Virtual Role-Play with Rapid Avatars

Ning Wang[1]✉, Ari Shapiro[1], David Schwartz[2], Gabrielle Lewine[2], Andrew Wei-Wen Feng[1]

[1] Institute for Creative Technologies, University of Southern California, Playa Vista, CA, USA
[2] Department of Psychology, University of Southern California, Los Angeles, CA, USA
nwang@ict.usc.edu

Abstract. Digital doppelgangers possess great potential to serve as powerful models for behavioral change. An emerging technology, the Rapid Avatar Capture and Simulation (RACAS), enables low-cost and high-speed scanning of a human user and creation of a digital doppelganger that is a fully animatable virtual 3D model of the user. We designed a virtual role-playing game, DELTA, with digital doppelgangers to influence a human user's attitude to-wards sexism on college campuses. In this demonstration, we will showcase the RACAS system and the DELTA game.

Keywords: Persuasive technology, Digital doppelganger, Virtual role-playing game, Rapid avatar.

1 Digital Doppelgangers

Digital doppelgangers are virtual humans that highly resemble the real self but behave independently [1]. Because digital doppelgangers possess a strong resemblance to the physical self – as they are actually a digital copy of the physical body – they have great potential to serve as powerful models [2][3]. Human reactions to doppelgangers have been observed to induce behavior changes in many areas, including promoting healthy lifestyles, e.g. routine exercise and better eating habits [3], be-coming more future-oriented, e.g. increasing retirement savings [4], altering consumer behavior [5], and alleviating public speaking anxiety [6], among others. The efficacy of doppelgangers in behavioral change can be explained using Social Cognitive Theory [7][8]. Bandura's theory states that people do not need to experience rewards or punishments themselves in order to learn behaviors, but rather they can learn behaviors through the observation of models. Moreover, according to the theory, greater similarity and identification with a model leads to more imitation of modeled behaviors. Similarity may be based on physical traits, personality variables, or shared beliefs and attitudes [9].

2 RACAS: Rapid Avatar Capture and Simulation

Traditionally, such "digital doubles" required complicated and expensive capture systems, as well as many man-months of effort from experts in various aspects of 3D

technology. An emerging technology, called Rapid Avatar Capture and Simulation (RACAS), makes the digital doppelganger a more accessible reality [10]. The RACAS takes scans of a user from the front, back, left, and right sides using an RGB-D sensor, then "stitches" the four images together to construct a 3D model. The 3D model is enhanced by inferring a skeletal and muscular structure, as well as generating a model for the deformation of the skin and clothes (see Fig. 2). SmartBody, a character animation system, drives the animation of the 3D virtual character [11]. Using RACAS, we can easily create a digital doppelganger that serves as an ideal model for maximizing feel-ings of similarity, enabling the demonstration of a wide range of rewards and punishments, and customizing the virtual self's behavior to portray an optimal performance that the physical self cannot yet achieve.

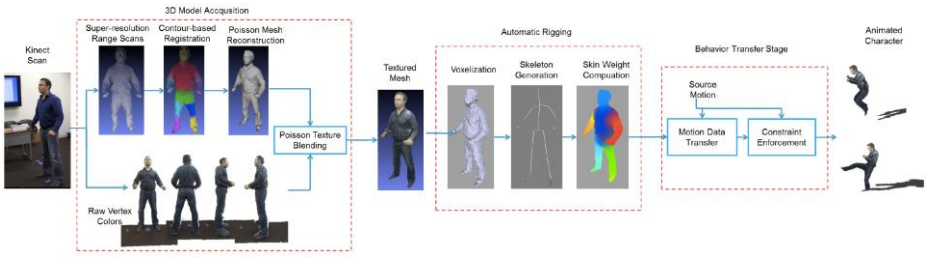

Fig. 1. Screenshot of one of the virtual encounters of sexist behavior in DELTA game.

3 The DELTA Game

We designed a virtual role-playing game – DELTA – integrated with digital doppelgangers, to influence a human user's attitude toward sexism on college campuses (Fig. 2). Human users guide digital doppelgangers of themselves created by RACAS to navigate through various scenarios where their doppelgangers encounter sexist attitudes on a virtual college campus. In each scenario, the virtual doppelganger witnesses the use of sexist comments and is asked to use his/her own words to counter such comments. The virtual role-playing game is designed following a well-studied behavioral alteration paradigm called induced-hypocrisy [12]. The induced-hypocrisy paradigm involves a specific sequence of events. First, individuals are asked to advocate for a desirable behavioral state (e.g., being an active bystander). Next, they are reminded of their own opposing tendencies (e.g., a history of being a passive bystander) and encouraged to engage in a state of mindful reflection. The inconsistency between their advocated stances and their actual behavior, is then presumed to produce negative emotions, called cognitive dissonance [13], that the individual is motivated to decrease. As a result, he or she effects a behavioral change in a desired direction. Induced hypocrisy interventions have been used to address a wide variety of problematic behaviors over the last two decades including unsafe sex [14], speeding [15], racial prejudice [16], smoking [17], eating disorders [18], excessive UV expo-sure [19], etc.

Fig. 2. Screenshot of one of the virtual encounters of sexist behavior in DELTA game.

We hypothesize that interacting with one's digital doppelganger in the virtual role-playing game can facilitate the reduction of the human user's own sexist attitude. Evaluations are currently under way to assess the efficacy of the DELTA game. In the demonstration, we will showcase the capture and creation of the Rapid Avatar and the DELTA role-playing game.

References

1. Bailenson, J. N.: Doppelgangers-a new form of self?. Psychologist , 25(1), 36-38 (2012).
2. Bailenson, J.N., & Segovia, K.Y. (2010). Virtual doppelgangers: Psychological effects of avatars who ignore their owners. In W. S. Bainbridge (Ed.), Online worlds: Conver-gence of the real and the virtual (175-186). Springer: New York. Bandura, A. (1977). Social learning theory. Englewood Cliffs, NJ:Prentice-Hall.
3. Fox, J., & Bailenson, J.N. (2010). The use of doppelgängers to promote health behav-ior change. CyberTherapy & Rehabilitation, 3(2), 16-17.
4. Hershfield, H. E., Goldstein, D. G., Sharpe, W. F., Fox, J., Yeykelis, L., Carstensen, L. L., & Bailenson, J. N. (2011). Increasing saving behavior through age-progressed render-ings of the future self. Journal of Marketing Research, 48, S23-S37.
5. Ahn, S.J., & Bailenson, J.N. (2011). Self-endorsing versus other-endorsing in virtual envi-ronments: The effect on brand attitude and purchase intention. Journal of Adver-tising, 40 (2), 93-106.
6. Aymerich-Franch, L. & Bailenson, J.N. (2014). The use of doppelgangers in virtual re-ality to treat public speaking anxiety: a gender comparison. Proceedings of the Inter-national Society for Presence Research Annual Conference. March, 17-19, Vienna, Aus-tria.
7. Bandura, A. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice Hall.
8. Bandura, A. (2001). Social cognitive theory of mass communication. Media Psychol-ogy, 3, 265–299.

9. Stotland, E. (1969). Exploratory investigations of empathy. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 4, pp. 274–314). New York: Academic Press.
10. Shapiro, A., Feng, A., Wang, R., Li, H., Bolas, M., Medioni, G., & Suma, E.: Rapid avatar capture and simulation using commodity depth sensors. Computer Animation and Virtual Worlds, 25(3-4), 201-211, (2014).
11. Shapiro, A.: Building a character animation system. Motion in Games. pp. 98-109. (2011).
12. Aronson, E. (1999). Dissonance, hypocrisy, and the self-concept. Readings about the social animal, 219-236.
13. Festinger, L. (1957). A Theory of Cognitive Dissonance. California: Stanford Univer-sity Press.
14. Eithel, P., & Friend, R. (1999). Reducing denial and sexual behviours in college stu-dents. Annals of Behavioural Medicine, 21, 12–19.
15. Fointiat, V. (2004). ''I know what I have to do, but…'' When hypocrisy leads to behavioral change. Social Behavior and Personality, 32(8), 741–746.
16. Son Hing, L. S., Li, W., & Zanna, M. P. (2002). Inducing hypocrisy to reduce prejudi-cial responses among aversive racists. Journal of Experimental Social Psychology, 38, 71–78.
17. Simmons, V. N., Webb, M. S., & Brandon, T. H. (2004). College-student smoking: An initial test of an experiential dissonance-enhancing intervention. Addictive Behav-iors, 29, 1129–1136.
18. Stice, E., Rohde, P., Butryn, M., Menke, K. S., & Marti, C. N. (2015). Randomized Controlled Pilot Trial of a Novel Dissonance-Based Group Treatment for Eating Disorders. Behaviour research and therapy, 65, 67-75.
19. Chait, S. R., Thompson, J. K., & Jacobsen, P. B. (2015). Preliminary development and evaluation of an appearance-based dissonance induction intervention for reducing UV exposure. Body image, 12, 68-72.