

# People Like Virtual Counselors That Highly-Disclose About Themselves

Sin-Hwa Kang<sup>1</sup> and Jonathan Gratch

*Institute for Creative Technologies, University of Southern California  
12015 Waterfront Drive, Playa Vista, CA 90094-2536*

**Abstract.** In this paper, we describe our findings from research designed to explore the effect of self-disclosure between virtual human counselors (interviewers) and human users (interviewees) on users' social responses in counseling sessions. To investigate this subject, we designed an experiment involving three conditions of self-disclosure: high-disclosure, low-disclosure, and non-disclosure. We measured users' sense of co-presence and social attraction to virtual counselors. The results demonstrated that users reported more co-presence and social attraction to virtual humans who disclosed highly intimate information about themselves than when compared to other virtual humans who disclosed less intimate or no information about themselves. In addition, a further analysis of users' verbal self-disclosure showed that users revealed a medium level of personal information more often when interacting with virtual humans that highly-disclosed about themselves, than when interacting with virtual humans disclosing less intimate or no information about themselves.

**Keywords.** virtual counselors, virtual humans, virtual agents, self-disclosure, co-presence, social attraction, rapport, anonymity, affective behavior, contingency, nonverbal feedback, psychotherapy

## Introduction

The goal of our ongoing studies is to investigate the potential use of virtual humans as counselors in psychotherapeutic situations.

Researchers in clinical psychology argue that people like their counselors more when the counselors highly disclose intimate information about themselves as compared to when they lowly-disclose in face-to-face counseling interactions [13]. The literature suggests that self-disclosure is a pre-requisite for verbal psychotherapy [4]. Self-disclosure is enhanced when social connections between the client and therapist are strengthened by mutual self-disclosure [6,8], often explained by the reciprocity principle. In a human-computer interaction study, Moon [14] showed that interviewers' self-disclosure promoted interviewees' self-disclosure and attraction to a computer that served as an interviewer and displayed solely text with no images.

However, we do not yet know whether we can consistently achieve similar outcomes through the application of a counselor's self-disclosure in face-to-face psychotherapeutic interactions between real humans and virtual humans. Recent studies

---

<sup>1</sup> Corresponding Author.

have shown that virtual humans can facilitate social interactions among people who have difficulty in forming social relationships, and that these patients' social skills can be developed by interacting with virtual practice [15]. In this type of interactions, virtual humans can provide high anonymity, maintaining communicators' privacy when they reveal intimate information about themselves [9].

Studies in virtual psychotherapy, however, have focused more so on short conversations in which virtual humans and schizophrenic patients introduce themselves to each other [7,12], rather than the counseling interaction between the virtual humans and the patients. Researchers found that patients positively responded to the affective expressions of virtual humans [7] and experienced an emotional connection with the virtual humans [12], as if interacting with a real human. In other studies, researchers explored the use of virtual humans as authorable virtual peers for children with autism spectrum disorder [15] or exercise counselors for people who want to promote their daily exercise [3]. In the study by Bickmore and his colleagues [3], the researchers found that users enjoyed communicating with a virtual human that talked about its created human life story compared to another human's created life story.

Although studies have explored users' engagement when interacting with virtual humans, few studies have investigated whether users like virtual human counselors who talk about themselves in counseling situations. No other study has explored whether a counselor's level of self-disclosure affects a person's social responses, including feelings of co-presence -- feelings of connection and togetherness with partners -- and social attraction -- feelings of being attracted to partners -- when he or she interacts with a virtual human as a counselor.

Therefore, we explored this subject through designing an experiment involving different levels of self-disclosure from virtual human counselors in an interview interaction. The virtual human counselor in this study disclosed information about itself using its individual back story as a programmed agent. We assumed that this approach would avoid some of the ethical controversy arising from the use of virtual human counselors employing made-up human back stories when communicating with real human users [2].

We formulated a research question: *Do users report greater feelings of co-presence and social attraction toward virtual humans who provide high levels of self-disclosure and intimate details compared to other virtual humans who disclose less intimate information or no information about themselves?* We additionally explored whether virtual humans' self-disclosure consequently enhanced users' verbal self-disclosure.

## 1. Method<sup>2</sup>

The experimental design was a between-subjects experiment involving three conditions of self-disclosure: High-Disclosure, Low-Disclosure, and Non-Disclosure. The study featured an interview-style interaction between virtual humans (interviewers) and real human users (interviewees). In this interview interaction, virtual humans asked users ten questions requiring gradually increasing levels of intimate self-disclosure from the users [9,14]. The virtual human counselors shared some of their computer back story

---

<sup>2</sup> A full set of the measurement items and interview questions is available from the corresponding author.

before asking the users each question. In the High-Disclosure condition, virtual counselors preceded all ten questions with their autobiographical computer back story (e.g., “I like to listen to what people say. I have lots of patience for listening, even if you have a lot to say. What characteristics of yourself are you most proud of?”). In other words, the virtual counselors revealed their individual back story more with higher intimacy in this condition. Similar to Moon’s research [14], virtual counselors in the Low-Disclosure condition of this study preceded the first three questions telling their individual back story (e.g., “I was created about 3 years ago. How old are you?”), with low intimacy levels, while asking the rest of the questions without disclosing any individual information. In Moon’s study, the first three questions and computer back stories of an interviewer were also introduced with low intimacy levels. In the Non-Disclosure condition, virtual counselors asked each question without revealing any information about themselves.

We measured users’ feelings of co-presence and social attraction which were used in our previous study [10]. The Co-presence scale was constructed using Likert-type scale with an 8-point metric (1 = Very Little; 8 = Very Much or 1 = Very Unlikely; 8 = Very Likely) and composed of fourteen items (Cronbach’s alpha = .87). The Social Attraction scale was constructed using Likert-type scale with an 8-point metric (1 = Strongly Disagree; 8 = Strongly Agree) and composed of the six items (Cronbach’s alpha = .88). In addition, we analyzed users’ verbal self-disclosure to find whether a virtual counselor’s self-disclosure consequently increased users’ self-disclosure. The intensity of users’ self-disclosure was rated by two coders independently using Altman and Taylor’s three-layer categorization scheme [1]: a peripheral layer (low intimacy), an intermediate layer (medium intimacy), and core layer (high intimacy). The results of Krippendorff’s alpha [11] showed good inter-coder reliability between the two coders’ disagreements: Alpha = .85; Do (Observed Disagreement) = 2485.35; De (Expected Disagreement) = 16846.55.

Fifty seven people (53% women, 47% men) from the general Los Angeles area participated in this study. They were recruited using Craigslist.com and compensated for seventy five minutes of their participation. On average, the participants were 31 years old ( $M = 30.68$ ;  $SD = 10.08$ ). The participants were randomly assigned to one of three experimental conditions. Participants were given instruction describing the counseling interview interaction. The interview questions were modified from ones used in Moon’s study [14] to describe virtual counselors as computer programmed agents represented by a human figure (see the image (a) in Figure 1). In Moon’s study an interviewer was not represented by an image at all. Participants in all conditions viewed the virtual humans on a 30-inch Apple display that approximated the size of a real human sitting 4 feet away. They wore a lightweight close-talking microphone and spoke into a microphone headset. The monitor was fitted with a stereo camera system and a camcorder. To control for gender effects, two types of gender dyads were used in equal numbers in each experimental condition: male-male and female-female. The typical interaction was allowed to last about thirty minutes, but users were not informed of any specific time limitation.

We used the Rapport Agents [5] (see the image (a) in Figure 1) that presented timely nonverbal feedback (i.e. head nods and body shifts) as virtual counselors. The Rapport Agent generates listening behaviors of a virtual counselor by recognizing and responding to features of an interviewee’s voice and upper-body movements [5] (see the image (b) in Figure 1). To generate speaking behaviors of the interviewer in all conditions, an experimenter controlled buttons that retrieved pre-recorded voice messages.

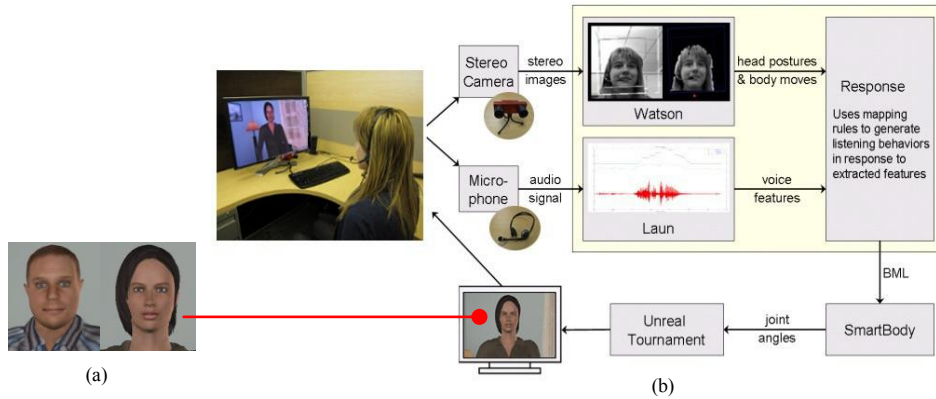


Figure 1. (a) Virtual humans (Rapport Agents: male & female) (b) System architecture of the Rapport Agent

## 2. Results

The between-subjects MANOVA analysis showed that users reported feelings of co-presence [ $F(2,54) = 8.794$ ;  $p < .001$ ; partial  $\eta^2 = .246$ ] and being attracted to their partners [ $F(2,54) = 5.479$ ;  $p = .007$ ; partial  $\eta^2 = .169$ ] more when they were interviewed by the virtual humans that preceded each interview question with high-disclosure about themselves than interaction with other virtual humans with low- or non-disclosure about themselves (see Table 1 & 2). The additional outcome of between-subjects MANOVA analysis for users' self-disclosure showed that users revealed a medium level of personal information more often, when interacting with virtual humans that highly-disclosed about themselves, than when interacting with virtual humans disclosing less intimate or no information about themselves [ $F(2,54) = 10.725$ ;  $p < .001$ ; partial  $\eta^2 = .284$ ]. For users' disclosing at either a high- or low-level, however, the level of the virtual human's self-disclosure ("high," "low" or "non") did not make a statistically significant difference.

Table 1. MANOVA with the independent variable Reciprocity and the dependent variable Co-presence (N = 57)

	High-Disclosure		Low-Disclosure		Non-Disclosure		<i>F</i>	$\eta^2$	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Co-presence	4.75	1.20	4.06	1.05	3.32	.890	8.794	.246	< .001

Table 2. MANOVA with the independent variable Reciprocity and the dependent variable Social Attraction (N = 57)

	High-Disclosure		Low-Disclosure		Non-Disclosure		<i>F</i>	$\eta^2$	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Social Attraction	4.31	1.51	4.10	1.91	2.62	1.68	5.479	.169	.007

## 3. Conclusions and Discussion

We found that virtual counselors' level of self-disclosure, specifically a high level of self-disclosure, positively affected users' sense of co-presence and social attraction to

virtual counselors, as well as users' medium level of self-disclosure. Based on the outcomes, we argue that clients are more likely to like virtual humans who precede interview questions with highly intimate information about themselves in a counseling interview interaction. This has been found in face-to-face counseling interactions with real human counselors. Our findings further imply that clients who feel co-presence with, and are attracted to their virtual counselors may reveal more intimate information in counseling interactions. The outcomes of this study suggest a possibility of using virtual humans as counselors in psychotherapeutic situations.

Future work could explore combining other forms of virtual counselor feedback that was not investigated in this study, feedback such as facial expressions or verbally empathetic utterances. Such a study would no doubt reveal even more interesting effects of a virtual counselor's level of self-disclosure on users' perceived level of co-presence and social attraction, as well as users' self-disclosure. The outcomes of future studies might explain the statistical insignificance of the virtual counselor's level of disclosure on highly-disclosing users found in this study.

## References

- [1] Altman, I. & Taylor, D. *Social penetration: Development of interpersonal relationships*. Holt McDougal, 1973.
- [2] Bickmore, T. Ethical Issues in Using Relational Agents for Older Adults. Paper presented at *the AAAI Fall Symposium on Caring Machines: AI in Eldercare*, Washington, DC, 2005.
- [3] Bickmore, T., Schulman, D., & Yin, L. Engagement vs. Deceit: Virtual Humans with Human Autobiographies. *Proc. 9<sup>th</sup> International Conference on Intelligent Virtual Agents*, 2009.
- [4] Diguseppe, R. & Bernard, M. *REBT assessment and treatment with children in Rational Emotive Behavioral Approaches to Childhood Disorders: Theory, Practice, and Research*, Ellis, A. & Bernard M. E. (Eds.), Springer, 2006.
- [5] Gratch, J., Wang, N., Gerten, J., Fast, E., & Duffy, R. Creating rapport with virtual agents. *Proc. 7<sup>th</sup> International Conference on Intelligent Virtual Agents*, 2007.
- [6] Hooi, R. & Cho, H. Deception and Self-Disclosure: The Roles of Self-Awareness, Avatar Similarity and Attraction. Paper presented at *the annual meeting of the International Communication Association*, 2010.
- [7] Jang, H., Ku, J., Park, S., Kim, S., Kim, I., Kim, C., Kim, J., & Kim, S. Investigation of Social Anxiety of Patients with Schizophrenia Using Virtual Avatar. *Annual Review of Cybertherapy and Telemedicine*, Vol. 3, (2005), 129-134.
- [8] Jourard, S. *Self-Disclosure: An Experimental Analysis of the Transparent Self*. Wiley-Interscience, 1971.
- [9] Kang, S. & Gratch, J. Virtual Humans Elicit Socially Anxious Interactants' Verbal Self-Disclosure. *Journal of Computer Animation and Virtual Worlds*, 21(3-4) (2010), 473-482.
- [10] Kang, S., Watt, J. H., & Ala, S. K. Social copresence in anonymous social interactions using a mobile video telephone. *Proc. Computer-Human Interaction Conference on Human Factors in Computing*, 2008.
- [11] Krippendorff, K. *Content Analysis, an Introduction to its Methodology*, 2nd Edition. Thousand Oaks, CA: Sage, 2004.
- [12] Ku, J., Kim, J., Jang, H., Park, S., Kim, S., Kim, C., Kim, C., Kim, K., Kim, Ja., Lee, J., Kim, I., & Kim, S. Relationship between Social Response to Virtual Avatar and Symptom Severity of Patients with Schizophrenia. *Annual Review of Cybertherapy and Telemedicine*, Vol. 3 (2005), 143-149.
- [13] MacCarthy, P. R. Differential effects of counselor self-referent responses and counselor states. *Journal of Counseling Psychology*, 29 (1982), 125-131.
- [14] Moon, Y. Intimate exchanges: Using computers to elicit self-disclosure from consumers. *Journal of Consumer Research*, Vol. 26, No. 4 (2000), 323-339.
- [15] Tartaro, A. & Cassell, J. Authorable virtual peers for Autism Spectrum Disorders. Paper presented at *the 17th European Conference on Artificial Intelligence*, Riva del Garda, Italy, 2006.

---

**Acknowledgements.** This work was sponsored by the U.S. Army Research Office / Simulation & Technology Training Center via DCoE/USAMRAA under grant # W911NF-04-D-0005. The content does not necessarily reflect the position or the policy of the Government, and no official endorsement should be inferred.