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Children and Adults use Attractiveness as a Social Cue in Real People and Avatars

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Abstract

Observing social interactions between children and adults is a major method in the toolkit of psychologists who examine social development and social relationships. Although this method has revealed many interesting phenomena, it cannot determine the effect of behavior independent of other traits. Research on the role of attractiveness in social development provides an example of this conundrum: Are attractive and unattractive children/adults treated differently because of their attractiveness (independent of their behavior), do they behave differently and thus elicit differential treatment, or both? Virtual world and avatar-based technologies allow researchers to control the social behaviors of targets; however, whether children and adults use the facial attractiveness of avatars as a social cue in the same way they do real peers is currently unknown. Using Mii™ avatars from the popular Nintendo® Wii™ video game console, Study 1 found that the facial attractiveness ratings of real people strongly predicted the attractiveness ratings of avatar faces based on the former group. Study 2 revealed that adults (n = 46) and children (n = 42) prefer attractive avatars as social partners. The results of this set of methodological studies may help to clarify future research on the relationship between attractiveness and behavior throughout the lifespan. Furthermore, the use of avatars may allow studies to experimentally examine the effects of attractiveness in situations in which such research is not ethical (e.g., peer victimization).

Keywords

attractiveness stereotype; differential treatment; social development; methodology; Nintendo® Wii™; avatars

Decades of research demonstrate that children and adults judge each other based on physical attractiveness. Attractive people are viewed as more sociable, honest, intelligent, and superior social partners compared with less attractive people (see Langlois et al., 2000 for a review and meta-analysis). Furthermore, these judgments are correlated with differential treatment in social and occupational settings. Not only are unattractive people less likely to

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be chosen as dating partners, but also they are less likely to receive equal pay and job advancement (Hamermesh, 2011; Hamermesh & Biddle, 1994; Hosoda et al., 2003). These presumed characteristics are not merely skin deep: Attractive people exhibit more socially desirable behaviors and traits compared with less attractive people (Langlois et al., 2000). Thus, attractiveness and differential treatment/behavior are particularly intertwined.

This association poses a problem for research that examines the development of attractiveness-related behavior and the impact of appearance on differential treatment. If attractive people are superior social partners, then research cannot unequivocally conclude that participants' choices of social partners develop because their partners are more attractive, more friendly, or both. Therefore, research that seeks to test the role of experience must separate attractiveness from behavior to determine their individual effects.

Modern technology allows researchers to separate behavior from appearance. In fact, computer science and virtual world research has revealed that adult behaviors in virtual social situations are similar to those in the real world. For instance, adults show realistic standards of interpersonal space with avatars (Bailenson, Blascovich, Beall, & Loomis, 2003), behave differently based on whether the agent resembles themselves or others (Bailenson, Beall, Blascovich, Raimundo, & Weisbuch, 2001), and prefer and are even persuaded by avatars programmed to mimic their own bodily behavior on a 4-s delay (Bailenson & Yee, 2005). Moreover, humans interact with computers in a social way (Nass, Steuer, & Tauber, 1994), hence the rise of avatars in everyday life.

Importantly, the physical appearance of avatars predicts adult online social behavior. Yee and Bailenson (2007) found that different self-representations change the way participants behave: the Proteus Effect. For example, participants who were assigned attractive avatars showed more behaviors associated with intimacy (e.g., less interpersonal distance and more self-disclosure) than those assigned less attractive avatars. Furthermore, people with taller avatars negotiate more aggressively than those with shorter avatars. Thus, the facial attractiveness of the perceiver's avatar predicts the perceiver's behavior with regard to the target.

Does the facial attractiveness of the target's avatar influence perceiver behavior? Here, the answer is less clear. Social learning via an avatar is promoted when the agent resembles the participant or a known stereotype (e.g., females will chose to learn about engineering from avatars who are "male, older, and uncool"; Baylor, 2009; Baylor, Rosenberg-Kima, & Plant, 2006). In a study of an early virtual environment, Suler (1996) noted that attractive avatars elicited significantly more attention from other gamers and encouraged them to behave in more flirtatious ways. Additional research has focused on differences in sexual attractiveness (e.g., Banakou & Chorianopoulos; Fox & Bailenson, 2009). Although these studies demonstrate that a form of target avatar attractiveness predicted perceiver behavior, the targets in question were not realistic representations of the general population. For instance, the attractive avatars that garnered more flirtation behaviors in Suler (1996) were often images of lingerie-clad females. Participants most likely did not believe their interaction partner resembled these images. In fact, people often use avatars for escapism and fantasy. With regard to the Proteus Effect, Yee, Bailenson, and Ducheneaut (2009) found that people who played as more attractive avatars were more successful at an online video game; however, "attractive" avatars were often nubile females, whereas "unattractive" avatars were often (literally) green ogres. These types of attractiveness disparities do not exist in the real world where the difference between a highly attractive face and a very unattractive face might be a matter of millimeters between features (see Pallett, Link, & Lee, 2010). Thus, we cannot be sure whether the attractiveness effects observed in these studies are similar to the classic attractiveness effects observed with real people in the literature.

Lastly, although some research has used avatar methodologies with children (see Segovia & Bailenson, 2009), we do not know whether children perceive avatars based on attractiveness in ways that match their perceptions of real peers.

Therefore, the current studies sought to determine whether people respond to avatar facial attractiveness in a manner predicted by the research on human attractiveness. Study 1 examined whether people use attractiveness to differentiate avatars based on real people. Although previous research suggests that adults cognitively represent non-human faces such as those belonging to chimpanzees (Principe & Langlois, 2012) and cartoons (Chen, Russell, Nakayama, & Livingstone, 2010) in similar ways to human faces, computerized avatars do not have many of the same cues that people typically use to identify facial attractiveness in humans (e.g., skin quality; see Thornhill & Gangestad, 1999). Thus, it is unclear as to whether people perceive humans and the avatars that resemble them as similar. Study 2 sought to replicate the findings from the developmental literature that repeatedly shows that adults and children prefer attractive peers as social partners (e.g., Dion, Berscheid, & Walster, 1972; Dion & Berscheid, 1974; Ramsey & Langlois, 2002) by testing whether 6- to 10-year-olds and adults prefer attractive to unattractive avatars as social partners.

Study 1

Method

Participants—Sixty-four undergraduates (20 male) rated Miis for attractiveness. An additional 96 undergraduates (58 male) rated human faces for attractiveness. The self-reported race/ethnicity of these raters was Caucasian (47.06%), Asian (21.93%), Hispanic (19.25%), African-American (5.35%), mixed (3.21%), or they did not report (3.21%). Undergraduates received partial course credit for their contribution. Children did not rate photographs because previous research demonstrates that adults and children agree on attractiveness judgments (e.g., Langlois et al., 2000).

Apparatus—To create avatars, we employed a Nintendo® Wii™. Unlike collaborative virtual environments such as Second Life (see http://secondlife.com/?v=1.1) in which users are actively encouraged to create an avatar with a unique appearance, the culture of the Wii encourages the creation of self-representative (albeit cartoonish) avatars called Miis™. Furthermore, because Miis are built from manufacturer-provided templates, researchers are easily able to design faces that deviate from each other in facial attractiveness only (rather than confounding attractiveness with sex, body type, facial expression, and so forth), thereby avoiding the weaknesses of other studies (e.g., Banakou & Chorianopoulos, 2010; Khan & De Angeli, 2009). The Wii was the first home console video game system to use motion-controlled technology. As a result of this feature and an aggressive marketing campaign, the Wii has been unusually successful at appealing to non-traditional gamers such as women and those older than 36. Moreover, as of June 30, 2012, Nintendo had sold over 96 million Wiis, making it one of the best-selling entertainment devices of the last 10 years. Thus, unlike past avatar research, which primarily examines adult participants who have no experience with a particular virtual technology, Mii avatar interactions are a commonplace part of children and adults' lives.

Stimuli—The stimuli consisted of two sets. The first set included 39 Caucasian undergraduate students (20 male) who had been recently photographed for their participation in a different study (see Principe, Rosen, Taylor-Partridge, & Langlois, in press). Participants posed with a neutral expression and a drape that obscured clothing cues. Images were standardized for size, lighting, and color using Adobe Photoshop 8.0™.

The second set of stimuli included 39 Mii avatars created using a Wii. The first set of human faces served as the template for creating the Miis. Like the human images, all Miis were given a standard facial expression so that raters would not differentiate Miis based on expressiveness. Unlike the human images, however, Miis were given a slight smile rather than a neutral expression (straight line) because pilot participants reported that neutral Miis appeared angry or upset. The final Miis were of a typical cartoonish nature (see Figure 1). We took photographs of each Mii from a 77-in plasma monitor. Photoshop smoothed the pixilated appearance of images captured from the monitor. Like the human images, we standardized each Mii image for size, lighting, and color.

Procedure—The rating procedure for human and Mii faces was identical. Participants rated images for attractiveness on a 7-point Likert scale (1 = very unattractive, 7 = very attractive). Participants first viewed all the faces they were to rate (either 39 humans or 39 Miis) in a random order for 1 s to gauge the attractiveness range of the faces. Immediately afterward, participants received 5 s to record their rating with pencil and paper for each Mii; again, each Mii was shown in random order (different from the initial exposure).

Results and Discussion

The mean attractiveness ratings of human faces significantly predicted the mean attractiveness ratings of Mii faces ($\beta = 0.65$, $p < .001$, $R^2 = .25$; Figure 2). The range of mean ratings of human faces was 2.40–5.08 (M = 3.41, SD = 0.72), and the range of mean ratings of Miis was 1.64–5.04 (M = 3.51, SD = 0.92). The inter-rater reliabilities for Mii and human facial attractiveness ratings were high ($\alpha > .95$). This significant relationship demonstrates that people discriminate digital avatars—even cartoonish ones—by facial attractiveness in much the same way they do images of real people. This result is somewhat surprising given that few attractiveness-related cues (e.g., skin quality) distinguish the Mii images.

Together with the previous work on behavior with avatars, this finding suggests that adults perceive avatars in the same way they would real people. However, previous research has not experimentally examined children with respect to avatars differing in attractiveness. Research demonstrates that children identify images of attractive peers as socially favorable (e.g., Dion & Berscheid, 1974; Ramsey & Langlois, 2002). To determine whether this hypothesis is correct for digital avatars, children and adults chose social partners from among high, medium, and low attractive Miis in Study 2.

Study 2

Method

Participants—Forty-six undergraduates (24 male; M = 19.84, SD = 2.79 years) and forty-two 6- to 10-year-olds (22 male; M = 7.84, SD = 1.52 years) participated. The self-reported race/ethnicity of the undergraduates was Caucasian (52.17%), Asian (26.09%), African-American (13.04%), Hispanic (6.52%), and mixed-race (2.18%). The parent-reported race/ethnicity of the children was Caucasian (83.33%), Hispanic (9.52%), Asian (4.76%), and mixed-race (2.39%). Undergraduates received partial course credit for their contribution. Children received a prize.

Stimuli and apparatus—We chose six Miis from Study 1 to represent the levels of attractiveness (low, medium, and high) for both sexes (see Figure 1). The mean (SD) attractive ratings for the low, medium, and high tertiles of female Miis were 2.53 (0.51), 3.78 (0.31), and 4.67 (0.28), respectively; the same ratings for the male Miis were 2.24 (0.44), 3.48 (0.30), and 4.22 (0.42). The experimental suite was equipped with a 77-in

monitor connected to a Nintendo Wii. Because we wanted participants to believe that the Miis represented real people (see Procedure), we controlled the avatars via an unseen, adjacent control room. A closed-circuit television camera provided a video feed of the monitor in the Wii room to a second television in the control room. Study confederates controlled the Wii via a secondary light sensor.[1]

Procedure—Rather than using Miis as stand-ins for facial stimuli, we sought to observe participant behavior when they believed each Mii represented a real person with whom they could interact but not see. To accomplish this goal, we told all participants that they were joining an in-progress study with three same age and gendered peers. We told participants that those who arrived first had created Miis to resemble themselves and that these avatars "looked a lot like" the real participants. In fact, many of our participants spontaneously told us that they had previously created Miis that closely resembled themselves, their friends, their parents, and so on. As such, we were confident that participants believed they were playing with real people. Participants subsequently created their own Miis.

Next, we told participants that they would be playing a game of doubles tennis on Wii Sports™ with the study participants located in adjacent rooms. In reality, the other "participants" were the set of high, medium, and low attractive Miis controlled by three confederates. We also told participants that they were "randomly selected" to choose doubles- tennis teams. At this point, a confederate entered the study room to display images of the high, medium, and low attractive Miis (sex-matched with the participant to avoid confounding sex and attractiveness judgments). The experimenter showed the participant these images in a row, with the order of faces (e.g., left, middle, right) counterbalanced across participants. The researchers counted the number of participants who chose the low, medium, and high attractive Miis as partners.

Results and Discussion

A chi-square test of independence revealed that sports-partner choice was not independent of Mii attractiveness level (high chosen 62.5% of the time; medium 25%; low 12.5%; $\chi^2 = 35.75$, $p < .001$; see Table 1). As expected, there was no difference in social-partner preferences across age groups ($\chi^2 = 3.28$, $p = .19$): Both children and undergraduates chose to play with the most attractive avatar, and by definition, against the lesser attractive avatars. Furthermore, although children did not rate the attractiveness of Mii faces in Study 1, the results of Study 2 support previous research showing that there are no age-related differences in facial attractiveness judgments, even among non-human avatars. Because we cannot prove the null hypothesis that there were no age differences, we calculated the effect size of this non-significant difference and determined that, if there is an age difference with regard to perceptions of Mii attractiveness, it is small and not of interest to the current research (Cramér's V = 0.19). As a whole, Study 2 suggests that we can experimentally examine the development of behaviors that vary by attractiveness using an avatar methodology.

General Discussion

Taken together, these studies demonstrate that adults and children respond to avatars differing in attractiveness in a way that matches how they respond to real people.

[1]The Wii is interfaced through wireless remotes that relay button presses via Bluetooth™. A camera in the front of the remote detects infrared light from a sensor above or below the monitor and triangulates its position in three-dimensional space back to the console, enabling point-and-click functionality. Because the Wii was designed so that any infrared light source can be read by the remote, we were able to set up a second light sensor in an adjacent room and have equal control of the Wii from a secondary video feed as the participant in the main room.

Specifically, we discovered that not only is avatar attractiveness predicted by the attractiveness of the real people upon whom they were based (Study 1), but also children and adults prefer to play with high attractive avatars compared with medium or low attractive avatars just as they would real peers (Study 2). Thus, avatars are viable replacement for real people when determining the role attractiveness plays in the social behaviors of children and adults.

In addition to using avatars to replace real people, the static images of avatars may also have value as a replacement for images of real people. As previously mentioned, avatars can be standardized to a greater degree than images of real people. Studies with adults often use face-generation software to overcome this problem; however, this solution is somewhat problematic for children because these images are typically of bald adults (see http://facegen.com/), which most likely does not reflect a majority of children's experience with faces. Thus, Miis may be "kid friendly" alternatives to highly standardized images. Furthermore, many studies using faces of real people are unable to publish examples due to privacy concerns. Therefore, the current studies reveal multiple methodological uses for avatars.

Blascovich et al. (2002) has argued that virtual environment technology is an important tool for understanding social behaviors. We agree; our results add to this argument by showing that a household gaming technology, which is relatively cheap and familiar to participants, can accomplish research goals involving children (particularly younger children who have more difficulty sitting still or in paradigms that require multiple participants). Importantly, avatars may be more than mere stand-ins for real people in psychological research. Millions of people of all ages and both sexes participate in online worlds with the primary goal of meeting and interacting with people via an avatar. Thus, these virtual environments themselves are worthy of continued study, and psychologists have only begun to investigate the associated research possibilities. Past work has examined avatars and virtual environments in education (e.g., Petrakou, 2010), physiological arousal (Lim & Reeves, 2010), and physical appearance (e.g., Vasalou & Joinson, 2009; Yee et al., 2010). To our knowledge, our research is the first to show that children and adults respond to digital avatars that differ in attractiveness in similar ways as they typically respond to real people. This finding opens the possibility of attractiveness research that is not possible with real children. For example, several naturalistic studies have found a relationship between perceived unattractiveness and both active (i.e., bullying: Björkqvist, Ekman, & Lagerspetz, 1982; O'Moore & Kirkham, 2001; Salmivalli, 1998) and passive (i.e., exclusion: Leenaars, Dane, & Marini, 2008; Owens, Shute, & Slee, 2000) peer victimization. Specifically, using avatars in place of a real victim may allow researchers to experimentally examine important and dangerous social phenomena that are not ethically reasonable with human participants (e.g., we cannot randomly assign children to bully and bullied conditions).

Because social behaviors and attractiveness judgments are intertwined, more research is needed to further understand their co-development. For example, future research should address whether children learn or behave differently when avatars exhibit stereotype-consistent versus stereotype-inconsistent behaviors. Ultimately, researchers should seek to examine whether avatar-based technologies can be used as an effective tool to alter negative social behaviors. One of the problems associated with the attractiveness stereotype (as opposed to race and gender stereotypes) is that few people, and perhaps especially children, are aware that they behave differently based on the attractiveness of others in everyday situations (Hamermesh, 2011). However, discriminatory behaviors often wane when they are brought to the perceiver's conscious attention (see Milligan Hughes & Bigler, 2007). We are hopeful that the use of avatar-related technologies will aid dissemination of the fact that judgments and behaviors are based on physical attractiveness.

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References

Bailenson JN, Beall AC, Blascovich J, Raimundo M, Weisbush M. Intelligent agents who wear your face: Users' reactions to the virtual self. Lecture Notes in. Computer Science. 2001; 2190:86–99.10.1007/3-540-44812-8_8

Bailenson JN, Blascovich J, Beall AC, Loomis JM. Interpersonal distance in immersive virtual environments. Personality and Social Psychology Bulletin. 2003; 29:819–833.10.1177/0146167203029007002 [PubMed: 15018671]

Bailenson JN, Yee N. Digital chameleons: Automatic assimilation of nonverbal gestures in immersive virtual environments. Psychological Science. 2005; 16:814–819.10.1111/j.1467-9280.2005.01619.x [PubMed: 16181445]

Banakou D, Chorianopoulos K. The effects of avatars' gender and appearance on social behavior in virtual worlds. Journal of Virtual Worlds Research. 2010; 2:4–16. Retrieved from http://journals.tdl.org/jvwr/index.

Baylor AL. Promoting motivation with virtual agents and avatars: role of visual presence and appearance. Philosophical Transactions of the Royal Society B: Biological Sciences. 2009; 364:3559–3565.10.1098/rstb.2009.0148

Baylor AL, Rosenberg-Kima RB, Plant EA. Interface agents as social models: The impact of appearance on females' attitude toward engineering. Conference on Human Factors in Computing Systems. 2006:526–531.10.1145/1125451.1125564

Björkqvist K, Ekman K, Lagerspetz KM. Bullies and victims: Their ego picture, ideal ego picture and normative ego picture. Scandinavian Journal of Psychology. 1982; 23:307–313.10.1111/j.1467-9450.1982.tb00445.x

Blascovich J, Loomis J, Beall AC, Swinth KR, Hoyt CL, Bailenson JN. Immersive virtual environment technology as a methodological tool for social psychology. Psychological Inquiry. 2002; 13:103–124.10.1207/S15327965PLI1302_01

Buss DM. The evolution of human intrasexual competition: Tactics of mate attraction. Journal of Personality and Social Psychology. 1988; 54:616–628.10.1037/0022-3514.54.4.616 [PubMed: 3367282]

Cashdan E. Are men more competitive than women? British Journal of Social Psychology. 1998; 37:213–229.10.1111/j.2044-8309.1998.tb01166.x [PubMed: 9639863]

Cavalli, E. World of Warcraft hits 11.5 million users. Wired. 2008 Dec. Retrieved from http://www.wired.com/gamelife/2008/12/world-of-warc-1/

Chen H, Russell R, Nakayama K, Livingstone M. Crossing the 'uncanny valley': Adaptation to cartoon faces can influence perception of human faces. Perception. 2010; 39:378–386.10.1068/p6492 [PubMed: 20465173]

Dion KK, Berscheid E. Physical attractiveness and peer perception among children. Sociometry. 1974; 37:1–12. Retrieved from http://www.jstor.org.

Dion K, Berscheid E, Walster E. What is beautiful is good. Journal of Personality and Social Psychology. 1972; 24:285–290. [PubMed: 4655540]

Fox J, Bailenson JN. Virtual virgins and vamps: The effects of exposure to female characters' sexualized appearance and gaze in an immersive virtual environment. Sex Roles. 2009; 61:147–157.10.1007/s11199-009-9599-3

Hamermesh, DS. Beauty pays. Princeton, NJ: Princeton University Press; 2011.

Hamermesh DS, Biddle JE. Beauty and the labor market. The American Economic Review. 1994; 84:1174–1194. Retrieved from http://www.aeaweb.org/aer.

Hosoda M, Stone-Romero EF, Coats G. The effects of physical attractiveness on job-related outcomes: A meta-analysis of experimental studies. Personnel Psychology. 2003; 56:431–462.10.1111/j.1744-6570.2003.tb00157.x

Khan R, De Angeli A. The attractiveness stereotype in the evaluation of embodied conversational agents. Lecture Notes in Computer Science. 2009; 5726:85–97.10.1007/978-3-642-03655-2_10

Langlois JH, Kalakanis L, Rubenstein AJ, Larson A, Hallam M, Smoot M. Maxims or myths of beauty? A meta-analytic and theoretical review. Psychological Bulletin. 2000; 126:390–423.10.1037/0033-2909.126.3.390 [PubMed: 10825783]

Langlois JH, Ritter JM, Casey RJ, Sawin DB. Infant attractiveness predicts maternal behaviors and attitudes. Developmental Psychology. 1995; 31:464–472.10.1037/0012-1649.31.3.464

Leenaars LS, Dane AV, Marini ZA. Evolutionary perspective on indirect victimization in adolescence: The role of attractiveness, dating and sexual behavior. Aggressive Behavior. 2008; 34:404–415.10.1002/ab.20252 [PubMed: 18351598]

Lim S, Reeves B. Computer agents versus avatars: Responses to interactive game characters controlled by a computer or other player. Journal of Human Computer Studies. 2010; 68:57–68.10.1016/j.ijhcs.2009.09.008

Milligan, Hughes J.; Bigler, RS. Addressing race and racism in the classroom. In: Frankenberg, E.; Orfield, G., editors. Lessons in Integration: Realizing the Promise of Racial Diversity in American Schools. Richmond, VA: University of Virginia Press; 2007. p. 190-206.

Nass C, Steuer J, Tauber ER. Computers are social actors. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Celebrating Interdependence. 1994:72–78.10.1145/191666.191703

Owens L, Shute R, Slee P. 'I'm in and you're out…': Explanations for teenage girls' indirect aggression. Psychology, Evolution, & Gender. 2000; 2:19–46.10.1080/14616660050082906

Pallett PM, Link S, Lee K. New "golden" ratios for facial beauty. Vision Research. 2010; 50(2):149–154.10.1016/j.visres.2009.11.003 [PubMed: 19896961]

Petrakou A. Interacting through avatars: Virtual worlds as a context for online education. Computers & Education. 2010; 54:1020–1027.10.1016/j.compedu.2009.10.007

Principe CP, Langlois JH. Shifting the prototype: Experience with faces influences affective and attractiveness preferences. Social Cognition. 2012; 30:109–120.10.1521/soco.2012.30.1.109 [PubMed: 23226915]

Principe CP, Rosen LH, Taylor-Partridge T, Langlois JH. Attractiveness differences between twins predicts evaluations of self and co-twin. Self and Identity. in press. 10.1080/15298868.2012.655895

Ramsey JL, Langlois JH. Effects of the "Beauty Is Good" stereotype on children's information processing. Journal of Experimental Child Psychology. 2002; 81:320–340.10.1006/jecp.2002.2656 [PubMed: 11884093]

Raudenbush, SW.; Bryk, AS. Hierarchical linear models: Applications and data analysis methods. 2. Thousand Oaks, CA: Sage; 2002.

Salmivalli C. Intelligent, attractive, well-behaving, unhappy: the structure of adolescents' self-concept and its relations to their social behavior. Journal of Research on Adolescence. 1998; 8:333–354.10.1207/s15327795jra0803_3

Segovia KY, Bailenson JN. Virtually true: Children's acquisition of false memories in virtual reality. Media Psychology. 2009; 12(4):371–393.10.1080/15213260903287267

Suler, J. The psychology of avatars and graphical space in multimedia chat communities. 1996. Retrieved June 6, 2010, from http://www-usr.rider.edu/~suler/psycyber/psyav.html

Sweeting H, West P. Being different: Correlates of the experience of teasing and bullying at age 11. Research Papers in Education. 2001; 16:225–246.10.1080/02671520110058679

Vasalou A, Joinson AN. Me, myself and I: The role of interactional context on self-presentation through avatars. Computers in Human Behavior. 2009; 25:510–520.10.1016/j.chb.2008.11.007

Yee N, Bailenson JN, Ducheneaut N. The Proteus effect: Implications of transformed digital self-representation on online and offline behavior. Communication Research. 2009; 36:285–312.10.1177/0093650208330254

Highlights

- Avatar attractiveness is highly correlated with that of real people
- Children and adults prefer to play with high attractive avatars as social partners
- Avatars thought to represent real people evoke differential treatment in children
- This method allows for study designs not otherwise ethically feasible in children

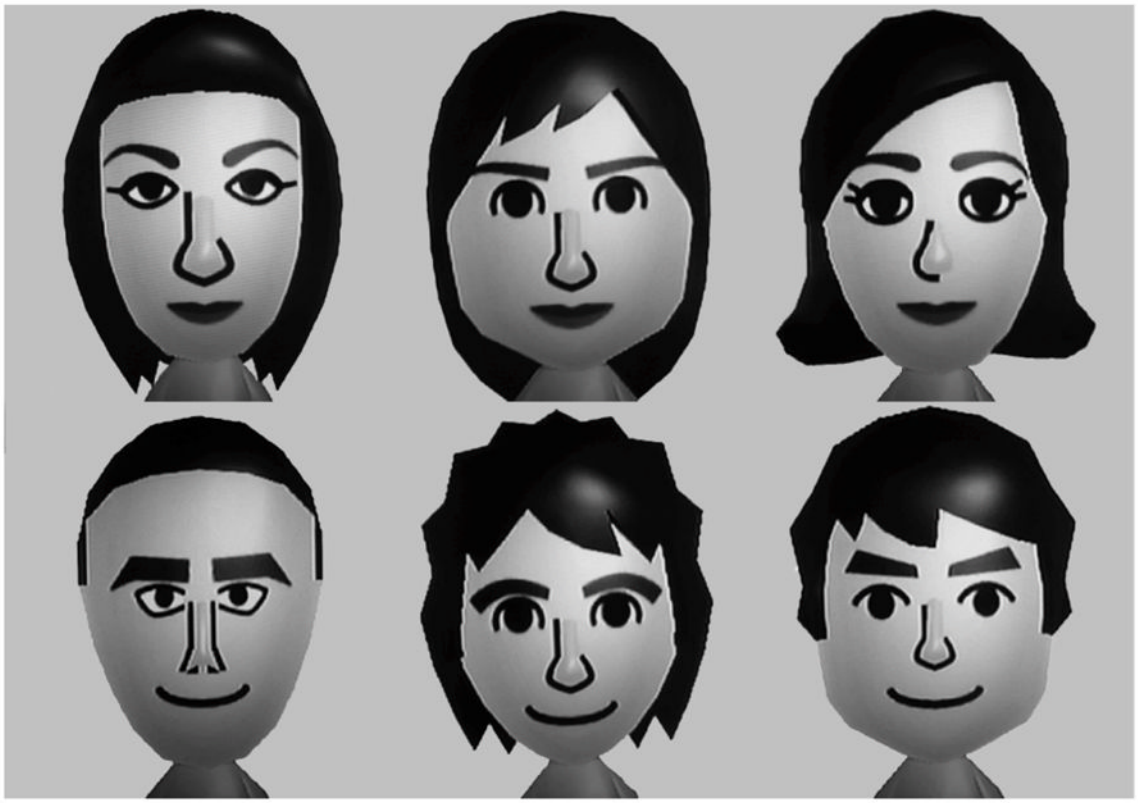

Figure 1.
Miis of differing attractiveness. The mean ratings (SDs) for the exemplars used in Study 2 and shown below (top, from left to right) were 1.64 (0.85), 3.45 (1.46), and 5.00 (1.33) as well as (bottom, from left to right) 1.82 (0.89), 3.65 (0.85), and 5.04 (1.46).

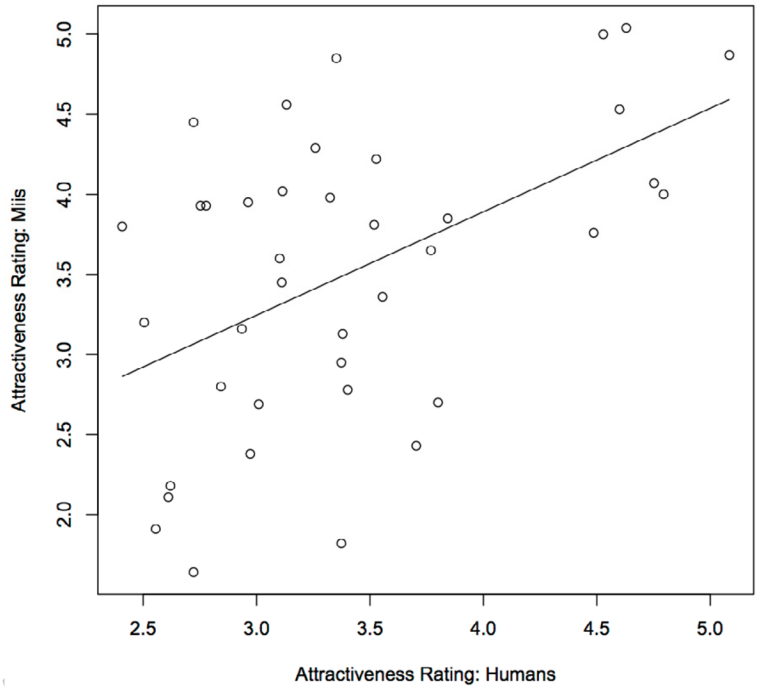

Figure 2.
The attractiveness ratings of Mii avatars are predicted by the human faces upon whom they were based.

Table 1

Chi-square test of independence table

Age Group	Low Attractive	Medium Attractive	High Attractive
Children	5	7	30
Adults	6	15	25