

## Trust and Deception in Mediated Communication

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### Abstract

*Guided by interpersonal deception theory and the principle of interactivity, this investigation examined whether communication modalities differentially affect the extent to which group members develop trust or are vulnerable to manipulation and deceit, based on the degree of interactivity the modalities afford. According to the principle of interactivity, involvement and mutuality should increase as one moves from text, to audio and audiovisual (AV) modalities, to face-to-face (FtF) communication. Under nondeceptive circumstances, greater interactivity should elicit corresponding increases in trust and credibility; under deceptive circumstances, it should produce greater truth biases and inaccurate detection of deceit. This effect should be partly mitigated in text and audio modalities due to the presence of diagnostic deception indicators. Pairs were assigned to a truthful or deceptive condition in one of three mediated conditions, or in a face-to-face condition. In the deceptive condition, one member of each pair was enlisted to deceive during the interaction. Following discussion, participants rated their communicative behavior and the credibility of the truthful or deceptive actor. Truth bias and accuracy in judging deceptive information was calculated. Results are compared to previous findings from face-to-face deception. Implications for collaborative technologies are advanced.*

### 1. Introduction

Successful collaboration and teamwork often depend on the manner in which participants exchange and process information [1]. Although many reasons are given for the failure of teams or groups to pool and process their

information resources [see 2, 3, one often overlooked factor is that members may have reasons to withhold or distort information], such as when group members wish to conceal their lack of knowledge, have hidden agendas, possess information they do not wish to share with others, and have other vested interests that result in introducing false, faulty, or misleading information. Under such circumstances, widely held presumptions about the trustworthiness of group members and the truthfulness of their communication [see 4, 5] are no longer valid. Research evidence from the interpersonal realm reveals that as much as one-third of daily conversations include some form of deception, broadly construed to include concealed, evasive, ambiguous, or exaggerated information as well as outright lies [6, 7]. Yet deception often goes undetected in face-to-face (FtF) interchanges, in part because as interpersonal relationships grow, the belief in others' truthfulness also grows [8]. Deception, then, stands as a threat to successful collaborative work.

What happens to trust and deception when such work is technologically mediated becomes an interesting and potentially paradoxical one. Several investigations have shown that distributed work yields weaker interpersonal relationships and less trust than does co-located and face-to-face work [e.g., 9, 10]. Paradoxically, a diminution in trust may cause potential targets of deception to become more skeptical and thus to detect deception more accurately. Alternatively, social identity deindividuation theory predicts that distributed collaborations promote group identity [11]. If individuals develop faith in the group, and lack other individuating information to assist them in making veracity judgments, there is the risk that deception detection will be impaired, making the group more vulnerable to manipulation and performance impairment. These effects may be moderated by the modality under which communication occurs. The

current investigation was undertaken to address not only the question of whether different communication modalities affect trust and users' abilities to discern deception but also how qualitative differences in communication patterns across modalities mediate these effects. Our investigation was guided by interpersonal deception theory and its corollary principle of interactivity, both of which we review next.

## 2. Interactivity in Interpersonal Deception

Interpersonal deception theory [IDT, 6] was initially developed as a propositional framework to account for the nature and success of deceptive interchanges by applying principles of interpersonal communication to the domain of deception. Encompassing a wide range of related communication and psychological principles, the theory illuminates interrelationships among input (preinteractional), process (interactional), and output (postinteractional) variables. From its inception, a central premise of IDT has been that interactive deception is unlike noninteractive deception. The *principle of interactivity* holds that interaction processes and outcomes are systematically influenced by the degree of interactivity that is afforded and transpires [12]. Within the context of deception in interpersonal encounters, interactivity should affect senders' deception displays, ongoing credibility, and receivers' accuracy in detecting deception. For example, being involved in an interaction is fundamentally different from merely witnessing it, and that difference often manifests itself as varying levels of trust and accuracy in detecting deceit [13].

Most extant deception research has been noninteractive: deceivers do not talk to their intended targets. Instead, they lie to a third party or record their lies for later viewing, hearing, or reading by the intended target who is to judge message veracity. Because interactive deception is a dynamic rather than static event, it allows deceivers to modify and adapt their communicative performance to changing circumstances. Compared to noninteractive deception, interactive contexts should give deceivers more opportunities to deliberately monitor, control, modify, and repair the content of their messages, the nonverbal behaviors accompanying those messages, and their overall demeanor. Moreover, underlying FtF interaction is a presumption of truthfulness that creates a truth bias, in which people err in the

direction of perceiving another's communication as truthful rather than deceptive [e.g., 8, 13, 14, 15-18]. This bias is especially common as people become more familiar with one another, a perception that is also fostered by interactivity. The truth bias, coupled with strategic and adaptive communication by senders, should result in higher levels of trust, attributions of sender credibility, and poorer recognition of sender deceit by receivers.

## 3. The Principle of Interactivity

Within the context of mediated communication, the term "interactive" has referenced a wide array of phenomena but typically refers to the structural features, or affordances, that are "built into" a given communication interface or modality and that enable ("afford") multiple, tightly interwoven conversational exchanges and a sense-making process that references current and prior messages. For example, technologies that allow synchronous (same-time), participatory, and contingent interaction are said to be interactive; those that interpose time delays between message transmissions, that place users in an observer or eavesdropper role, or that fail to provide responses that are directly related to prior transmissions are said to be noninteractive. This definition, though quite serviceable for many purposes, only scratches the surface of the complex nature of interactivity. Interactivity actually comprises a constellation of properties, one or more of which may be the operative feature leading to the effects ascribed to the general term "interactivity." One such property may be the extent to which interactants have multiple sensory modalities through which to exchange verbal and nonverbal cues and hence, to create a tighter interpersonal web of related messages. As communication technologies move from FtF to mediated formats, and from mediated formats with full access to visual, auditory, tactile, and other sensory information to ones in which some modalities are absent, communicators have fewer sensory channels that are engaged and available to "interact" with one another. This can create, in the short-run at least, a chain reaction of dampened involvement, weakened interactional coordination and synchrony, reduced sense of mutuality, and diminished exchange of individuating social information. Structural affordances, then, have the potential to amplify or reduce interactivity by virtue of affecting the qualitative properties of

communication contained therein. As for the qualitative properties associated with the interaction process itself, those that appear to be the sine qua non of interactive communication include involvement (the degree to which users feel cognitively, affectively, and behaviorally engaged in the interaction), mutuality (the extent to which users perceive and create relational connection, interdependence, coordination, and understanding with one another), and individuation (the degree of distinctive, personal knowledge of another that sets that person apart from others). Interactivity, then, can be judged by the extent to which the communication process is involving, evinces behavioral patterns and perceptions of mutuality, and entails exchange of individuating information.

Interactivity in itself is neither virtue nor vice. The principle of interactivity merely postulates that the degree of interdependent, contingent, participative and synchronous interaction afforded by a communication interface and/or experienced by users will systematically and substantially affect communication processes and outcomes, including social judgments such as trust, honesty, and other facets of credibility. In the case of truthful interchanges, higher interactivity may be associated with higher trust and perceived credibility. Conversely, in the case of deceptive interchanges, higher interactivity may be associated with higher truth biases and failure to detect deception. We consider these two respective circumstances in more detail next.

#### 4. Interactivity When Deception is Absent

It is of course impossible to claim that a given interaction is devoid of deceit, in light of the substantial estimates of how much lying, fibbing, exaggerating, concealing, equivocating, and the like take place in routine conversation [19, 20]. Nevertheless, we can speak of circumstances under which deceit is neither highly probable nor actively introduced. Under these “normal” conditions, the question is the extent to which communication modality moderates interactivity and ensuing trust and truth estimates. We have already noted that the paradigm case of interactivity is one characterized by high involvement and mutuality (among other qualities). The more participants become engaged in the interaction, establish feelings of connection and similarity, share a sense of the other as “present” and receptive, and feel understood, the more likely they

will create the kind of coordinated, synchronized interaction that, at its most effortless, evokes a mutual flow of consciousness [21]. Empirical evidence confirms this: higher degrees of involvement and mutuality have been shown to create more favorable perceptions of one's partner or group [22]. Consequently, communication interfaces that create more involvement and perceived mutuality should foster more trust and attributions of truthfulness between participants.

Research by several investigators [e.g., 12, 23] has shown that trust is higher under FtF than CMC, and should produce more favorable attributions about another's sincerity and honesty. Among CMC modalities, there is evidence [24, 25] that the auditory channel has unique advantages relative to text in synchronizing and pacing interaction in a way that sustains involvement and facilitates comprehension, revealing receiver states that serve as back-channel feedback about receiver understanding and reactions, and through turn-taking mechanisms, creating a coherently threaded discourse. Because both audio and AV modalities include oral speech, the organizing and pacing properties of the voice may confer benefits on both of these CMC modalities, although there is some reason to believe that removing visual distractions may actually promote more personalized, “hyperpersonal” communication than when visual cues are present [26]. Thus, under CMC conditions, when vocal cues are available, trust and attributions of truthfulness should be higher than when they are absent.

#### 5. Interactivity When Deception is Present

The very features assumed to promote interactivity also promote truth bias. Mutuality and involvement contribute to leniency and truth biases in making judgments of another's credibility, and with truth bias comes lowered accuracy in detecting deceit because telltale indicators of deceit are overlooked, ignored, or discounted in favor of believing the person is telling the truth. So, all else being equal, conditions that create the highest mutuality should be the worst for detecting deceit. In FtF contexts, deceivers have been shown to deliberately and successfully modify their performances over time, in part because they respond to any observed skepticism on the part of receivers by working harder to appear normal, engaged, and pleasant. If mediated

communication attenuates not only the sense of mutuality and level of involvement but also the total available amount of feedback, then deceivers may not accrue the same advantages present in FtF. Thus, those mediated conditions that foster highest mutuality should be the same ones that create the highest trust and truth biases and the least accurate detection of deception.

But, all else is not equal. Additional factors are also at work. It has been argued, and demonstrated empirically, that deception is often a more difficult task than telling the truth [6]. It requires more mental “heavy lifting,” hence is referred to as creating more cognitive “load” than truth-telling because of the demands of creating plausible and coherent verbal messages while also monitoring and managing accompanying nonverbal behavior and weaving it all into a congruent whole. To the extent that the act of deceit creates more cognitive load for message senders, deceivers should experience more challenges in putting together a credible deceptive performance than a truthful one. The question, then, is whether the degree of interactivity afforded by different communication modalities eases or exacerbates this load.

FtF might be thought to have highest load because of the number of verbal and nonverbal channels and features needing to be managed. But the same demands apply to message receivers as well as senders, and deceivers have been shown to be rather adept at managing deceit under these conditions. For deceivers, as the number of channels to manage decreases, the management tasks should also decrease, allowing them to turn their attention to more careful management of those that remain. Additionally, fewer channels means fewer opportunities for channel discrepancies, which have been shown to be more common under deception than truth and which can tip off receivers to the presence of deceit. Moreover, when communicating via text, senders also have opportunities to plan and edit their messages before transmitting. This brief time lapse between sender and receiver messages—a slight bit of asynchronicity, if you will—relative to the immediate conversational turn-switching required under FtF, audioconferencing and videoconferencing modalities gives senders a further advantage and receivers a further disadvantage. Deception detection, then, might be the least accurate under text conditions for receivers untrained in the subtle, inadvertent deception indicators available in text. Finally, although senders do attempt to control the verbal and nonverbal features of their deceptive

communication, they are commonly less prone to monitor and successfully manage their voice than their face and body, so the audio channel leaks indicators to deceit, some of which elicit suspicion from receivers [27, 28]. Thus, among mediated conditions, receivers may be most successful at detecting deceit when using audio-based formats (such as cell phones and audio-conferencing) and least successful when using text formats (such as email and instant messaging).

## 6. Hypotheses and Research Questions

In the experiment to be reported, participants completed a decision-making task either FtF or under one of three distributed, mediated conditions: text, audio, or audiovisual (AV). In addition, dyads were randomly assigned to either a deception or truthful condition. In the former, one of the participants was instructed to provide deception information to his or her partner, whereas participants in the truthful condition were simply allowed to act normally. If the principle of interactivity holds, and visual and auditory nonverbal cues provide for richer interactions characterized by high involvement and mutuality, then conditions should be most favorable for high degrees of involvement and mutuality as one moves from text to audio and AV to FtF modalities. Because the special properties of oral communication—e.g., interactional synchrony, pressure to tightly link conversational turns, greater message comprehension, and rapid exchange of information—may be sufficient to overcome any deficits from losing visual cues, we left as a research question whether the AV modality affords more interactivity than the audio-only condition. Thus, we hypothesized as follows:

*H1: Involvement and mutuality are greatest under FtF communication, followed by AV and audio forms of mediated communication, and lastly, text.*

*RQ: How do the audio and AV modalities compare on involvement and mutuality?*

IDT predicts that the introduction of deception should adversely impact senders’ performance during the early stages of the interaction, leading to behavioral patterns of reduced involvement and deviations from normal behavioral patterns that can trigger suspicions. Conceivably, receivers attuning to such behavioral abnormalities may feel less mutuality. However, IDT holds that such difficulties should be transitory, as deceivers adjust to receiver feedback. In the current experiment, deception was also only present during

the first task. Thus, Hypothesis 2 sought to assess the adverse impact of deception on interactivity and the extent to which it would persist or disappear after the first task by positing a deception by time interaction: *H2: Relative to truth-tellers, deceivers (a) exhibit lower involvement and mutuality initially in interactions and (b) converge toward truth-tellers' levels of involvement later in interactions.*

Given our stance that modalities merely create favorable or unfavorable conditions for involvement and mutuality to materialize and that it is these communication properties of interactivity that are truly responsible for resultant outcomes; and, given our previous findings that higher involvement and mutuality are associated with more favorable social judgments, a natural corollary is as follows: *H3: Trust and truth estimates are positively correlated with involvement and mutuality.*

It follows, then, that under nondeceptive conditions, trust and truth estimates should increase as one moves from text to audio and AV to FtF modalities. However, adding deception to the mix may modify this rank-ordering because the diagnosticity of deception indicators available in the text and audio channels should partially offset the interactivity effects. Thus, under deceptive conditions, trust, truth estimates, and truth bias should be greatest in the FtF condition followed by the AV and then the text and audio conditions. This deception by modality interaction is reflected in Hypotheses 3 and 4. Under nondeceptive conditions, it makes little sense to speak of truth biases, because we would expect all estimates to be in the upper end of the spectrum based on a combination of the actual veracity of the messages and the truth bias [29]. But, in the deceptive condition, it becomes useful to know the extent to which estimates are actually above the midpoint of a truth estimate scale and thus constitute absolute truth biases. Consequently, H4 was worded in terms of truth bias.

*H4: Under nondeceptive conditions, trust and truth estimates are (a) higher under FtF than mediated communication and (b) higher under AV and audio than under text communication.*

*H5: Under deceptive conditions, trust and truth biases are (a) higher under FtF than mediated communication and (b) higher under AV than audio and text communication.*

## 7. Method

### 7.1 Sample

Participants ( $N=128$ ) were undergraduate students, recruited from a mass-lecture communication course at a large southwestern university, who received extra credit for their participation. Participants were paired to form 64 same-sex dyads.

### 7.2 Independent Variables

The experiment was a 4 (Modality) x 2 (Truth/Deception) design with cells balanced by gender. The four modalities consisted of (1) FtF, (2) text, (3) audio, and (4) AV communication. In the FtF condition, participants were seated in caster armchairs facing one another, with separate computer terminals available nearby for each to complete written materials. Participants in the mediated conditions reported to separate locations in the same building and interacted via the Microsoft NetMeeting program. In the text condition, they were seated at computer terminals in separate rooms and communicated via the chat window. In the video condition, in place of the chat window, two small windows presented the participants with a view of their partner as well as the image of themselves being transmitted. The audio signal was transmitted via computer as well. In the audio condition, the video link and chat window were disabled. In mediated conditions, participants were unaware of the proximity of their partner (i.e., that he or she was located in the same building).

Truth/deception was manipulated by randomly assigning participants to the truth or deception conditions. Within the deception conditions, one member of each dyad was randomly assigned the role of deceiver (designated as Person A) and given special instructions. The other (Person B) received no special instructions.

### 7.3 Procedures

Participants, randomly assigned the role of Person A or Person B, reported to separate rooms in the Communication Research Lab (CRL). The CRL consists of four interaction rooms which are networked via TCP/IP and Ethernet. Each room contains a Pentium computer, Connectix video camera, and video-conferencing software. After completing consent forms and the Social Skills Inventory [30] in their respective intake rooms, Persons A who were randomly assigned to the deception condition received their deception

instructions. Persons A and B in the FtF condition were then brought together in one of the interaction rooms. Those in the mediated conditions remained in their respective locations.

All participants next received instructions for conducting a “get-acquainted” social task in which they were to discuss, in order, a series of topics printed on index cards. Topics included....Discussions lasted approximately 10 minutes. At the conclusion of this discussion, participants completed a Web-based questionnaire. They then proceeded to conduct a second, decision-making task which consisted of an interactive management case study on employee motivation [31]. No deception occurred during this task. At the conclusion of this task, participants again completed a Web-based questionnaire. They were then scheduled to conduct a third task a week later (results of which are to be reported elsewhere), after which they were debriefed and thanked.

#### 7.4 Pre-Interaction and Post-Interaction Measures

All measures used were modified from previous IDT and interactivity studies. To measure interaction involvement, participants rated perceived involvement with four Likert-format items taken from Burgoon and Hale’s [32] Relational Communication Scale (coefficient alpha reliability = .82 and .87 after the first and second tasks, respectively). To capture the range of possible perceptions that might correspond to mutuality, participants also rated partners on four receptivity/similarity items from the RCS (reliabilities = .80 and .81) and three items from McCroskey, Hamilton, and Weiner’s [33] homophily scale (reliabilities = .88 and .92). To these measures were added Aron, Aron, and Smollan’s [34] pictorial instrument, which uses seven increasingly overlapping circles to depict degrees of perceived connectedness, and three items from Cahn and Shulman’s [35] Feelings of Understanding/-Misunderstanding Scale (reliability = .66 and .79). Involvement and mutuality were measured immediately after the social get-acquainted task and again after the decision-making task.

Assessments of the partner trust, completed after the get-acquainted task, utilized items taken from credibility measures developed by McCroskey, Hamilton, and Weiner [33] and Wheelless and Grotz [36]. The specific attributes of truthful, trustworthy, high character, and very credible obtained coefficient

alpha reliability of .75. Estimates of partner truthfulness during the get-acquainted discussion were obtained at the conclusion of the session’s tasks so as not to create any reactivity during the decision-making task (during which no deception took place). Participants rated on a 0 (not at all truthful) to 10 (completely truthful) scale their partner’s honesty on each of the four topics.

## 8. Results

### 8.1 Hypotheses 1 and 2

Communication process measures are typically highly intercorrelated and more parsimoniously understood as a set of interactivity indicators. Thus, we initially tested the H1 and H2 variables as a set to determine if the measures collectively showed modality and deception effects. Analyses were conducted on ratings taken immediately following the get-acquainted task and also at the end of the session, after completing the decision-making task. The latter measures assess persistence over time. The initial analysis was a 4 (modality) x 2 (deception) x 2 (time: first and second administrations of the measures following each task) x 2 (role: Person A or B) x 5 (dependent measures) repeated measures analysis of variance, with the last three factors repeated. (Dependent measures were included as a factor in the statistical analysis to control for multicollinearity and to pinpoint where differences existed among measures.) Where there were violations of compound symmetry conditions (e.g., a significant Mauchly’s test of sphericity for measure), we used Huynh-Feldt adjusted degrees of freedom in the averaged univariate analyses. The five dependent measures included involvement and the four mutuality measures of connectedness, feeling understood, homophily, and receptivity.

In preface, the initial omnibus analyses produced several significant within-subjects effects that place the hypothesized effects in context. First, there was a significant effect for time,  $F(1,94) = 17.26, p < .001, \text{partial } \eta^2 = .16$ , showing that, regardless of condition, involvement and mutuality increased over time. A significant measure by time interaction,  $F(3.40,319.48) = 13.47, p < .001, \text{partial } \eta^2 = .12$ , revealed differential changes across the two tasks for the different measures. A significant measure by modality interaction,  $F(8.67,272) = 3.36, p = .001, \text{partial } \eta^2 = .10$ , indicated that the modality effects differed by measure. Finally, there was a

deception by measure interaction,  $F(3.18,305.18) = 9.71, p < .001$ , partial  $\eta^2 = .09$ , and deception main effects after the get-acquainted task,  $F(5,92) = 2.76, p = .023$ , partial  $\eta^2 = .13$ , and after the decision-making task,  $F(5,94) = 5.30, p < .001$ , partial  $\eta^2 = .22$ . The latter, in addition to supporting H2, argued for conducting the contrast tests for H1 separately within truth and deception conditions. The focused contrasts that corresponded to H1 were then conducted on the individual measures averaged across the two time periods. The 3 df contrasts followed a modified Helmert contrast scheme: the first compared FtF to the mediated conditions, the second compared audio and AV to text, and the third compared AV to audio. We used a  $p < .05$ , one-tailed, criterion for the first two directional comparisons (which is the same as  $p < .10$ , two-tailed) and a  $p < .05$ , two-tailed, criterion for the third, nondirectional one.

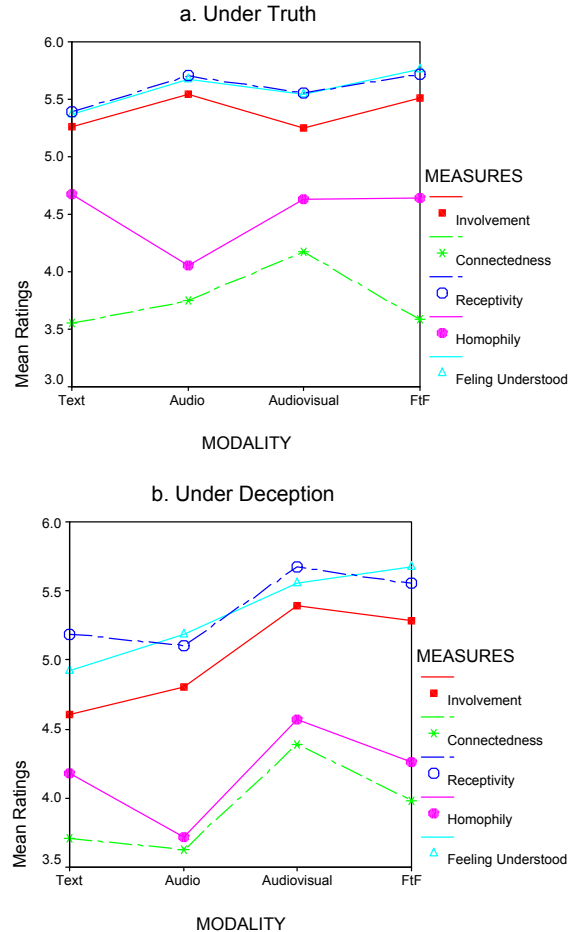
Means shown in Table 1 reveal that the first contrast was significant for involvement and feeling understood within the deception condition; it was not within the truth condition. The second contrast, comparing audio and AV to text, was significant for the same two measures under deception on both the averaged measures and measures collected immediately after the get-acquainted task, and also on connectedness under truth (first task only). The third contrast, comparing audio to AV, was significant for all measures except understanding under deception and for homophily and involvement on the averaged measures under truth plus on receptivity after task one. (Figures 1a and 1b show the effects of modality on each of the measures, averaged across time.)

Table 1. Means and standard deviations for all measures, averaged across tasks.

MEASURE	Mode	Truth		Deception	
		Mean	SD	mean	SD
Connectedness	Text	2.93	.98	4.29	1.12
	Audio	4.00	1.31	4.04	1.16
	AV	4.15	1.13	4.81	1.32
	FtF	3.63	1.23	3.92	1.12
Receptivity	Text	5.49	1.15	5.50	1.00
	Audio	5.88	.89	5.44	.56
	AV	5.44	.83	5.80	.94
	FtF	5.79	.84	5.66	.79
Homophily	Text	4.44	1.13	4.28	1.38
	Audio	4.38	1.02	3.80	1.13
	AV	4.66	.92	4.48	1.57
	FtF	4.97	1.24	4.23	1.02
Understanding	Text	5.43	1.06	5.07	1.12

Involvement	Audio	5.77	.82	5.43	.62
	AV	5.52	.46	5.61	.95
	FtF	5.78	.91	5.71	1.03
	Text	5.39	.99	4.76	1.15
Trust	Audio	5.59	.83	4.87	.70
	AV	5.33	.57	5.40	.89
	FtF	5.56	1.08	5.33	1.08
	Text	5.36	1.07	4.98	1.18
Truth Estimate	Audio	5.89	1.04	5.11	1.11
	AV	5.56	.78	5.72	.64
	FtF	5.39	.96	5.48	1.02
	Text	7.18	3.04	8.33	1.91
	Audio	8.52	1.81	7.07	2.33
	AV	9.08	.88	8.13	1.44
	FtF	8.06	2.15	7.85	2.08

Figure 1. Effects of modality on involvement and mutuality under truth (a) and deception (b).



Involvement and feeling understood were higher under FtF than under mediated conditions and under audio and AV than text when deception was present. Moving from FtF to leaner modalities

produced corresponding declines in the interactive qualities of involvement and feeling understood when one partner had engaged in deception, indicating that availability of nonverbal cues was relevant in establishing a sense of involvement and mutuality under such conditions. Interestingly, those effects persisted beyond the deceptive task to a nondeceptive one. Although the patterns were quite similar under truth (as evident from the figures), these same effects did not reach statistical significance. Only feelings of connectedness differed, being higher under AV and audio than text. Thus, Hypothesis 1 received far more support under deception than truth.

H2 predicted that deception would initially dampen involvement and mutuality but that deception and truth would converge by the end of the second task. The hypothesized interaction did not obtain. Instead, deception reduced involvement and mutuality relative to truth but its effects continued to persist beyond the initial task, despite the fact that deception was no longer present. The impact was most applicable to involvement,  $F(1,96) = 4.30$ ,  $p = .041$ , partial  $\eta^2 = .04$ , after the get-acquainted task, and to involvement,  $F(1,98) = 3.85$ ,  $p = .05$ , partial  $\eta^2 = .04$ , connectedness,  $F(1,98) = 7.81$ ,  $p = .006$ , partial  $\eta^2 = .07$ , and homophily,  $F(1,98) = 2.72$ ,  $p = .10$ , partial  $\eta^2 = .03$ , after the decision-making task (see Table 1 for means averaged across the two tasks). In sum, H2 was partially supported: Deception lowered interactivity in terms of involvement, felt similarity, and felt understanding. Contrary to the hypothesis, these effects continued past the deceptive task, with the exception that the changes across questions in the effects of deception under text did demonstrate some temporal adjustments in favor of deceivers becoming less detectable as the interaction progressed.

The research question asked whether audio or AV modalities would elicit more interactivity. The focused contrast tests comparing audio to AV indicated that under truth, involvement and homophily were higher under audio than AV yet under deception, all measures except understanding showed higher ratings under AV than audio.

## 8.2 Hypothesis 3

Hypothesis 3 predicted that involvement and mutuality measures would be positively correlated with trust and with truth estimates. Correlations were computed between trust and the involvement and mutuality measures, which were taken following each task, and with truth estimates, which were taken

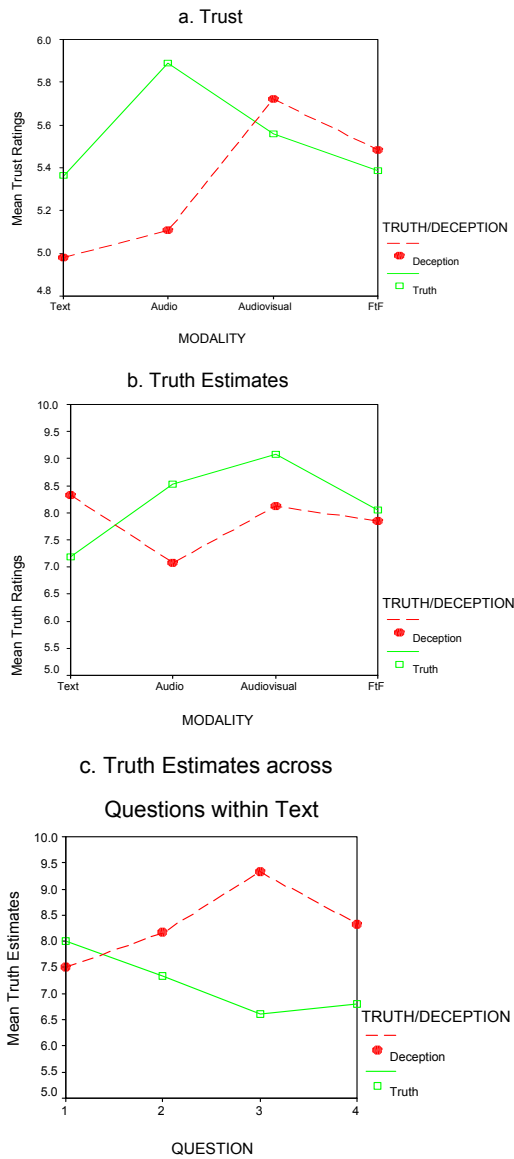
at the conclusion of the session (so as not to introduce suspicion during the case study task). They were calculated separately for Persons A (who included deceivers) and Persons B. This hypothesis was fully supported for both criterion measures and for both roles. Trust and truth estimates were higher, the more participants felt involvement and mutuality with their partners. Feelings of understanding and receptivity showed especially strong relationships to trust and truth bias. (Table of contrast tests available from authors upon request).

## 8.3 Hypotheses 4 and 5

Hypotheses 4 and 5 were tested on Person B data only, inasmuch as half of those in the Person A role were deceivers. Although there was no modality by deception interaction on either trust or truth, there was some support for the hypothesized relationships in the simple effect tests. H4b (truth condition) received support in that the AV and audio conditions elicited higher truth estimates than the text condition,  $t(49) = 2.28$ ,  $p = .01$ , one-tailed. Contrary to H4a, FtF did not elicit higher truth ratings. Related to H5b (deception condition), trust and truth estimates did not differ between FtF and mediated conditions or between text and the other two mediated conditions. However, the AV condition elicited more trust than the audio condition,  $t(55) = 1.75$ ,  $p = .04$ , one-tailed. Moreover, simple effect tests *within modality* between truth and deception revealed that trust was much higher under truth than deception when participants interacted within the audio modality,  $t(28) = 2.00$ ,  $p = .03$ , one-tailed. Truth estimates were also much higher under truth than deception within audio,  $t(24) = 1.75$ ,  $p = .04$ , one-tailed, and within AV,  $t(29) = 2.11$ ,  $p = .02$ , one-tailed, indicating that believability suffered under these modalities when deception was present. These patterns are shown in Figures 2a and 2b. Finally, the text condition produced a question by deception interaction,  $F(3,75) = 3.36$ ,  $p = .02$ , such that the last two questions were actually judged as *more* truthful under deception than under truth when participants interacted via text (see Figure 2c). In other words, *deceivers* were more successful over the course of time in creating believable text messages than were truthful participants. In sum, modality did influence believability. Under nondeceptive circumstances, participants were best served in appearing trustworthy and truthful when using audio or AV modalities. However, under deceptive circumstances, trust dropped under the audio

modality, and truth estimates were lower under both audio and AV, indicating that these modalities were more revelatory of 0deception than were the other conditions. And, deceivers were actually more believable under text as questioning progressed, indicating that this was the least "leaky" modality for revealing deceit and therefore the one that was best for evading detection.

Figure 2. Effects of Deception and Modality on (a) Trust and (b) Truth Estimates across Modalities and (c) across Questions within Text.



## 9. Discussion

Ever since researchers have been comparing

FtF to mediated forms of communication, there have been disputes about whether FtF communication is a necessary and/or sufficient condition for creating trust, group morale, and effective group performance. In many cases, in straight FtF to text-based CMC comparisons, CMC has fallen short, leading to the conclusion that some form of FtF, either as the sole means of communication, or as a prerequisite to CMC, is needed for groups to establish common ground, solidarity, and trust [see, e.g., 23].

The current investigation disputes these claims. Clearly, participants in this investigation were able to establish trust and mutuality without meeting face-to-face. In fact, across all conditions, involvement and mutuality increased over time indicating that even in mediated formats, as people get to know one another and become accustomed to interacting with each other, they can share a connection that influences their perceptions of one another. Further, a close examination of the means in Table 1 reveals that participants in mediated formats established *greater* involvement, mutuality, and trust than those in the FtF modality under some conditions. This stands in contrast to earlier claims that to create trust and mutuality, individuals must meet FtF.

Tests of the interaction of modality and deception produced some of the most informative results regarding the conditions most likely to engender trust and the conditions most likely to impair deception detection. Under "truthful" conditions, the two mediated modalities that include oral speech--audio and AV-- generated the most trust; and the three that include both auditory and visual nonverbal information--audio, AV, and FtF-- elicited highest estimates of truth. The audio modality was especially facilitative of trust perceptions. Text suffered by comparison. On average, trust and truth estimates were the lowest under text communication. This modality, then, is not the optimal choice when the objective is to achieve trust among interactants. When text is the only choice, one must be cognizant that trust is more fragile than under other modalities and may require extra measures to bolster such trust. Of course, as the interactivity results show, the key is in creating involvement and mutuality among participants.

When deception was introduced, it also generally had a dampening effect on judgments. Even so, truth bias was still evident in that all truth estimates were above the midpoint of the range. conditions. Thus, the tendency for CMC users to believe fellow users persists, even though users seem

to recognize at some less-than-conscious level that something is amiss. The modality under which truth bias was least acute and where trust also plummeted was the audio channel. This means that the audio channel is a "leaky" channel, one in which CMC users are most likely to detect deceit. Comparatively, the condition in which audio cues are absent, i.e., text, was the least likely to detect deceit. Even though trust was also at the lowest level in this condition, deceivers were more believable than truth-tellers under this modality, especially on later questions, making it perhaps the most ripe for manipulation and misuse. Also, consistent with the "seeing is believing" visual bias, the channels in which visual information was available (AV and FtF) offered relatively poor discrimination between truth and deception, suggesting that visual information may serve as a distraction or source of misdirection when one user is deceiving others. Therefore, more is less; the more visual information available, the less accurate the detection of deceit.

This investigation challenges some traditional beliefs in the CMC literature. First, it demonstrates that FtF communication is not essential for establishing trust or mutuality and that mediated formats can be used successfully for group tasks or establishing interpersonal relationships. In fact, in many cases, CMC modalities are on a par with or even superior to FtF for these goals. Second, this research demonstrates that FtF is neither the ideal venue for detecting deceit nor for perpetrating it. Results show that FtF conditions did not elicit higher truth ratings than CMC, indicating that the truth bias is active even in mediated formats. The FtF truth and deception conditions also did not differ from one another on trust and truth estimates, indicating that FtF interaction would be the effective modality for discriminating truth from deception. By comparison, the audio condition appears to be the ideal condition for detecting deceit in that interactants had the most trust for truthful senders and the least trust for deceptive ones under this modality. Third, the variability across the modalities in differentiating truthfulness and trust indicates that future investigators cannot simply compare FtF messages to CMC (often tested only as text). We must separate out different forms of mediation, and must not combine different formats or compare different formats across studies under the global heading of CMC. A high-priority research issue must be establishing what aspects of various modalities contribute to interactivity, rather than assuming that FtF must be replicated in CMC.

## 10. References

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