

# Socially Anxious People Reveal More Personal Information with Virtual Counselors That Talk about Themselves using Intimate Human Back Stories

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 virtual human counselors' self-disclosure using intimate human back stories on real human clients' social responses in psychological counseling sessions. To investigate this subject, we designed an experiment involving two conditions of the counselors' self-disclosure: human back stories and computer back stories. We then measured socially anxious users' verbal self-disclosure. The results demonstrated that highly anxious users revealed personal information more than less anxious users when they interacted with virtual counselors who disclosed intimate information about themselves using human back stories. Furthermore, we found that greater inclination toward facilitated self-disclosure from highly anxious users following interaction with virtual counselors who employed human back stories rather than computer back stories. In addition, a further analysis of socially anxious users' feelings of rapport demonstrated that virtual counselors elicited more rapport with highly anxious users than less anxious users when interacting with counselors who employed human back stories. This outcome was not found in the users' interactions with counselors who employed computer back stories.

**Keywords.** virtual counselors, virtual humans, self-disclosure, human back story, anonymity, affective behavior, contingency, nonverbal feedback, psychotherapy

## Introduction

Previous studies suggest that self-disclosure is a pre-requisite for verbal psychotherapy [5], and that this is increased when the social relationship between the client and therapist is reinforced by reciprocal self-disclosure [7]. These findings inspired the exploration of associations between self-disclosure and psychosocial disorders, such as social anxiety [8]. Social anxiety disorder has been reported to be the most common chronic psychological disorder, occurring in 18% of the general population [11].

The prevalence and gravity of this disorder inspired us to formulate a novel approach to current treatment. We investigated the potential use of virtual humans as counselors in psychotherapeutic situations, specifically in the socially anxious population. In our previous study [8], we found promising results for the use of virtual humans and interactive virtual environments in therapeutic settings for social anxiety disorder. We observed that socially anxious people revealed greater information and more intimate information about themselves when interacting with a virtual human when compared with real human video interaction, whereas less socially anxious

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<sup>1</sup> Corresponding Author.

people did not show this difference. We [9] also discovered that human clients tended to like virtual human counselors more when the counselors revealed intimate information about themselves compared to when they did not disclose it in virtual counseling situations. This trend has been observed in face-to-face counseling interactions with real human counselors as well. The virtual human counselor in our previous study [9] disclosed information about itself using computer back stories in psychotherapeutic interactions. In physical activity counseling interactions, Bickmore and his colleagues [3] discovered that users were more engaged in conversations with virtual counselors who talked about their back story in first person, e.g. "I workout for three hours per week," compared to third person, e.g. "Jane works out for three hours per week."

Although previous research has been conducted on the use of virtual counselors, none of these studies has explored whether a counselor's different type of self-disclosure affects users' social responses such as verbal self-disclosure, specifically in the socially anxious population. Therefore, we conducted an investigation to explore this subject in psychological counseling situations. The research question that we formulated for this inquiry was:

*Do socially anxious users reveal intimate information differently when they interact with virtual counselors who provide their self-disclosure and intimate details using human back stories, compared to other virtual counselors who used computer back stories to talk about themselves?*

In addition, we explored whether virtual counselors' self-disclosure consequently enhanced socially anxious users' feelings of rapport when they interacted with counselors that talked about themselves by employing human back stories or computer back stories.

## 1. Method

We designed a between-subjects experiment involving two different types of self-disclosure from virtual counselors in an interview interaction: i) human back stories, e.g. "I was born and raised in LA"; ii) computer back stories, e.g. "I was designed and built in LA." We measured users' dispositional social anxiety (the modified Cheek & Buss shyness scale) and verbal self-disclosure. For the data of verbal self-disclosure, 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 showed good inter-coder reliability between the two coders' agreements: Alpha = .83; Do (Observed Disagreement) = 4376.182; De (Expected Disagreement) = 25521.558.

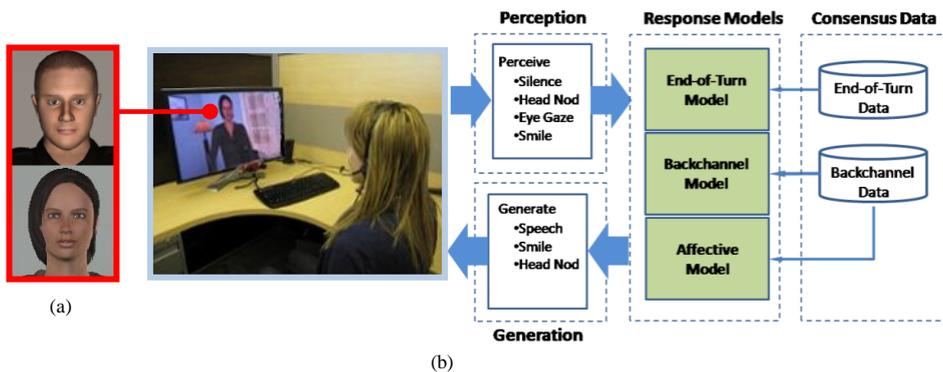
In addition, we assessed users' feelings of rapport using the Virtual Rapport scale which were created by combining the Co-presence scale [9] and the Rapport scale [13] used in our previous studies. The Virtual Rapport scale was constructed using Likert-type scale with an 8-point metric (1 = Very Little; 8 = Very Much or 1 = Very Unlikely; 8 = Very Likely) and composed of twenty three items (Cronbach's alpha = .93).

Forty people (50% women, 50% men; average 31 years old) were recruited from the general Los Angeles area using Craigslist.com and compensated for seventy five

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minutes of their participation. The participants were randomly assigned to one of the two experimental conditions. Participants were given instruction describing the counseling interview interaction. The interview questions were modified from ones used in our previous study [9]. The virtual counselors preceded each interview question with some information about themselves before asking each counseling question to participants. Participants (human clients) in all conditions viewed the virtual humans on a 30-inch screen 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 webcam 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.

The Rapport Agents [6] were used as virtual counselors (see the image (a) in Figure 1) that presented timely positive feedback such as smile and head nods by detecting and responding to features of smile, voice, head nods and upper-body movements displayed by human clients (see the image (b) in Figure 1). To produce the verbal self-disclosure of the virtual counselor, an experimenter controlled buttons that retrieved pre-recorded voice messages.



**Figure 1.** (a) Virtual counselors (Rapport Agents: male & female) (b) Interview interaction between a human client and a virtual counselor (with the system architecture of the Rapport Agent)

## 2. Results

We ran a between-subjects ANOVA analysis between two social anxiety levels (median split) and verbal self-disclosure. We observed a general trend of facilitated self-disclosure from more anxious users following interaction with a virtual counselor who employed a human back story ( $N = 20$ ) rather than a computer back story ( $N = 20$ ). The results [ $F(1,18) = 4.60$ ;  $p = .046$ ;  $\eta^2 = .203$ ] showed that more anxious users revealed personal information more ( $M = 12.98$ ,  $SD = 2.43$ ) than less anxious users ( $M = 9.75$ ,  $SD = 4.10$ ) when they were interviewed by virtual counselors that employed human back stories (see Table 1). The results [ $F(1,18) = 4.18$ ;  $p = .053$ ;  $\eta^2 = .192$ ] also showed that there was a moderately significant difference between the level of intimacy seen in the answers from more anxious users ( $M = 31.79$ ,  $SD = 6.39$ ) and less anxious users ( $M =$

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23.42, SD = 11.08) in the same condition (see Table 1). There was no statistically significant difference in the amount [ $F(1,18) = .35$ ;  $p = .56$ ;  $\eta^2 = .019$ ] and level of intimacy [ $F(1,18) = .42$ ;  $p = .52$ ;  $\eta^2 = .023$ ] in the users' self-disclosure based on their level of social anxiety when interviewed by virtual counselors that employed computer back stories.

**Table 1.** ANOVA results with the explanatory variable *Social Anxiety Levels (median split)* and the response variables *Amount and Level of Intimacy in Self-Disclosure (%)* in the "Human back stories" condition

	More anxious (N=10)		Less anxious (N=10)		<i>F</i>	$\eta^2$	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
<b>Amount in Self-Disclosure (%)</b>	12.98	2.43	9.75	4.10	4.60	.203	.046
<b>Level of Intimacy in Self-Disclosure (%)</b>	31.79	6.39	23.42	11.08	4.18	.192	.053

We further ran ANOVA analysis to find users' Virtual Rapport associated with their anxiety levels in each condition. The results [ $F(1,18) = 5.14$ ;  $p = .036$ ;  $\eta^2 = .222$ ] showed that more anxious users felt rapport more ( $M = 4.56$ ,  $SD = 1.07$ ) than less anxious users ( $M = 3.21$ ,  $SD = 1.55$ ) when they were interviewed by virtual counselors that employed human back stories (see Table 2). However, we did not detect a general trend of facilitated rapport building from more anxious users who interacted with a virtual counselor that talked about him/herself using a human back story rather than a computer back story. There was no statistically significant difference [ $F(1,18) = .28$ ;  $p = .601$ ;  $\eta^2 = .015$ ] in users' feelings of rapport based on their level of social anxiety when interviewed by virtual counselors that employed computer back stories.

**Table 2.** ANOVA results with the explanatory variable *Social Anxiety Levels (median split)* and the response variable *Virtual Rapport* in the "Human back stories" condition

	More anxious (N=10)		Less anxious (N=10)		<i>F</i>	$\eta^2$	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
<b>Virtual Rapport</b>	4.56	1.07	3.21	1.55	5.14	.222	.036

### 3. Conclusions and Discussion

We found that the type of self-disclosure employed by virtual counselors, specifically human life stories, promoted greater verbal self-disclosure in highly anxious users and positively affected their sense of rapport more than less anxious users in interactions with virtual counselors. We discovered a general trend of facilitated self-disclosure from highly anxious users following interaction with the virtual counselors who employed human back stories rather than computer back stories. In our experiment sessions, we observed that users were quite impressed by our realistic characters, although they demonstrated awareness that the counselors were programmed and animated characters. We used a life sized, animated virtual human counselor that presented timely positive feedback by recognizing and responding to attributes of a user's behaviors. It is likely that users perceived the virtual counselors as real human counselors when the counselors self-revealed intimate information using human back stories. This phenomenon is demonstrated in the Computers as Social Actors Theory [12], which posits that people generally treat computers as if interacting with a real human. Existing literature [10] also notes that socially anxious people display more expressive behavior when their partner exhibits positive reactions to their behavior. According to these findings, highly anxious users could have been more inclined to subconsciously reveal personal information more than less anxious users when the counselors

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presented timely positive feedback and talked about themselves using human back stories rather than computer back stories.

We found that there was no tendency toward greater rapport reported by highly anxious users when they interacted with the counselors who disclosed personal information using human back stories rather than computer back stories. Although highly anxious users experienced greater rapport than less anxious users when they communicated with the counselors that employed human back stories, the amount of rapport that highly anxious users reported was approximately the same level between both types of the counselors. This may have been related to users' perception of the virtual counselor as a programmed character, thus resulting in feelings like deception [2] or expectancy violation [4] when interacting with a virtual human that employed a human back story. It seems that users' existing views toward interacting with programmed characters contributed to the levels of rapport highly anxious users experienced for both interactions, regardless of whether counselors employed either human or computer back stories.

Based on our findings, we argue that virtual counselors should employ human back stories and likewise reveal intimate information about themselves in psychological counseling interactions in order to enhance socially anxious clients' self-disclosure. This approach would carry the most successful outcome and most likely encourage rapport building. Future work could explore effects of a virtual counselor's self-disclosure on the social responses of human clients who suffer from other types of psychological disorders.

## 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. *Proceedings of 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. *Proceedings of the 9<sup>th</sup> International Conference on Intelligent Virtual Agents*, 2009.
- [4] Burgoon, J., Le Poire, B. A., & Rosenthal, R. Effects of preinteraction expectancies and target communication on perceiver reciprocity and compensation in Dyadic Interaction. *Journal of Experimental Social Psychology*, 31, 287-321, 1995.
- [5] 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.
- [6] Huang, L. Morency, L.-P., & Gratch, J. Virtual Rapport 2.0. *Proceedings of the 11th International Conference on Intelligent Virtual Agents*, Iceland, 2011.
- [7] Jourard, S. *Self-Disclosure: An Experimental Analysis of the Transparent Self*. Wiley-Interscience, 1971.
- [8] Kang, S. & Gratch, J. Virtual humans elicit socially anxious interactants' Verbal Self-Disclosure. *Journal of Computer Animation and Virtual Worlds*, 21(3-4), 473-482, 2010.
- [9] Kang, S. & Gratch, J. People like virtual counselors that highly-disclose about themselves, *The Annual Review of CyberTherapy and Telemedicine*, Vol. 167: 143-148, 2011.
- [10] Perez, J. & Riggio, R. Nonverbal social skills and psychopathology. In: *Nonverbal Behavior in Clinical Settings*, Philippot, P., Feldman, R. & Coats, E. (Eds.), Oxford, 2003.
- [11] Raj, B. & Sheehan, D. Social anxiety disorder. *Medical Clinics of North America*, vol. 85, Issue 3, 711-733, 2001.
- [12] Reeves, B. & Nass, C. *The Media Equation*. Cambridge, 1996.
- [13] von der Pütten, A., Krämer, N., Gratch, J & Kang, S. It doesn't matter what you are! Explaining social effects of agents and avatars. *Computers in Human Behavior*. Volume 26 Issue 6, November, 2010.

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