The Effects of Spatial and Temporal Video Distortion on Lie Detection Performance

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ABSTRACT

In various types of interactions, individuals may attempt to determine whether their communication partners are being honest or deceptive. Judgments of honesty rely, in part, on assessments of nonverbal behavior. With the increased use of videoconferencing technology, many traditionally face-to-face interactions now take place over sub-optimal video connections. In these connections, reduced spatial and temporal video quality may affect the ability to detect whether others are lying or telling the truth. In the current study we examined the effects of varying levels of temporal and spatial distortion on lie detection performance. Consistent with earlier work, we found that a slight distortion of the video signal impaired lie detection performance. Surprisingly, performance improved when the video was severely spatially degraded.

Keywords

Video Mediated Communication, Lie Detection

INTRODUCTION

In many types of interactions, such as negotiations and job interviews, the ability to detect whether others are being honest or deceptive is important. Improvements in computational power and bandwidth have enabled organizations to conduct these types of exchanges through videoconferencing systems. However, although these technologies are undergoing continuous improvement, most videoconferencing systems provide sub-optimal video signals. Given bandwidth and other constraints, most affordable videoconferencing systems deliver signals that are subject to spatial and temporal distortions. Although these distortions do not significantly hinder the ability to convey meaning, there is a distortion of subtle visual cues. These cues, while not central to understanding, play an important role in the detection of deception [3]. Numerous studies have shown that degrading video quality can have cognitive and perceptual consequences for viewers [4, 5].

In previous work, we have shown that reducing the temporal quality of a video signal can hinder lie detection performance [2]. However, in that work we examined only one level and one type of video distortion. Our goal in the current study is to understand the relative effects of spatial and temporal distortions on the ability to detect deception.

METHOD

Participants

A total of 113 undergraduate and graduate students (57 women) at our university participated in this study. Participants were offered $10 for participating, plus a bonus of up to $10 based on their performance.

Materials

Six female university staff members were videotaped as they took part in mock job interviews. During these interviews, the women were instructed to answer some questions honestly, and others deceptively. Each interview contained 10 sets of questions, half of which were answered truthfully. Interviewees received $20 for their participation, plus a bonus of up to $10 based on performance. The videotapes were then digitized and distorted into the six conditions listed in Table 1. The same high quality audio channel was used in each condition.

Procedure

Participants took part in this Experiment in groups of 1 to 8 in a large computer room. Each participant sat at his or her own computer wearing a pair of stereo headphones. All materials were presented in a web browser. Each participant saw each of the 6 video interviews. Each video was presented in 1 of the 6 conditions listed in Table 1. The sequence and combination of Interviews and Video Qualities were counterbalanced such that each participant saw each interview in a different Video Condition, and that across participants all Interview X Video Condition combinations were assessed.

Participants were told that some of the questions had been answered truthfully, and some deceptively. They were not told how many truthful or deceptive responses there were. For each of the 10 sets of questions in each interview, participants made judgments of the truthfulness or deceptiveness of interviewee responses. These judgments were made using a 6-point Likert scale ranging from

"Definitely Lying" to "Definitely Truthful." Participants received a bonus of $1 for every 10% of accuracy they achieved for a maximum of a $10 bonus.

Table 1 - Experimental Conditions

Condition	Resolution	
	Spatial (Pixels)	Temporal (FPS)
High Spatial; High Temporal	320x240	29.97
Med. Spatial; Med. Temporal	106x80	10
Med. Spatial; Low Temporal	106x80	5
Low Spatial; Med. Temporal	53x40	10
Low Spatial; Low Temporal	53x40	5
Audio Only	320x240	0[a]

[a] There is one still image frame throughout the video.

Analyses

Accuracy scores for each participant were calculated for each judgment, interview, condition, and experimental session. The judgment for a particular item was deemed accurate if it was on the correct end of the Likert scale. That is, lies that were given ratings of 1, 2, or 3 and truths that were rated 4, 5, or 6 on the scale were considered correct, all other responses were incorrect. An Accuracy rate of 50% indicates chance performance. An ANOVA was completed with Video Condition as a fixed factor and Interviewee as a random factor and accuracy as the dependent variable.

Results

Accuracy differed significantly across Video Conditions, ($F(5,25)=3.50$, $p=.016$, $eta^2=.41$)(see Figure 1). Planned contrasts for Temporal and Spatial quality effects indicated that lie detection performance was significantly better in both Low Spatial quality conditions than in the Medium Spatial quality conditions $t(106)=-2.22$, $p=.029$.

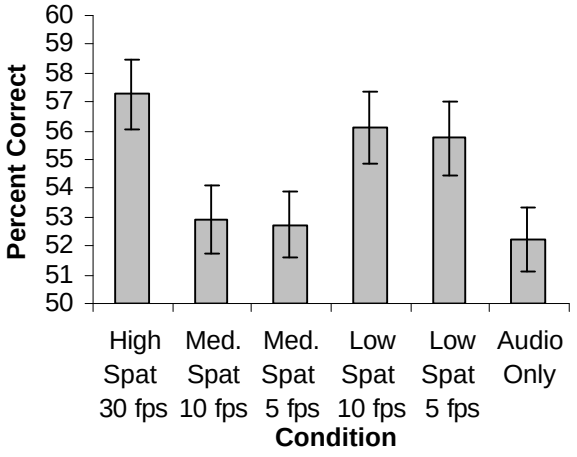

Figure 1 Lie Detection Accuracy by Condition

DISCUSSION

These findings indicate that, while a slight reduction in video quality impairs lie detection accuracy, performance in severely spatially degraded video does not appear to suffer a similar fate. There are two theories that may explain this finding. One possible reason for this finding is that highly degrading the image masks non-diagnostic visual cues. For this explanation to be consistent with the other findings of this study, the presence of a degraded video channel would need to either provide some useful visual cues to deception or serve some sort of orienting function, as performance in the Audio Only condition was rather poor.

An alternative explanation rests on the fact that college students exhibit a truth bias [1]. That is, suspicious participants in lab studies typically categorize approximately 85% of stimuli as truths, while the stimuli are actually evenly split between truthful and deceptive items. It is possible that the lower spatial resolution leads to more negative overall assessments, which would reduce the truth bias and thus increase accuracy as a byproduct of this regression toward the baseline. If this hypothesis were true, it would indicate that perhaps the effects of decreases in spatial resolution could manifest themselves as more negative assessments of others, an interpersonally dangerous concept. Future studies of the truthfulness bias may prove useful in fleshing out this possibility. Given these findings, users of reduced bandwidth videoconferencing technology would be wise to take great caution in relying on assessments of honesty in others.

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