

When what you type isn't what they read: The perseverance of stereotypes and expectancies over e-mail

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Received 14 January 2004; revised 19 August 2004

Available online 5 November 2004

Abstract

People form impressions of others by communicating with them, but not all modes of communication transmit information with equal fidelity. E-mail, for instance, is an inherently more limited mode of communication than is voice because of its relative lack of paralinguistic and non-verbal cues. The present research investigated the implication of this distinction for the biasing influence of stereotypes and expectancies. Three experiments demonstrated that racial stereotypes and bogus expectancies influence people's impressions of a target more strongly over e-mail than voice interactions (Studies 1–3). This occurred despite an experimental design that ensured that the word-for-word content was constant across the two mediums. Follow-up analyses revealed that the effect was due, at least in part, to the greater ambiguity of e-mail versus voice communication (Study 3). Although e-mail affords many benefits, the present research suggests that it may also have some unexpected costs.

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Keywords: Stereotypes; Impression formation; Communication; Communication medium; E-mail; Ambiguity

People experience the world with their senses but interpret it with their brains. Whether a person is selfish, a lion is aggressive, or a fire is dangerous is therefore partly determined by what the person, lion, or fire does, but also by our pre-existing stereotypes and expectancies about people, lions, and fires. Two equally sighted people may therefore watch the same event and “see” two very different things (Hastdorf & Cantril, 1954). Indeed, research on topics as diverse as memory, person perception, and the (in)effectiveness of subliminal “self-help” tapes demonstrates that what people see is a function, at least in part, of what they expect to see (Brewer, 1988; Fiske & Neuberg, 1990; Higgins, 1996; Pratkanis, Eskenazi, & Greenwald, 1994; Ross, 1989; Srull & Wyer, 1979, 1980).

Of course, the influence of expectancies is far from total, and varies as a function of stimulus ambiguity. As a general rule, the more ambiguous the stimulus, the more expectancies guide one's interpretation of that stimulus (Gilovich, 1991; Higgins, 1996; Kunda & Sherman-Williams, 1993; Locksley, Borgida, Brekke, & Hepburn, 1980; Srull & Wyer, 1979, 1980). The ambiguous figure “13,” for instance, is interpreted as the letter “B” when it appears in the series “A, 13, C” but as the number “13” when it appears in the series “12, 13, 14.” The word “thirteen,” in contrast, is impervious to this context effect because its meaning is perfectly clear. Similarly, an aggressive tackle might be interpreted as “unnecessary roughness” when committed by a black-uniformed Oakland Raider—but as a legitimate hit when delivered by an aqua-clad Miami Dolphin—because of the stereotype that “bad guys wear black” (Frank & Gilovich, 1988). A 30-foot kick through the uprights, in contrast, would presumably be recognized as a field-goal regardless of

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whether the kicker's uniform is black, aqua, or pink with yellow polka-dots.

The present research tested the implications of these observations for everyday communication, and in particular, everyday *electronic* communication (e-mail). If the influence of expectancies varies as a function of ambiguity, then all else equal, expectancies and stereotypes ought to influence impressions formed over e-mail more than impressions formed via vocal communication. E-mail is, after all, an inherently more ambiguous mode of communication than is voice because of e-mail's lack of paralinguistic and non-verbal cues (Bargh, 2002; Kiesler, Siegal, & McGuire, 1984; Kruger, Parker, Ng, & Epley, in press; Ramirez, Walther, Burgoon, & Sunnafrank, 2002; Sherman et al., 2001; Spears, Postmes, Lea, & Wolbert, 2002; Sproull & Kiesler, 1986; Walther, 1996). Although the importance of non-verbal communication is sometimes overstated (Krauss, 1981), the fact remains that a great deal of communication depends not only on *what* is said but also *how* it is said (Archer & Akert, 1977; Depaulo & Friedman, 1998). Paralinguistic cues such as gesture, inflection, pronunciation, vocal expression, fluency, and tone are each important clues to a speaker's meaning—and personality. As a result, impressions can be difficult to convey in electronic forms of communication (Ramirez et al., 2002; Walther, Anderson, & Park, 1994). As Wallace (1999, p. 28) put it,

“Managing your own impression on the internet is like navigating white water with two-by-fours for oars. Your impression management toolkit is strangely devoid of the tools most familiar to you... Your commanding voice is silenced...”

This silence led us to predict that expectancies—whether derived from stereotypes, bogus preconceptions, or misleading first impressions—ought to influence impressions formed through e-mail interactions (or any text-based communication, for that matter) more strongly than impressions formed through voice interactions.

Despite the intuitive appeal of this prediction and its obvious practical importance, there are at least two reasons to question it. First, it is well known that people evaluate the validity of stereotypes and expectations, and hypotheses in general, by trying to confirm them (Snyder, Tanke, & Berscheid, 1977; Nickerson, 1998). As a result, ambiguous information—that is, information that both supports and contradicts a hypothesis—tends to be construed in a manner consistent with the hypothesis (Ditto, Scepansky, Munro, Apanovich, & Lockhart, 1998; Dawson, Gilovich, & Regan, 2002; Klayman & Ha, 1987; Lord, Ross, & Lepper, 1979). This suggests that providing additional information about a person might *increase* one's reliance on stereo-

types and expectancies, at least if the additional information is sufficiently ambiguous. Indeed, participants in one well-known study were more likely to base their judgments of a child's intellectual ability on her socioeconomic background when participants also watched a videotape of the child performing inconsistently—both very well and very poorly—in a separate test situation (Darley & Gross, 1983). This presumably occurred because the videotape was sufficiently ambiguous with respect to the child's academic ability to be construed in a stereotype-consistent manner (Kunda & Sherman-Williams, 1993). In much the same way, the additional information conveyed in voice communication might be similarly construed in a hypothesis-consistent manner. If so, people might be *more*, rather than less, likely to rely on stereotypes and expectancies when communicating with their voice versus e-mail.

Second, it is also well known that people are reluctant to rely solely on stereotypes and expectancies because of their perceived invalidity and inequity (Leyens, Yzerbyt, & Schadron, 1992; Locksley et al., 1980; Locksley, Hepburn, & Ortiz, 1982; Yzerbyt, Leyens, & Schadron, 1997). Although most people share the stereotype that lawyers are more sociable than bankers, few would advocate basing a personality judgment solely on a person's occupation. However, as people learn more about others—or *think* they learn more about others—they feel more licensed to make stereotype-consistent judgments (Yzerbyt, Schadron, Leyens, & Rocher, 1994). To the extent that the added non-verbal information associated with voice affords a similar license, this suggests that individuals might be more likely to be influenced by their expectancies and stereotypes when they communicate with their voice than when they communicate via e-mail.

Taken together, these two findings suggest that all else equal, people may be more, rather than less, likely to utilize stereotypes and expectancies in voice versus e-mail communication. But all else, we offer, is not equal. A long line of research suggests that spontaneous non-verbal cues are often a reliable guide to an individual's personality, abilities, and even sexual orientation (for a review, see Ambady, Bernieri, & Richeson, 2000). Indeed, even very brief or degraded exposures to non-verbal cues can lead to surprisingly accurate judgments of a target's dispositions, traits, and abilities (Albright, Kenny, & Malloy, 1988; Ambady, Hallahan, & Rosenthal, 1995; Costanzo & Archer, 1989; Zebrowitz & Collins, 1997). If so, then compared with e-mail, voice ought to provide more individuating information than e-mail, and as such, ought to be less susceptible to the biasing influence of expectancies and stereotypes (Hilton & Fein, 1989).

We conducted three experiments to test these hypotheses. In each, participants' expectations about a person whom they were to “interview” over e-mail or over

the phone were experimentally manipulated. In Experiment 1, we led participants to believe that the target was either intelligent or unintelligent, and in Experiments 2 and 3, outgoing or shy. We predicted that preconceived notions about the target would be more likely to persevere over e-mail than over the telephone. Finally, Experiment 3 explored whether this difference in e-mail versus voice communication is produced by the increased ambiguity of e-mail versus voice interaction.

Experiment 1

We led participants in Experiment 1 to believe that they were communicating with either an intelligent or unintelligent individual by capitalizing on shared, albeit suspect, racial and cultural stereotypes. We predicted that participants' final impressions about the target's intelligence would be more heavily influenced by their manipulated expectancies when typing over e-mail than when talking over the telephone. To control for potential differences in the content of responses in the e-mail and voice conditions, the responses of participants in the telephone condition were transcribed verbatim and used as responses in the e-mail condition.

Method

Sixty Cornell undergraduates participated in exchange for extra course credit. On arrival to the lab, participants assigned to the role of interviewer were escorted to a private cubicle and told that they would engage in a short interaction with another student. Participants next completed a short "background questionnaire" that asked for information such as GPA, major, and "greatest high school achievement," and were then photographed with an instant camera. These materials were ostensibly collected to give to their interviewee (the target), but in actuality were used only as a justification for the expectancy manipulation to follow. Participants were then given a pre-prepared photograph supposedly of, and a background questionnaire completed by, the target. Participants randomly assigned to the intelligent-expectancy condition received a photograph of a professionally dressed Asian-American male who, among other honors, had a 3.85 GPA, double-majored in Physics and Philosophy, and was valedictorian of his high-school class. Participants in the unintelligent-expectancy condition, in contrast, received a photograph of a European-American male wearing a torn "Metallica" T-shirt who had a 2.30 GPA, majored in Hotel Administration, and whose greatest high-school achievement was being voted "most valuable player" by his high-school football team.

Participants next received a list of six questions to ask the target, such as "if you had the opportunity to meet

one US President, either alive or dead, who would it be and why?" and "if you could ask a genie to grant you any wish, what would you wish for?" Participants in the telephone condition asked each question, waited for a response, and continued to the next question. Participants in the e-mail condition "e-mailed" each question to the target (using the software Chatter 2.03), waited for a typed response, and continued to the next question. Finally, participants evaluated the target along six semantic differential scales. Of these, three were related directly to intelligence (*dumb/smart*, *inarticulate/articulate*, and *uninformed/knowledgeable*), and three were not (*unfashionable/fashionable*, *unhappy/happy*, and *unfriendly/friendly*). Responses were made on a 13-point scales ranging from -6 to $+6$.

Meanwhile, a separate group of participants (all male, in order to match the gender of the individual pictured in the photograph) were escorted to a private cubicle and told that their job was to answer each question posed by the interviewer. To ensure that these responses did not systematically differ between the e-mail and voice conditions, the responses of each target in the voice condition were transcribed and e-mailed to an interviewer in the e-mail condition by a confederate.

Results and discussion

Data from one e-mail participant (and therefore one group) was lost due to a computer malfunction, leaving 57 total participants in the experiment. Of these, 19 served as interviewers in the voice condition, 19 as interviewers in the e-mail condition, and 19 as targets in the voice condition (whose transcribed responses were used in the e-mail condition).

We predicted that the interviewers' expectancies would influence their final impressions of the target's intelligence more heavily in the e-mail than in the telephone condition. To test this prediction, we analyzed the interviewers' impressions of the target in a 2 (expectancy: intelligent vs. unintelligent) \times 2 (communication: e-mail vs. voice) analysis of variance (ANOVA), using the average of the three intelligence-related dimensions as the dependent measure ($\alpha = .91$). This analysis revealed a main effect for expectancy, $F(1,17) = 4.87$, $p < .05$, $\eta^2 = .22$, qualified by the predicted interaction, $F(1,17) = 4.54$, $p < .05$, $\eta^2 = .21$. As can be seen in Fig. 1, the expectancy manipulation influenced participants' impressions of the target's intelligence in the e-mail condition, $t(17) = 3.00$, $p < .01$, $d = .69$, but not in the voice condition, $t < 1$. Somewhat unexpectedly, the effect of medium on final impressions was significant for participants in the unintelligent condition, $t(17) = 2.78$, $p < .05$, $d = 1.35$, but not for participants in the intelligent condition, $t < 1$. Why this might have occurred is an issue to which we return to in the General Discussion. Finally, we observed no such interaction on any

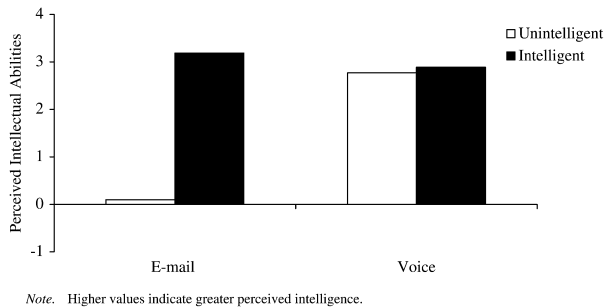


Fig. 1. Perceived intelligence by medium and expectancy condition, Experiment 1.

of the traits unrelated to the expectancy (fashionable, happy, friendly), $F_s < 1$, ns .¹

These results provide initial evidence that expectancies influence impressions formed over e-mail more than those formed over the telephone. There was a larger expectancy-consistent difference in participants' final impressions about a target's intelligence when they communicated over e-mail than when they communicated over the telephone. This occurred even though the word-for-word content of the messages was identical across the communication mediums. Whereas only the words of the target could alter the first impressions of interviewers in the e-mail condition, interviewers in the voice condition could presumably also rely on the target's non-verbal and paralinguistic behavior. As a consequence, the interviewers' bogus first impressions persevered in the e-mail but not in the voice condition.

Experiment 2

Few social problems have captured the interest of psychologists as much as racial prejudice and stereotyping. The implication of Experiment 1 is that expectancies, such as stereotypes, are more likely to persevere after an e-mail conversation than a voice conversation. However, Experiment 1 manipulated expectations by providing participants with what they believed was factual, diagnostic information about the target's personality. Most stereotypes, however, are of far more questionable diagnosticity than the seemingly useful information we provided to participants in the first experiment. Whether participants would be similarly influenced by racial stereotypes alone, however, remains to be seen.

Participants in Experiment 2 were therefore led to believe that their interaction partner was either an Asian-American woman or an African-American woman, and then interviewed this person over either e-mail or

the telephone. Consistent with the existing literature on stereotypes (Devine & Elliot, 1995; Gilbert & Hixon, 1991), we predicted that participants would expect the Asian-American woman to be more shy and timid than the African-American woman, but that these stereotypes would persevere more when interacting over e-mail than when interacting over the telephone.

Experiment 2 also was designed to test an alternative interpretation of the previous experiment. Prior research has demonstrated that people tend to remember information they hear better than information they read (Feldman, 1971). It is possible, then, that stereotypes persevere more in the e-mail than voice condition because the content of e-mail conversation fades from memory more rapidly than the content of voice communication. We therefore tested participants' memory of the conversation at the end of the experiment to address this issue.

Method

Sixty Cornell undergraduates participated in exchange for extra course credit. The procedure was similar to Experiment 1 in all but the following respects. First, the "background questionnaire" was eliminated. Second, expectancies were manipulated by presenting interviewers with a photograph of either an African-American or Asian-American woman, with a different photograph used for each participant. Third, interviewers evaluated the target after the interaction on 10 dimensions, again on a -6 to $+6$ scale. Four were directly related to the target's sociability (*shy/outgoing*, *unassertive/assertive*, *reserved/bold*, *introverted/extroverted*), and six were not (*unfashionable/fashionable*, *insensitive/sensitive*, *impractical/practical*, *insincere/sincere*, *unhappy/happy*, and *sheltered/experienced*). Fourth, all participants were European-American women to ensure that targets matched the gender, but not race, depicted in the photograph given to the interviewer. Finally, participants received a surprise memory quiz at the end of the experiment that asked them to recall the target's responses to each interview question. Two coders, unaware of our hypotheses, then evaluated these responses on a scale from 0 (*no recall*) to 2 (*perfect recall*).

Results and discussion

To test our hypotheses, the interviewers' ratings on the four sociability traits were averaged ($\alpha = .87$) and submitted to a 2 (photograph: Asian-American vs. African-American) \times 2 (communication: e-mail vs. voice) ANOVA. This analysis yielded a marginally significant main effect for photograph, $F(1,18) = 3.41$, $p = .08$, $\eta^2 = .16$, qualified by the predicted interaction, $F(1,18) = 4.61$, $p < .05$, $\eta^2 = .20$. As Fig. 2 shows, participants' stereotypes influenced their impressions of the target when communicating over e-mail, $t(18) = 2.57$,

¹ Because the irrelevant traits in this and the following experiments were conceptually unrelated to one another, it was inappropriate to average them into a composite index as we did with the relevant traits.

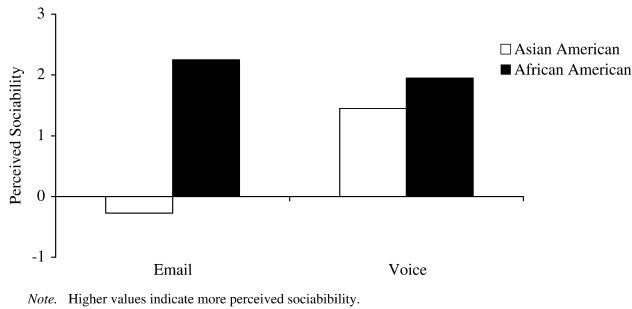


Fig. 2. Perceived sociability by medium and activated stereotype condition, Experiment 2.

$p < .05$, $d = 1.42$, but not when communicating over the telephone, $t(18) < 1$. As in Study 1, the effect of expectancies on final impressions was larger for the more negative stereotype (in this case introversion), $t(18) = 2.59$, $p < .05$, $d = 1.22$, than for the more positive stereotype (extroversion), $t < 1$. Follow-up analyses indicated that the predicted interaction was unique to the stereotype-related traits (all F s < 1 , ns).

To investigate whether these results could be explained by poorer memory for the content of the conversations among participants in the e-mail condition, we averaged the two coders' ratings ($r = .86$, $p < .001$) and compared them between conditions. Overall recall was quite high ($M = 1.80$ on a scale from 0 to 2), and participants in the e-mail condition actually showed slightly better recall ($M = 1.91$) than did participants in the voice condition ($M = 1.70$), paired $t(19) = 2.69$, $p < .05$. In addition, recall was uncorrelated with participants' final impressions within the e-mail and voice conditions. It thus does not appear that poorer recall in the e-mail condition can account for the results of this experiment.

Experiment 3

Experiments 1 and 2 demonstrate that expectancies are more likely to persevere after an electronic interaction than after a voice interaction. Moreover, they demonstrate that neither differences in word-for-word content nor memory can explain this effect. Instead, we have suggested that e-mail is inherently more ambiguous than is voice, and that people communicating electronically consequently have more opportunities to "fill in the blanks" with their expectancies and stereotypes than people communicating verbally. To test this mechanism, participants in Experiment 3 engaged in a conceptual replication of the previous experiments, and independent coders evaluated the ambiguity of both the voice and e-mail versions of the target's responses. We predicted that the e-mail transcripts would be seen as more ambiguous than voice transcripts, and that this

difference would statistically mediate the impact of participants' expectancies on their final impressions.

Method

Eighty-four Harvard undergraduates earned \$6 for their participation. On arrival to the laboratory, interviewers ($n = 56$) were sequestered into a private cubicle and told that they would be interacting with another participant either over the telephone or e-mail. They next completed a short background questionnaire that asked for 5 traits that best described their personality, as well as a short response to the question "Who am I?", both of which would ostensibly be swapped with the other participant. Interviewers in the outgoing condition learned that the target described him- or herself as "sociable," "extroverted," and "fun-loving," whereas interviewers in the shy condition learned that the target described him- or herself as "quiet," "introverted," and "thoughtful." The paragraph written in response to "Who am I?" was similarly manipulated by altering a few key phrases (e.g., "I tend to be very *sociable and outgoing*," versus "*shy and reserved*").

After reading these materials, interviewers received a list of eight questions to ask the target, such as "what are your plans for the upcoming Spring Break?" As in the previous studies, interviewers either typed each question into a computer or asked each question over the telephone. Finally, interviewers evaluated the target on 14 dimensions. Of these, seven were related directly to sociability (*shy/outgoing*, *unassertive/assertive*, *introverted/extroverted*, *unsociable/sociable*, *socially skilled/socially unskilled*, *unfriendly/friendly*, and *reserved/bold*) and seven were not (*unfashionable/fashionable*, *dull/clever*, *unhappy/happy*, *noncompetitive/competitive*, *weak/strong*, *simple/complex*, and *unemotional/emotional*). As before, each rating was made on a separate -6 to $+6$ scale.

Meanwhile, a separate group of participants ($n = 28$) served as targets. As in Experiments 1 and 2, these participants simply answered each question posed by the interviewer, and the responses of those in the voice condition were transcribed and used as responses in the e-mail condition.

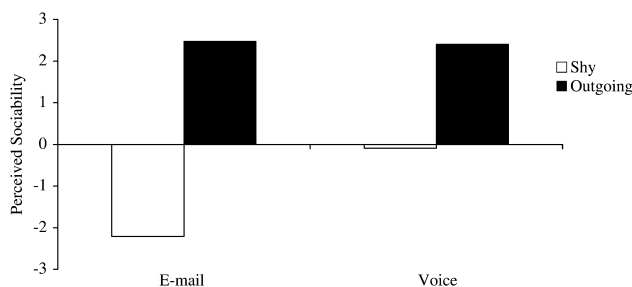
Finally, two coders blind to our hypotheses rated the ambiguity of the targets' responses, which we defined as "the extent to which the communication can be interpreted in multiple ways." Specifically, coders evaluated (sequentially in counterbalanced order) both the text and voice versions of each target's responses on separate 0 (*not at all ambiguous*) to 10 (*extremely ambiguous*) scales.

Results and discussion

We first predicted that the interviewers' manipulated expectancies would influence their final impressions

more strongly when communicating over e-mail than when communicating over voice. To assess this prediction, ratings on the seven expectancy-relevant traits were averaged into a composite index ($\alpha = .88$) and submitted to a 2 (expectancy: outgoing vs. shy) \times 2 (medium: e-mail vs. voice) ANOVA. This analysis revealed main effects for medium, $F(1, 26) = 5.84, p < .05, \eta^2 = .18$, and expectancy, $F(1,26) = 51.25, p < .001, \eta^2 = .66$, qualified by the predicted interaction, $F(1,26) = 6.63, p < .05, \eta^2 = .20$. As Fig. 3 shows, interviewers' expectancies influenced their final impressions more strongly when communicating over e-mail, $t(26) = 8.47, p < .001, d = 1.74$, than when communicating over voice, $t(26) = 3.34, p < .05, d = 1.13$. As in the previous studies, the effect of medium was again significant for the negative (i.e., shy) expectancy, $t(26) = 3.17, p < .05, d = 1.25$, but not the positive (i.e., outgoing) expectancy, $t < 1$. Follow-up analyses revealed that the predicted interaction was again unique to expectancy-relevant traits, all $F_s < 1.2, ns$.

Our primary prediction, however, was that the e-mail transcripts would be perceived as more ambiguous than the voice transcripts, and that this difference in ambiguity would mediate the relationship between medium and perceived target sociability. Because responses of targets in the e-mail and voice conditions were interdependent, we employed the method outlined in Judd, Kenny, and McClelland (2001) for testing mediation in within-group designs. The first step in this method is to establish that the IV (in this case, communication medium) is significantly related both to the proposed mediator (stimulus ambiguity) and the dependent variable (perceived sociability). Recall that two coders evaluated the ambiguity of both the e-mail transcript and the voice recording from which it was derived. After averaging the two coder's ratings ($r = .93, p < .001$), a paired t -test revealed that the e-mail version of the transcript was seen as more ambiguous than the voice version, $M_s = 5.88$ & 3.91 , respectively, $t(27) = 12.92, p < .001$. This analysis, coupled with the interaction reported above, establishes the first step of the mediational analysis.



Note. Higher values indicate more perceived sociability or extroversion.

Fig. 3. Perceived sociability by medium and expectancy condition, Experiment 3.

The next step is to establish that the proposed mediator is significantly related to the DV at each level of the IV (i.e., that there is a significant relationship between ambiguity and perceived sociability in both the voice and e-mail conditions). To do so, we first reverse scored sociability ratings in the shy condition so that higher numbers always indicated more expectancy-consistent impressions. As predicted, the more ambiguous the communication, the more participants' final impressions were consistent with their initial expectancy in both the e-mail and voice conditions, $\beta_s = .42$ & $.37, ps \leq .05$.

The third and final step is to show that the differences in ambiguity between e-mail and voice communication are significantly associated with differences in expectancy-consistent impressions in the e-mail and voice conditions. This is precisely what we found, $\beta = .48, p < .05$. In addition, the significant effect of communication medium on expectancy-consistent impressions was eliminated when ambiguity was included in the statistical model, $F < 1, \eta^2 = .02$. Overall, these data demonstrate that the difference in ambiguity between e-mail and voice communication statistically mediated the difference in expectancy-consistent impressions.

General discussion

Expectancies and stereotypes are an essential part of everyday communication. The ability to go beyond the information given is a key feature of any intelligent system, one that has proven to be a major obstacle in the design of computer intelligence (Bruner, 1957; Schank, 1984). Whereas even the most sophisticated computer might spin its silicon wheels trying to interpret the newspaper headline "red tape holds up new bridge" (Cooper, 1987), most English-speaking adults have little trouble realizing that the "red tape" is of the bureaucratic rather than adhesive variety. In short, expectancies are what make us smart (Gilovich, 1991).

But there is also a dark side to expectancies as well. Inaccurate expectancies, whether derived from stereotypes, erroneous first impressions, or negative preconceptions, can cause information to be interpreted in a manner consistent with those expectancies, thereby perpetuating the expectancy. Moreover, as in the case with expectancies in general, the extent to which stereotypes guide perception depends on the ambiguity of information being evaluated (Higgins, 1996; Srull & Wyer, 1979, 1980). The more ambiguous the information, the more likely it is to be shaped by one's stereotypes or expectancies.

The present research explored the implications of these observations for the rapidly escalating use of e-mail. Three experiments demonstrated that bogus first impressions were more likely to persevere over e-mail than over voice. This was true despite an experimental

design that held constant the word-for-word content between the two mediums. Experiment 3 suggested that this difference was due, at least in part, to the increased ambiguity of e-mail versus voice communication.

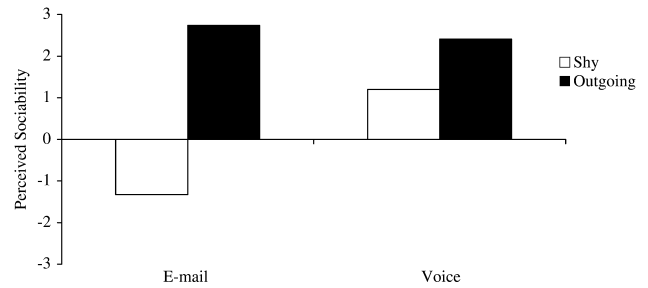
One unexpected finding was that this difference between the e-mail and voice conditions was greater for some expectancies than others. In Study 1, for instance, participants in the unintelligent-expectancy condition showed a large difference in their final ratings depending on whether they communicated via e-mail versus voice, but there was no such difference in the intelligent-expectancy condition. Similarly, the influence of communication medium in Studies 2 and 3 was greater when participants were led to believe that their interaction partner was shy than social. Although other explanations are possible, we suspect that this asymmetry simply reflects that the demands of vocal communication cause individuals to appear more outgoing (and, to a lesser extent, intelligent) than do the demands of e-mail communication.

Limitations

Of course, there are likely to be additional situational factors that moderate the impact of expectancies in communication. This research investigated short, structured, single interactions, and a change in any of these features might influence the size, and perhaps even direction, of the effects observed. For instance, impressions formed over e-mail tend to converge with those formed in face-to-face communication over time (Walther, 1993). Thus, it may be that the differences we documented between the mediums attenuate over longer or more extensive interactions.

That said, we suspect the opposite may be true. Stereotypes and expectancies, after all, are notoriously self-sustaining, even self-exacerbating. An initial expectancy may not only alter one's interpretation of a target's behavior, but may also alter one's interaction style to make the stereotype self-fulfilling (Snyder et al., 1977). Notice also that our experimental designs controlled for what are likely to be considerable differences in the natural content of e-mail versus vocal communication. In addition to lacking paralinguistic cues, e-mail communication is also likely to contain far fewer words than voice interactions. Because it requires more work to type than to speak, it seems likely that the average e-mail interaction would be considerably shorter—and therefore even more informationally impoverished—than the average voice interaction. Thus, the results documented here may actually underestimate the magnitude of the difference between e-mail and voice communication in everyday life.

One possible limitation of our experiments may stem from our experimental manipulation of medium. Rather than simply allowing some participants to communicate



Note. Higher values indicate more perceived sociability or extroversion.

Fig. 4. Perceived sociability by medium and expectancy condition, Experiment 3 conceptual replication.

via e-mail and others to communicate with their voice, we transcribed the responses of targets in the voice condition to create the responses of targets in the e-mail condition. Although desirable for internal validity (by ensuring that there would be no systematic differences in the word-for-word content of responses of targets between the two conditions), it is perhaps less-than-desirable from the standpoint of external validity. Seldom, after all, do people communicate over e-mail by transcribing another person's voice conversation.

To overcome this limitation, we conducted a conceptual replication of Study 3 in which we simply randomly assigned each target to either the e-mail or voice condition and let them communicate as they may. As Fig. 4 shows, the results were virtually identical, including a significant medium by expectancy interaction, $F(1, 56) = 5.45, p < .05, \eta^2 = .22$.

Implications

One of the more widely touted advantages of computer mediated communication, and of e-mail in particular, is its capacity as a socially "blind" medium. On the internet, no one knows whether you are white or black, male or female, rich or poor—features that allow interactants to express their "true selves" and increase the frequency of close relationships (Bargh, McKenna, & Fitzsimmons, 2002; McKenna, Green, & Gleason, 2002). Yet, despite its potential as a social equalizer, the research presented here suggests that e-mail can have the very opposite effect. When individuals interact over e-mail with someone about whom they already have a stereotype, they are more, not less, likely to come away from the communication with those stereotypes still intact.

What is more, these effects of communication medium on impressions are likely to be contagious. One of the most insidious features of stereotypes and expectancies is that they can spread to friends, colleagues, or acquaintances who do not have first-hand experience with the target. A racist court witness, for instance, may not only "remember" a weapon in the hands of

an innocent African-American, but may bias a courtroom jury by presenting false witness. Indeed, in another follow-up to Study 3 we found that it was not only the interviewers themselves who formed a more stereotype-consistent impression of the target in the e-mail versus voice condition, but also a second-generation of participants who merely read a personality summary of the target written by the interviewer. Given the ubiquity of electronic communication, the effects we have documented may have both frequent and far-reaching implications for the nature of impressions formed in everyday life.

Acknowledgments

This research was supported by NSF grant SES 0241544 awarded to Epley. We thank Brett Robinson, Noah Goldstein, Leif Holtzmann, Adrianna Lucianno, Celene Menschel, Rachel Smallman, Allison Vasios, and Beverly Whelan for help conducting the experiments, Tom Gilovich for suggestions throughout this research, and Katelyn McKenna and Kenneth Savitsky for comments on an earlier draft.

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