2011

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ABSTRACT

In this 2 (cue type) x 2 (statement type) two-way within-subject ANOVA design study, investigators look at the differences in average accuracy in determining whether a statement is a truth or a lie. Participants, college students, and professors from South Dakota State University, were assessed in their ability to detect deception. The participants had to determine whether a statement was a truth or a lie based on the actor's verbal or nonverbal cues, each presented independently. The results suggest no significant effect of cue type (verbal or nonverbal) or statement type (truthful or deceitful) with participants' accuracy being no better than guessing rate.

DECEPTION DETECTION ACCURACY USING VERBAL AND NONVERBAL CUES

Everyone is caught in a lie sometime in their life, and this event seems to stick in most people's memory. Stories are constantly told about these experiences of being caught red-handed. According to Vrij, Edward, Roberts, and Bull (2000), a liar can be caught three different ways. One strategy is by observing the behavior of the person in question (i.e. if they are making fidgety movements or averting gaze). The second strategy is to analyze what they are saying (i.e. if they are stuttering, fluctuating pitch, or have long pauses in speech). Lastly, a liar can be caught by measuring physiological correlates, which can be explicitly measured (i.e. heart rate, GSR). Nonverbal cues are clues of deceit that are expressed through facial expressions, eye movements, and body language. Verbal cues are linguistic clues of deceit that are expressed in an individual's statement, such as stuttering, differentiation in pitch, etc. (Wang, Chen, & Atabakhsh, 2004a). In order to make a credible discrimination between a truthful and a deceitful statement, verbal and nonverbal cues may need to be considered (Henningsen, Valde, & Davies, 2005). DePaulo, Rosenthal, Green, and Rosenkrantz (1982) found that individuals who based their decisions solely on verbal cues were more accurate than solely nonverbal cues. Fabbro, Gran, and Bava (1993) also found that individuals made more correct than incorrect judgments when using only verbal cues.

The current study of deception detection accuracy using verbal and nonverbal cues focuses on the first two strategies of Vrij et al.'s (2000) principles. Verbal cues are used to help distinguish between truthful and deceitful statements (Wang, Chen, & Atabakhsh, 2004b). Verbal cues help this differentiation because these cues are more likely to occur in

deceitful statements than in truthful statements. According to Wang et al. (2004b) nonverbal cues, even when observed by a trained officer, are usually too elusive to be noticed. When comparing verbal versus nonverbal cues in detecting truthful statements, Wang et al. (2004b) found otherwise. Accuracy when using nonverbal cues in detecting truthful statements varied from 51-82% in comparison to a steady 76% when using verbal cues. The fluctuation in nonverbal cue accuracy implicates that using nonverbal cues to distinguish statements is not reliable.

Based on the literature review, the authors expect to find that participants will be more accurate in detecting deception when utilizing verbal cues, than when using nonverbal cues. It is also expected that participants will be more accurate at identifying deceitful statements than truthful statements.

METHODS

Participants
Participants in this study included one male actor (for the video/audio recording), 22 undergraduate students, and three professors of South Dakota State University. The average age for 20 of the participants was 20.06 (SD=.80), the last five participants all exceeded the age of 22. The undergraduate students were recruited using a PowerPoint presentation given to a pseudoscience and psychology class. These participants had the opportunity to receive ten points extra credit for their participation. Those who did not want to, or could not participate, were given an alternative opportunity for the extra credit. All those who participated also were given a chance in a $20 raffle. Professors and the male actor were recruited by request of the investigators. The male actor and professors who participated received no compensation. All participants were informed of participation criteria. The exclusion criteria included were: no individuals with psychiatric or behavioral disorders; no one under the influence of alcohol, illegal substances, any form of antidepressants or anti-anxiety drug, antihistamines or any form of medication; no one who had a history of epilepsy or seizure; no one taking medication for any form of Attention Deficit Disorder; no one under the age of 18 years. The institutional review board (IRB) approved this study and recruitment, approval number is IRB-1103007-EXP.

Materials and Procedures
Prior to the recording of the video, the investigators received consent from the student actor. The actor was recorded using a small handheld camera, while answering simple investigator-generated questions such as, "What scholarships have you received at SDSU?" These questions were randomly assigned to be a true statement or a false statement based on the knowledge the investigators had of the actor. The actor was not practiced in telling these lies and the investigators did not inform the actor of any of the questions until the time of the recording.

All testing occurred at SDSU. One of the investigators tested one to four students in a single twenty minute session. Each session began with the investigator reading the consent form to all of the participants and an additional information sheet was provided for the

participants' own records. Participants were then instructed to complete an investigator generated five minute pre-questionnaire (pencil and paper). After completing the survey, participants answered two practice questions on SuperLab (Version 4.0 & 4.5), following a detailed description of the task. SuperLab is electronic software used to present visual or auditory stimuli and to read accuracy of responses. Each participant listened to the recording of the actor using Vic Firth Insulation headphones, and at a separate time watched the video of the actor making true and false statements. All participants received the same questions, the difference was in the way the statements were presented (verbal or non-verbal). Half of the participants listened to the recording first, and then they watched the video. The other half watched the video first, and then they listened to the recording. The participants were then asked to discriminate if the statement made by the actor is a truth or a lie. The responses were recorded through SuperLab on a Dell computer. To eliminate any order effect, investigators counterbalanced the type of presentation style. Half of the participants received the statements visually first and half of the participants listened to the statements first. The actual discrimination task took about ten minutes. Following the task, the participants were asked to complete a three minute investigator generated post-questionnaire regarding the assessment (pencil and paper). Investigators then debriefed the participants as to the purpose of the study. They were told that the investigators believed that individuals would be more accurate at detecting lies during the verbal presentation style. Any participants wishing to see their results on the task were shown a summary data file from SuperLab. Investigators retrieved data for the analysis through Super Lab Cedrus Data Viewer.

RESULTS

Table 1 illustrates the 2 (cue type) x 2 (statement type) within-subject ANOVA which revealed cue type (verbal or nonverbal) as producing no significant main effect on the participants' accuracy. Results in Table 1 also show that statement type (truthful or deceitful) produced no significant main effect on accuracy of participants. There was no significant effect of the interaction between the cue and the statement type on accuracy of participants, as seen in Table 1. Figure 1 illustrates that average percent correct (accuracy) was no different following true statements during nonverbal (M=56%, SD=16.97) and verbal cues (M=54%, SD=13.66). Although participants had a lower average percent correct for the lie statements during the nonverbal (M=51.33%, SD=17.29) and verbal cues (M=46.67%, SD=15.22), this difference was not significant.

DISCUSSION

In this study, accuracy during the detection task varied only slightly between the verbal presentation style and the visual presentation style. The accuracy during each presentation style was at chance rate. The frequency of correctly identified truths did not differ significantly across presentation style. Investigators also found insignificant differences between the frequency of correctly identified truths and lies during each presentation style.

Finally, accuracy insignificantly decreased when using the verbal presentation style when compared to the non-verbal presentation style.

Contrary to Vrij, Edward, Roberts & Bulls (2000), and Reinhard (2010), participants who were detecting deception using only verbal cues did not yield higher accuracy frequencies than when using non-verbal cues. Stromwall and Granhag (2003) state that individuals who are detecting lies using non-verbal cues achieve higher accuracy rates than individuals who are detecting lies using verbal cues.

Riggio (1992) and Malcolm and Keenan (2005) support the current findings. Accuracy of deception detection was at chance levels (50%). Participants in the current study did no better than if they were guessing. Even if the participants were confident in their deception detection abilities, accuracy did not change (Malcolm and Keenan 2005).

There were several possible confounds in the current study. The primary possible confound would be the lack of motivation from the participants. Several of the participants were simply pressing buttons and not paying attention to the actual content of the video. Another possible confound is the quality of the video. The video was recorded on a low-end camera so the picture quality was poor. Also, the background of the video recording room may have been cluttered and therefore distracted the participants from the actor in the video.

The sample size, number of statements, and content of the statements could affect the outcome of the study. The study only consisted of 25 participants, which is not an adequate sample size. Malcolm and Keenan (2005) used 112 pre-recorded statements whereas the current study used only 30. Of the 30 statements, four were practice questions. This may have altered the results because participants might not have fully understood the task, therefore more practice questions should be integrated. Finally, the content of the actual statements were too detached from the actor, which resulted in no noticeable emotion to the actor's true or false answers. Other studies suggest that accuracy depends on the severity of the lies. It was revealed that lies that are more severe are easier to detect than less severe lies (DePaulo, Rosenthal, Green, and Rosenkrantz 1982). Due to this, the ability to lie may have also hindered the results. The investigators attempted to account for this by randomly selecting questions the actor never encountered before. Another confound that should be noted is that there was no control group where participants received the verbal and non-verbal cues simultaneously. Vrij, Edward, Roberts and Bull (2005) stated that when using both cues, 80.82% of participants correctly identified true and false statements. A possible future revision of this study controlling these specific confounding variables could result in finding differences between the average accuracy of participants.

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Table 1. A Two-Way Analysis of Variance for Effect of Statement Type (Truthful or Deceitful) and Cue Types (Nonverbal or Verbal) on Accuracy

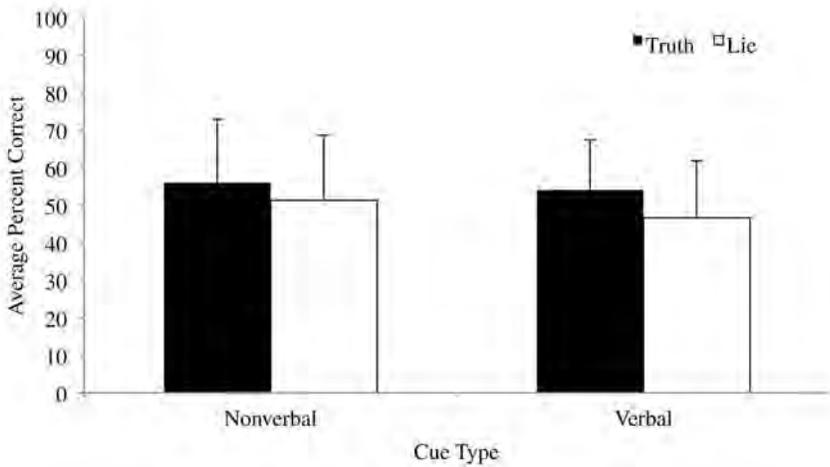| Source	SS	df	MS	F	p-value
Non-Verbal/Verbal	277.69	1	277.69	1.14	0.3
Error	5859.7	24	244.15		
Truth/Lie	900	1	900	2.69	0.14
Error	8032.42	24	334.68		
Interaction	44.41	1	44.41	0.27	0.61
Error	4009.23	24	167.05		
Total	19123.5		1967.98		

Figure 1. The average percent correct (accuracy) of all participants during verbal and nonverbal cues. Error bars represent standard deviation.