/pplt.2005.12.1.107

Da Silva, C. S., Leach, A.-M., Vrantsidis, M., Meissner, C. A., & Kassin, S. M. (2010). *Detecting deception in second-language speakers*. Poster session presented at the meeting of AP-LS, Vancouver.

DePaulo, B. M., Charlton, K., Cooper, H., Lindsay, J. L., & Muhlenbruck, L. (1997). The accuracy–confidence correlation in the detection of deception. *Personality and Social Psychology Review*, *1*, 346–357. doi:10.1207/s15327957pspr0104_5

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *American Psychological Association*, *129*(1), 74–118. doi:10.1037/0033-2909.129.1.74

DePaulo, B. M., & Pfeifer, R. L. (1986). On-the-job experience and skill at detecting deception. *Journal of Applied Social Psychology*, *16*, 249–267. doi:10.1111/j.1559-1816.1986.tb01138.x

DePaulo, B. M., Stone, J. L., & Lassiter, G. D. (1985). Deceiving and detecting deceit. In B. R. Schenkler (Ed.), *The self and social self* (pp. 323–370). New York: McGraw-Hill.

Dewaele, J.-M., & Pavlenko, A. (2002). Emotional vocabulary in interlanguage. *Language Learning*, *52*, 263–322. doi:10.1111/0023-8333.00185

Ekman, P., & O'Sullivan, M. (1991). Who can catch a liar? *American Psychologist*, *46*(9), 913–920. doi:10.1037/0003-066X.46.9.913

Ekman, P., O'Sullivan, M., & Frank, M. G. (1999). A few can catch a liar. *Psychological Science*, *10*, 263–266. doi:10.1111/1467-9280.00147

Granhag, P. & Strömwall, L. (Eds.), (2004). *The detection of deception in forensic contexts* (pp. 269–286, 348). New York, NY, USA: Cambridge University Press. doi:10.1017CBO9780511490071.012

Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York: Wiley.

Gregersen, T. S. (2005). Nonverbal cues: Clues to the detection of foreign language anxiety. *Foreign Language Annuals*, *38*(3), 388–400. doi:10.1111/j.1944-9720.2005.tb02225.x

Jarvis, B. G. (2006). *MediaLab (Version 2006.1)[Computer Software]*. New York, NY: Empirisoft Corporation.

Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, NJ: Prentice-Hall.

Kassin, S. M., Leo, R. A., Meissner, C. A., Richman, K. D., Colwell, L. H., Leach, A.-M., & La Fon, D. (2007). Police interviewing and interrogation: A self-report survey of police practices and beliefs. *Law and Human Behavior*, *31*, 381–400. doi:10.1007/s10979-006-9073-5

Kozel, F. A., Padgett, T. M., & George, M. S. (2004). A replication study of the neural correlates of deception. *Behavioral Neuroscience*, *118*(4), 852–856. doi:10.1037/0735-7044.118.4.852

McCornack, S. A. (1997). The generation of deceptive messages: Laying the groundwork for a viable theory of interpersonal deception. In J. O. Greene (Ed.), *Message production: Advances in communication theory* (pp. 91–126). Mahway, NJ: Lawrence Erlbaum.

Meissner, C. A., & Kassin, S. M. (2002). "He's guilty!": Investigator bias in judgments of truth and deception. *Law and Human Behavior*, *26*(5), 469–480. doi:0147-7307/02/1000-0469/1

Munro, M. (2003). A primer on accent discrimination in the Canadian context. *TESL Canada Journal*, *20*(2), 38–51.

O'Sullivan, M., Frank, M. G., Hurley, C. M., & Tiwana, J. (2009). Police lie detection accuracy: The effect of lie scenario. *Law and Human Behavior*, *33*, 530–538. doi:10.1007/s10979-008-9166-4

Perani, D., & Abutalebi, J. (2005). The neural basis of first and second language processing. *Current Opinion in Neurobiology*, *15*(2), 202–206. doi:10.1016/j.conb.2005.03.007

Porter, S., & ten Brinke, L. (2009). Dangerous decisions: A theoretical framework for understanding how judges assess credibility in the courtroom. *Legal and Criminological Psychology*, *14*, 119–134. doi:10.1348/135532508281520

Russano, M. B., Meissner, C. A., Narchet, F. M., & Kassin, S. M. (2005). Investigating true and false confession within a novel experimental paradigm. *Psychological Science*, *16*(6), 481–486. doi:10.1111/j.0956-7976.2005.01560.x

Smith, P. B., & Bond, M. H. (1994). *Social psychology across cultures: Analysis and perspectives*. Boston: Allyn & Bacon.

Ullman, M. T. (2001). The neural basis of lexicon and grammar in first and second language: The declarative/procedural model. *Bilingualism: Language and Cognitive*, *4*, 105–122. doi:10.1017/S1366728901000220

Vrij, A. (1991). *Misverstanden Tussen Politie en Allochtonen: Sociaal-Psychologische Aspecten van Verdacht Zijn*. Amsterdam: VU Uitgeverij.

Vrij, A. (2000). *Detecting lies and deceit: The psychology of lying and implications for profession practice*. Chichester: Wiley.

Vrij, A. (2008). *Detecting lies and deceit: Pitfalls and opportunities* (2nd ed.). West Sussex, UK: John Wiley.

Vrij, A., Fisher, R., Mann, S., & Leal, S. (2008). A cognitive load approach to lie detection. *Journal of Investigative Psychology and Offender Profiling*, *5*, 39–43. doi:10.1002/jip.82

Vrij, A., Mann, S. A., Fisher, R. P., Leal, S., Milne, R., & Bull, R. (2008). Increasing cognitive load to facilitate lie detection: The benefit of recalling an event in reverse order. *Law and Human Behavior*, *32*, 253–256. doi:10.1007/s10979-007-9103-y

Wang, Y. P., Xue, G. M., Chen, C. S., Xue, F., & Dong, Q. (2007). Neural bases of asymmetric language switching in second-language learners: An ER-fMRI study. *NeuroImage*, *35*, 862–870. doi:10.1016/j.neuroimage.2006.09.054

Warren, G., Schertler, E., & Bull, P. (2009). Detecting deception from emotional and unemotional cues. *Journal of Nonverbal Behavior*, *33*, 59–69. doi:10.1007/s10919-008-0057-7

Received 12 June 2011; revised version received 25 August 2011