Social Responses in Mobile Messaging: Influence Strategies, Self-Disclosure, and Source Orientation

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ABSTRACT

This paper reports on a direct test of social responses to communication technologies theory (SRCT) with mobile messaging. SRCT predicts that people will mindlessly respond to computers in social ways that mirror their responses to humans. A field experiment (N=71) using participants' own mobile phones compared three influence strategies (direct request, flattery, and social norms) in the context of asking intimate questions of participants. These messages came from either an ostensibly human or computer sender. Flattery significantly increased self-disclosure when ostensibly sent by a human, but not when from a computer. The interaction effect for sender and influence strategy is inconsistent with SRCT's predictions. Implications for theories of source orientation, research methods, and future research are discussed.

Author Keywords

social responses to communication technologies, persuasive technology, mobile phones, self-disclosure, flattery, mobile messaging, source orientation, field experiments

ACM Classification Keywords

H.1.2 User/Machine Systems: Software psychology.

INTRODUCTION

According to social responses to communication technologies theory (SRCT), as proposed by Nass, Reeves, and colleagues, people respond to interactive technologies with a host of behaviors and attitudes determined by the same social rules and expectations they apply to people; see [10, 11] for reviews.[1] For example, a computer that flatters, makes jokes, or takes on a similar personality can shape attitudes and behaviors in ways similar to responses in human-human interaction. But just how similar does SRCT predict these responses are? Answering this question generates stronger and weaker versions of SRCT.

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The principal method for establishing SRCT has been to adapt social psychology experiments for human-computer, rather than human-human, interactions while maintaining the same predictions [10]. In these tests of SRCT, the results of the new, human-computer experiment are evaluated for similarity to the human-human one. For example, Fogg & Nass [3, p. 599] find that "flattery from a computer can produce the same general effects as flattery from humans," but there has been no finer-grained analysis (e.g., of effect sizes) or a direct, experimental comparison of the effects of flattery from humans and computers. There may be unexplained substantial differences in responses and underlying processes; therefore these tests only support a weak version of SRCT. If only a weak version of SRCT were supported, one might reconsider both whether the responses in question should be understood as *social* responses and when the effects are large enough to design for. On the other hand, a direct, experimental test lends support to strong SRCT only if (1) there is an effect of the manipulated social cues, but (2) no effect for the interaction of those social cues and the interactant (human or computer) with whom participants ostensibly interact [8]. When investigators have undertaken such tests, the results have been mixed [8, 10, 12, 13], and failures have sometimes been attributed to the particular social phenomena studied (e.g., humor [8]). The current research directly tests SRCT for flattery for the first time (H1 and H3 below).

These social responses are generally taken to be *mindless* [10]: that is, specific cues generate social responses which are nonetheless out of place when the situation as presented is more fully and reflectively considered [6]. Thus, a change in the particular variables of the task, context, artifact, or technology that manifest these cues could influence the strength and presence of social responses altogether [9]. Little SRCT research has departed from the common fixed values (e.g., desktop computers) for

[1] SRCT is sometimes also called "the media equation" [e.g., 4, 11, 12] and is a more general version of the computers as/are social actors (CASA) research program.

many context, artifact, and technology variables [10]. But other research has established contextual [e.g., 1, 2], task [e.g., 2, 5], and identity [e.g., 1] variables that influence disclosure in human-computer interaction and computer-mediated communication. A failure at near-replication of SRCT results with mobile devices in a lab context [4] suggests the need for further research on social responses with mobile devices. The present work is the first field experiment testing SRCT, and the first direct experimental comparison of social responses in human-human and human-computer interaction through mobile devices.

Designers can use social responses to computers to increase self-disclosure. People make disclosures of greater breadth and depth to a computer when its questions are coupled with "self-disclosures" by the computer and when the same computer (rather than a distinct but identical computer) begins with low intimacy questions before asking high intimacy questions [7]. However, it remains to be shown both whether other social responses can increase self-disclosure (H1f below) and whether the change in self-disclosure for computers and humans provides further evidence against the similarity predicted by strong SRCT (H3 below). Other strategies for increasing self-disclosure in which the computer functions as a tool rather than social actor may also be successful (H1s below), but there is no expectation of an interaction with whether the sender is a human or a computer.

Experiments [e.g., 12] have found people to manifest greater breadth of disclosure to ostensible humans than computers in similar message exchanges (*contra* meta-analysis [15] of computer vs. paper questionnaire studies). The present work experimentally tests the extension of this claim to disclosures via mobile messaging (H2 below).

The present work investigates factors that influence intimate self-disclosure on mobile devices. The broader aims are (1) directly testing a strong version of SRCT, (2) extending SRCT to mobile devices and beyond the lab, and (3) establishing that computer-mediated and computer-directed social responses other than reciprocity can increase self-disclosure. We do this through a field experiment in which participants receive intimate questions as text messages on their own mobile phones. This study is a first test of the following hypotheses, each motivated by previous work as described above.

H1. Participants will self-disclose more via mobile messaging in response to intimate questions coupled with flattery (H1f) and social norms (H1s) strategies than direct requests.

H2. Participants will self-disclose more via mobile messaging in response to intimate questions ostensibly from a human than ostensibly from a computer.

H3. Participants' self-disclosure via mobile messaging in response to intimate questions will be differentially affected by an ostensibly human or computer sender that flatters them compared to one that does not flatter them.

METHOD

To test these hypotheses we carried out a two (sender: "human", "computer") by three (strategy: "direct request", "flattery", "social norms") mixed design experiment. Sender was a between-participants factor since the levels differed only in a deception that would be transparent in a within-participants design. Since we expected considerable individual variation, strategy was a mixed factor: all participants received "direct requests" to disclose information, and each participant received *either* messages that included flattery or social norms. The order of these two conditions was balanced.

Participants

Participants were 71 university students recruited through campus mailing lists and online postings. Each received either course credit or a $20 Amazon.com gift certificate for their participation. Participants were told that the study was testing a new questionnaire system. All participants used their own mobile phones and service plans. 65 participants had phones with number keypads for text entry, and the remainder had QWERTY keypads.

Procedure

Participants received text messages at convenient times. To achieve this, each participant used a Web-based sign-up process to select two 48-hour *periods* spaced one week apart. Participants chose an hour on each of the four days when they would receive and reply to seven text messages. They were told that they could go about their daily business as long as they could respond to incoming text messages during the hours they selected.

Each day of participation began with a *welcome message*: "Welcome to the mobile phone questionnaire study. This is the research [assistant *or* computer] that will be sending you questions today. Please reply when you're ready." A few minutes after the participant replied, the computer sent the first *question message*. Following another reply the next question message was sent, for a total of six questions each of the four days.

Because people are less disclosive when abruptly asked intimate questions whether by a human or computer [7], the first two questions each period were not intimate, and the remaining ten each period were intimate. The questions, which were adapted from [7], were the same for all participants. For example, one intimate question was: "What has been the biggest disappointment in your life?" Participants were told to respond to all messages, even if only with a blank message or by declining to answer.

Manipulation

The sender levels were identical except that the sender was referred to as a "research assistant" or "research computer" in the two reminder emails (which were sent one day before the start of each period) and the four welcome messages. All text messages were in fact sent by a computer via SMS.

The strategy conditions were identical except for the non-question content included in all of the question messages.

For the direct request level, each message after the welcome message included only a single question. For flattery, each message contained a compliment (e.g., "Nice reply!", "You are better at texting than most.") before the question. Likewise, for social norms, the messages began with a sentence stating the percentage (87-100%) of participants which had fully answered the following question (Figure 1).

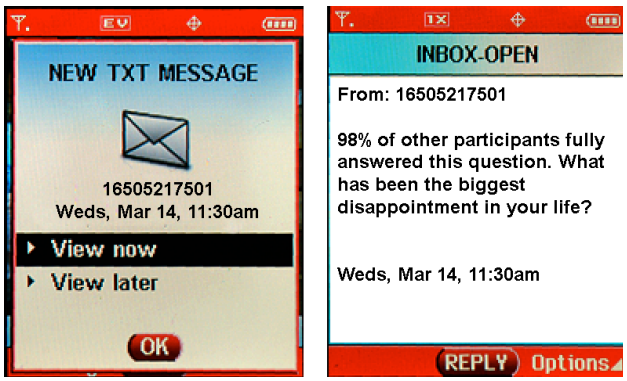

Figure 1. Sample message in the social norms level of strategy as it would appear on a popular mobile phone at the time of the study (Motorola RAZR).

Measure

Each of our hypotheses concerns self-disclosure as a dependent variable, and we use breadth of disclosure as our measure. Previous work has established a strong correlation between depth of disclosure, as measured by ratings from judges assessing intimacy, and breadth of disclosure, as measured by word count [7]. For this study we used a modification of simple breadth of disclosure that takes into account the variable response length associated with refusals to reply used by participants. Two coders identified those responses that were refusals to disclose by following pre-established, objective criteria. The *breadth of disclosure exclusive of refusals* is the word count of a response where responses that were refusals to disclose are given a value of 0.

RESULTS

A mixed effects model was fit to the measure for responses to all intimate questions.[2] The data show a significant main effect for strategy ($F(2, 300) = 5.69$, $p < .005$). In support of H1f, a planned contrast shows that participants disclosed more in response to flattery than direct request alone ($t(329) = 2.54$, $p < .05$). This same contrast within the computer level alone was not significant. No support was found for H1s, and the contrast for social norms and direct request was not significant.

The main effect for sender was significant ($F(1, 273) = 6.47$, $p < .05$). This effect of increased disclosure to an ostensible human supports H2.

Finally, the data show a significant interaction between sender and strategy ($F(2, 300) = 3.41$, $p < .05$). That is, H3 is supported: self-disclosure was differentially affected by flattery on the sender dimension.

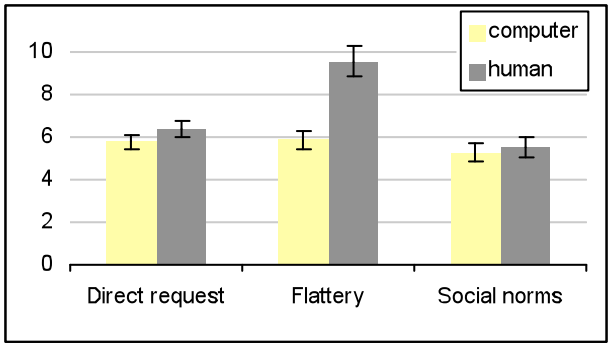

Figure 2. Mean breadth of disclosure exclusive of refusals for intimate questions by condition.

DISCUSSION AND IMPLICATIONS

This experiment demonstrates that the addition of flattery to a direct request can increase self-disclosure via mobile devices – if the request ostensibly comes from a human. These results, particularly the interaction effect, provide additional evidence against strong SRCT. This behavioral and experimental evidence can be contrasted with the results of Fogg & Nass [3]: both praise and flattery from a computer elicit *attitudinal* responses consistent with the *general pattern* described by the social psychology literature on human-human flattery. The present results further tips the evidence against strong SRCT: the responses to another social cue have been shown to be inconsistent with its predictions, supporting the idea that previous disconfirmatory results are not best explained by treating the particular social cues examined as exceptional. Stronger versions of SRCT should further evaluated. If users' interaction is not with an actual or ostensible human, designers should have more conservative expectations for social responses than predicted by strong SRCT.

Source Orientation

According to SRCT, people orient to proximal sources (e.g., the computer in front of them), rather than distal sources; social norms, categories, and behaviors associated with the proximal source prompt social responses [10, 13]. Direct experimental comparisons of human-computer and human-human interaction designed to test strong SRCT have so far followed one of two patterns. First, some studies use contrived instructions or language in the interface to manipulate source orientation (e.g., participants are led to orient to the "programmer", as in [13]). Second, other studies [e.g., 12] both (1) decouple the embodied computer that participants interact with from the source of the messages so that either a distant computer or a human can

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2 Sender and strategy factors were specified as fixed effects, with question as a random, repeated measures effect and participant as a random effect with unstructured covariance. The random effects were selected using the Bayesian Information Criterion (BIC). Nine participants with technical problems or at least five missing responses to intimate questions were excluded from analysis.

be the source oriented towards and (2) use deception about the sender to manipulate exactly this.

This second pattern, used in the present study, is different from most SRCT studies in that participants in all conditions are expected to orient to a distant source, whose embodiment they do not encounter (e.g., they neither see or touch the distant computer or human). In this case, some potentially important cues for social responses may be absent or modified. The realism of the present study may have influenced source orientation through familiarity: participants used their own phones, distinguishing the new messages' source from the familiar device in their hands; and the interaction took place through a medium known to the participants (text messaging) rather than a new medium.

Future work could manipulate these variables (e.g., familiarity with the proximate and distant devices). These results should inform methods for field deployments of prototypes: source orientation may be influenced by choosing whether to equip participants with new devices in order to study an application or service that is, at least in the researchers' minds, distinct from the device.

Task Variables and Mobility

Unlike previous in-lab studies of SRCT, participants in this experiment interacted with the ostensible human or computer in situations of their choosing, including while completing other tasks and in somewhat distracting contexts. Realistically for mobile messaging, their interaction was not continuous, but punctuated by receiving the next question message shortly after sending their reply.

These differences could heighten inconsistency with previous SRCT results, and are subjects for future research. Nass and colleagues [9, 10] suggest that task engagement may influence mindless responses, but this has not been tested in the SRCT paradigm. Repeated disengagement and reengagement with an interaction could make different cues salient. Such work would help generalize the application of SRCT to dynamic and mobile contexts.

Finally, the methods of this experiment can be used as a template for future direct comparisons of responses to social cues. This method takes research on SRCT into the field, people use devices they already possess, and deception about the humanity of the interaction partner is possible. Some of the controls and limitations of the current study (e.g., the times during which participants receive messages) could be modified to achieve greater ecological validity for different contexts.

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REFERENCES

1. Ahern, S., Eckles, D., Good, N.S., King, S., Naaman, M., & Nair, R. (2007). Over-exposed?: Privacy patterns and considerations in online and mobile photo sharing. In *Proc. CHI 2007*, 357-366. ACM Press.
2. Consolvo, S., Smith, I. E., Matthews, T., LaMarca, A., Tabert, J., & Powledge, P. (2005). Location disclosure to social relations: Why, when, & what people want to share. In *Proc. CHI 2005.* ACM Press.
3. Fogg, B.J., & Nass, C. (1997). Silicon sycophants: The effects of computers that flatter. *International Journal of Human-Computer Studies*, *46*(5), 551-561.
4. Goldstein, M., Alsio, G., & Werdenhoff, J. (2002). The Media Equation does not always apply: People are not polite towards small computers. *Personal and Ubiquitous Computing*, *6*(2), 87-96.
5. Joinson, A.N. (2001). Self-disclosure in computer-mediated communication: The role of self-awareness and visual anonymity. *European Journal of Social Psychology*, *31*(2), 177-192.
6. Langer, E.J. (1992). Matters of mind: Mindfulness/mindlessness in perspective. *Consciousness and Cognition*, *1*, 289-305.
7. Moon, Y. (2000). Intimate exchanges: Using computers to elicit self-disclosure from consumers. *Journal of Consumer Research*, *26*(4), 323-339.
8. Morkes, J., Kernal, H. K., & Nass, C. (1999). Effects of humor in task-oriented human-computer interaction and computer-mediated communication: A direct test of SRCT theory. *Human-Computer Interaction*, *14*(4), 395-435.
9. Nass, C., & Mason, L. (1990). On the study of technology and task: A variable-based approach. *Organizations and Communication Technology*.
10. Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues*, *56*(1), 81-103.
11. Reeves, B. & Nass, C. (1996). The Media Equation: How people treat computers, television, and new media like real people and places. Cambridge University Press & CSLI Press.
12. Shechtman, N., & Horowitz, L.M. (2003). Media inequality in conversation: How people behave differently when interacting with computers and people. In *Proc. CHI 2003*, 281-288. ACM Press.
13. Sundar, S.S., & Nass, C. (2000). Source orientation in human-computer interaction: Programmer, networker, or independent social actor. *Communication Research, 27*(6), 683-703.
14. Wang, Q. & Nass, C. (2005). Less visible and wireless: Two experiments on the effects of microphone type on users' performance and perception. In *Proc. CHI '05*. ACM Press.
15. Weisband, S. & Kiesler, S. (1996). Self disclosure on computer forms: Meta-analysis and implications. In *Proc. CHI '96*. ACM Press.