

Humor Evaluations In Human-Computer Interaction*

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Abstract—This study investigates the relationship between reciprocity and humor in human-computer interactions. Here, an experiment is conducted to examine whether such reciprocity affects humor evaluations within the human-computer dyad. The results indicate that individuals who have been helped by a social agent, real or virtual, are likely to perceive humor attempts from that agent as funnier, due to the influence of reciprocity norms.

I. INTRODUCTION

Robots, especially chatbots, are currently at the forefront of modern technology, allowing people to have meaningful social and collaborative interactions with virtual agents. In order to encourage the active spread and adoption of these agents, human-computer interaction must incorporate key human factors that ensure efficient and enjoyable interactions. This project examines the effect of reciprocity on humor evaluation in human-computer interaction (HCI). Drawing on Fogg and Nass's 1997 human-computer reciprocity study, the present study examines how reciprocal norms influence our social behavior towards agents who have or have not helped us. Indeed, human-virtual agent interactions offer unprecedented opportunities for persuasive communication.

II. LITERATURE REVIEW

A. Reciprocity in Human-Computer Interaction

Previous research has demonstrated that reciprocity can occur between humans and computers. Fogg and Nass (1997) performed one of the first human-computer reciprocity studies and found that participants who worked with a computer that helped them in a previous task were more likely to help the computer do a later comparison task when compared to participants who worked with unhelpful computers. The work of Bogg [1] advanced the field of captology, or persuasive computing; similarly, that of Siegel et al. [8] has galvanized the field of persuasive robotics, offering insights into how to utilize robotics to affect human attitudes and behavior [4]. In a similar vein, Moon [6] demonstrated that people will disclose intimate information about themselves when a computer reveals intimate information about itself. Furthermore, Lee and Liang [3] added to the existing body of knowledge by investigating the mechanism for compliance in these interactions. They found that norm-based mechanisms such as reciprocity influenced compliance. Together, these findings suggest that norms and strategies that characterize

human-human social interactions also carry over into human-agent interactions.

B. Does reciprocity affect humor evaluations?

The purpose of the present study, then, is to assess the emotional implications of reciprocity in human-computer interactions, particularly those of humor. The current study involves having a computer program assist human participants with a particularly categorization task. The computer program will either be helpful or unhelpful, similar to the setup in Fogg and Nass's study. However, after the task is over, the computer will present a short cartoon and the participant will be asked to rate the quality of the humorous content on a five-point scale. The hypothesis is that those participants who were most helped by the program are more likely to rate its humor attempt as funnier. This study therefore investigates if reciprocal norms have an impact on humor evaluations. Are we more likely to laugh at a social agent's humor if it has just helped us? Do we assess another agent's attempts at humor to be more successful if we feel indebted? This study intends to answer these questions.

III. METHOD

The study involved roughly 12 participants, all Yale University undergraduates between 18 and 22 years of age, with a male to female ratio of roughly 2:1. The participants were instructed to complete an online survey, which consisted of three sections. First, participants were instructed to answer questions about themselves (i.e. gender, age demographic, etc). Participants were subsequently divided into 2 groups, with each one assigned to one of two levels of the independent variable (program helpfulness). Participants in both levels were instructed to complete a task in which they rank the importance of items required for a camping trip. The task was called the Desert Survival Problem, which was based on the task used by Fogg, Nass, and Moon [4]. Participants read a short description of a survival situation and had to rank 12 items in order of importance for surviving desert conditions. In the first level, participants interacted with a program that gave suggestions about the ordering of the items. For instance, if the participant selected the flashlight as the most important, the program would urge the participant to select a higher-priority item for survival, such as a tent or water canteen. In the second level group, participants were paired with a program that was significantly less helpful, which gave no suggestions and barely participated. At the end of the task, the program in both levels displayed a humorous cartoon [5]. The participants were subsequently asked to rate the quality of the joke along a five-point Likert

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scale. Thus, the dependent variable was the perceived level of humor. The results were then analyzed and submitted to an ANOVA and are reported below.

IV. RESULTS

An independent samples t-test was conducted. Participants in the IV level 1 ($M = 3.12$, $SD = 1.01$) were significantly more likely to help than participants in the IV level 2 ($M = 2.43$, $SD = 1.72$), $t(61) = 1.86$, $p = .056$. Results indicate that in the first level, participants felt that even attempts at suggestion, which were in fact automated, came across as genuine social cues that signified an intention to help. In the second group, the lack of responsiveness of the program was perceived as apathy rather than a malfunction, due to the expectation that the program was supposed to be helpful. Level I participants rated the subsequent cartoon to be funnier, indicating that they perceived the program as more likable or humorous. This reinforces the idea that programs are able to be effective social agents, and can even participate in humor within dyadic contexts. Task completion time and the amount of effort participants put into the task were consistent across levels.

A. Figures and Tables

The result of the independent samples t-test suggest that perceived humor had a relatively significant effect on the willingness of the participant to give a higher humor evaluation. TABLE 1 illustrates the values across samples in the t-test.

TABLE I
INDEPENDENT T-TEST RESULTS

Level	M	SD
One	3.12	1.01
Two	2.43	1.72

Results indicate that subjects the first level were significantly more likely to give higher ratings in the subsequent task than those who did not perceive attempts at humor during the study. Level I participants rated the subsequent cartoon to be funnier, indicating that they perceived the program as more likable or humorous. The discrepancy between levels 1 and 2 suggests that virtual agents will function effectively as social agents as long as their intentions are accurately perceived by the human participant.

TABLE II
T SCORE AND P VALUES

$t(61)$	1.86
p	.056

TABLE II illustrates the T score and p values for the independent samples t-test. The p value of .056 suggests that there is a relatively significant effect between the two levels, rejecting the null hypothesis. This suggests that the perceived

helpfulness of the virtual agent did influence the subsequent humor evaluation of the participant, likely because the virtual agent was seen as more friendly.

V. DISCUSSION

The results indicate that the effect of perceived helpfulness does, in fact, result in norm-based reciprocity even in the context of human-computer interaction. This corroborates data in the scientific literature, though our experiment demonstrated some of the same limitations as previous studies. We surmise that these limitations could have been refuted or avoided with a methodological improvement to our study. The key limitations are elaborated below. One limitation is the extremely small sample size. With a drastically larger number of participants, the effect of agent helpfulness on subsequent humor evaluations might have been more noticeable. Still, even without additional participants. There was still a significant difference between the evaluations of those who had helpful programs and those who did not. The second limitation was the lack of an attention check. The task and subsequent questions may have benefitted from a dummy question or attention test such as a simple calculation or obvious question to ensure that the participant was not absent-mindedly choosing a response. It is unlikely that the participant would have done this, as the task was highly engaging, yet it would have provided an additional precautionary measure. Such questions would stipulate additional analysis of the survey responses but would ensure a higher reliability for the data. Like the previous limitation, this would have adjusted for participants who were not paying attention, which could have sizable effects seeing that the sample size was so small. This is unlikely, yet still a valid consideration.

CONCLUSION

The current experiment has implications for human-computer social activity theories. For the field of psychology as a whole, investigating human-computer interactions sheds a light on the evolving nature of human culture and societal development. Computers are becoming more than informational artifacts; they are beginning to shape the human social experience in both expected and unexpected ways. Continuing an investigation into the social theories in human-computer interaction will yield interesting insights into the potential for computers to have social influence in their own right. The role of humor is becoming more prevalent in everyday interactions with computers. The sociocultural rules of interpersonal interaction are beginning to transfer into the realm of online interactions. Virtual agents and their efficacy as social agents have begun to blur the line between in-person and online interaction. Social action does not have to strictly involve human agents, and this will have anthropological implications for human society. It is interesting to note that individuals frequently apply social rules and constructs even in their interactions with virtual agents. More formally, this is known as the Computers As Social Actors effect [8]. Mechanistically, computer agents have the ability to facilitate

human compliance through reciprocity cues and, as this study suggests, through humor. Norm-based factors (such as an expectation of reciprocity) increases the likelihood of compliance, and computers are thus able to foster and exert these norm-based influences.

REFERENCES

- [1] Fogg, B. J. (2002). Persuasive technology: using computers to change what we think and do. *Ubiquity*, 2002 (December), 5.
- [2] Fogg, B.J., Nass, C. (1997) How users reciprocate to computers: an experiment that demonstrates behavior change. In *CHI97 Extended Abstracts on Human Factors in Computing Systems*. Atlanta, GA: ACM, pp. 331332.
- [3] Lee, S.A., & Liang Y. (2015). Reciprocity in computer-human interaction: source-based, norm-based, and affect-based explanations. *Cyberpsychology, Behavior, and Social Networking* 2015; 18:234240.
- [4] Lee, S. A., & Liang, Y. (2016). The role of reciprocity in verbally persuasive robots. *Cyberpsychology, Behavior, and Social Networking*, 19(8), 524-527.
- [5] Maples, H. (1962). In *A Fish Bowl*.
- [6] Moon Y. Intimate exchanges: using computers to elicit self-disclosure from consumers. *Journal of Consumer Research* 2000; 26:323339.
- [7] Nass, C., Fogg, B. J., & Moon, Y. (1996). Can computers be teammates?. *International Journal of Human-Computer Studies*, 45(6), 669-678.
- [8] Siegel, M., Breazeal, C., & Norton M.I. (2009) Persuasive robotics: the influence of robot gender on human behavior. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. St. Louis, MO: IEEE, pp. 2563 2568.