Is Seeing Believing? Detecting Deception in Technologically Mediated Communication

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ABSTRACT
Despite increases in bandwidth, most video conferencing equipment delivers a sub-optimal quality signal. Artifacts caused by video compression and other technological constraints lead to the distortion of subtle communicative cues. This study explores the effects of such video degradation on individuals' ability to detect whether others are lying or telling the truth. Forty-two participants observed mock job interviews presented in High-Quality Audio, High-Quality Audio + High-Quality Video, and High-Quality Audio + Reduced Frame Rate (3 fps) Video. The interviews contained a mix of truthful and deceptive responses, and participants attempted to distinguish the two. Performance in the Reduced Frame Rate condition was significantly worse than in the High Quality Video condition. These findings have implications for both the development and implementation of video-conferencing technology.

Keywords
Video mediated communication, deception

INTRODUCTION
Because direct travel costs are often prohibitive and the overhead of lost time in travel costly, people are using various technologies to support aspects of teamwork. These technologies include fax, transfer of files through attachments in email, document sharing software, and of course audio- and video- conferencing.

In spite of anticipated increases in quality of transmission with advances in video compression and network bandwidth, the problem of video degradation will be with us for a long time. Although corporations and large well-endowed government agencies might be able to afford the future high quality transmission, there will always be organizations that will have lower quality connectivity. Non-profits, community organizations, public educational institutions, and third world economies will be shut out of the high quality connectivity for some time. Even with low cost, high bandwidth, wireless communications, there will be situations where quality of service issues will still be difficult to overcome. As an example, display limitations on handheld devices make high quality video communications extremely unlikely.

As would be expected, subjective judgments of video quality decrease as spatial (i.e., image resolution) or temporal (i.e., frame rate) properties of a video signal decrease [1,4]. Independent of subjective judgments of image quality, people have been shown to exhibit physiological symptoms of stress when presented with a reduced frame rate video signal [6]. In addition, difficulty in the detection of nonverbal cues due to decreased image resolution can lead to confusion in cooperative and competitive tasks [2].

Although nonverbal cues are not central to understanding, they do play an important role in subtle communication tasks such as the detection of deception. Cues associated with perceived deceptive communication include facial expression and adaptors (a class of gesture) [5]. These cues are often masked or distorted by video degradation. Even under the best of conditions, untrained observers typically perform only slightly (but significantly) better than chance in laboratory studies of lie detection [3].

The ability to effectively detect deception is a key component in the very types of interactions (e.g., negotiations) that are routinely being conducted via videoconference. If such interactions leave their participants less able to detect truth from deception, users should at least be informed, and perhaps advised to explore alternative channels of communication. This study investigates the effects of one type of video degradation, reduced frame rate, on the ability of people to detect deception.

METHOD

Participants

42 undergraduate and graduate students, (22 Female) participated in this study. Participants were rewarded based on performance accuracy.

Materials

6 female university staff members participated in mock job interviews. Each interview consisted of 10 sets of questions. Before each set of questions, interviewees were instructed to either lie or tell the truth in their responses. Each interview consisted of 5 sets of truthful responses and 5 sets of deceptive responses. All interviews were videotaped via a camera placed 6 feet away and approximately 1-foot above eye level, focused on the shoulders and head of the interviewee. The interviewer sat across from the interviewee below the camera. This was done to simulate the perspective of a video-conferencing partner.

3 videotapes consisting of 3 sets of 2 interviews each were created. For each videotape, one set of interviews was presented in NTSC quality audio and video ("High Quality Video"), one set was presented with high quality audio only and the screen blackened ("Audio"), the third set of videos consisted of a video signal at 3 fps with high quality audio ("Choppy Video"). The order of the sets and their composition was randomized. Judgments of deception were measured for each set of responses using a 6-point Likert scale ranging from 1 "Definitely lying" to 6 "Definitely truthful."

Procedure

Participants watched 6 interviews, 2 High Quality Video, 2 Audio, and 2 Choppy Video, indicating their judgments of deception for each set of questions.

RESULTS

A Discrimination Score was calculated by subtracting each participant's mean Likert score for deceptive interview items from the mean for truthful items, with a greater Discrimination Score indicating greater success at differentiating lies and truths. These data are presented in figure 1.

Participants were significantly better at discriminating lies and truths in the High Quality Video condition than in the Choppy Video condition ($t(10)=2.11, p=.04$). In concordance with earlier studies, simple accuracy (i.e., the proportion of Likert scores that were on the correct end of the scale) in each condition was significantly (although slightly) better than the 50% that would be predicted by chance (Audio=54.4%, $t(41)=2.53$, $p=.015$; High Quality Video=56.2%, $t(41)=4.78$, $p<.001$; Choppy Video = 55.1%, $t(41)=3.80$, $p<.001$). There were no simple accuracy differences between conditions.

DISCUSSION

These data indicate that signal degradation caused by reduced video frame rate makes it significantly more difficult for people to detect deception in others. These results should give pause to those using such video in sensitive or high stakes interactions in which detecting lies or other subtle communicative cues is important. Future research will investigate the effects of other types of video distortions such as image resolution as well as audio distortion. The ultimate goal of this research is to inform both developers (e.g., to indicate the relative value of spatial vs. temporal resolution in a codec) and users (e.g., provide usage guidelines) of communication technologies.

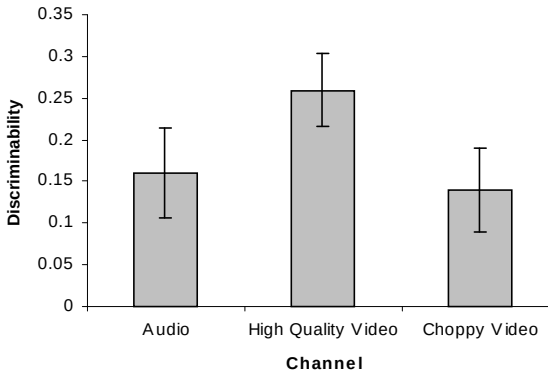

Figure 1 Discrimination Scores by condition

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