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Dancing with Robots and Women in Robotics Design

Men in literature, film, and art have long been pictured dancing with robots and dolls—beautiful artificial women who gaze at them lovingly and fill them with wonder and bliss. In a pivotal scene in E.T.A. Hoffmann’s “The Sandman,” Nathanael dances with Olympia and is captivated by her charms, without realizing that she is only a mechanical doll. These men are swept up in the charms of the uncanny as they dance with a woman that isn’t real. Soon, though, their dreams, like Nathanael’s, will be shattered as their fantasy female is torn apart. Updating the image, in American writer Hannah Dela Cruz Abrams’s novella *The Man Who Danced with Dolls* (2012), the male narrator watches with wonder as an Argentinian busker in a subway entertains passersby by dancing with his beloved doll Beatrice, but there is a sad poignancy when errant boys destroy his beloved doll.¹

In the 2004 film remake of Hollywood’s *The Stepford Wives*—a film that spoofs men’s quest for the perfect female—dancing with a robot became a metaphor for illusory connubial bliss. In the film’s climactic scene, Walter enters the Stepford ballroom with his beautiful, newly transformed (or so it seems) robotic wife, Joanna, on his arm and invites her to join him in a “midsummer night’s glorious waltz.” Joanna in her shimmering dress is radiant as the two gracefully swirl to the strains of the movie’s theme, and they are soon joined by a ballroom-full of men dancing with their glamorous robot wives. At the end of the film, though, when Walter sets in motion a “nanoreversal,” the men lose their perfect dance partners, who jarringly revert back to real.

Designing Robot Women

But for at least one twenty-first-century male roboticist, untroubled by the artifice, the idea of a robot female dance partner had special appeal. In 2005, engineering and robotics professor Kazuhiro Kosuge of Tohoku University in Japan dazzled audiences with his waltzing pink plastic Pavlova, the prototype of a three-wheeled electronic female dubbed Partner Ballroom Dance Robot (PBDR) (plate VIII). Kosuge was in little danger of being shocked by the uncanny, for he led the team that created and designed this robot. PBDR was very much created with men in mind: it had a pretty face, a sexy molded plastic body and dress, and, with an added bit of whimsy, it sported what looked like two Mickey Mouse ears on top of its head. Equipped with underbody electronic sensors, Kosuge's robot was the kind of female dance partner men could fantasize about—a beautiful female who seemed responsive and could mirror their moods and moves.²

Kosuge's pink PBDR robot highlighted twenty-first-century trends in robot development as male roboticists used the latest in technologies to embody their fantasies about a perfect female (to his credit, Kosuge in an interview fretted that the compliant robot female partner—or an overly compliant android—could “feed our narcissism”). During the first decades of the twenty-first century, the field of robotics has been slow to turn its attention toward issues of gender in the production of robots. As male roboticists in academia, particularly in Japan and Korea, sought ways to make female robots ever-more realistic looking and acting, they seemed to be only rarely aware of how their research has been shaped by their attitudes toward women themselves.³

Robot women have often been envisioned by men as both nurturing and alluring—in essence, electronic versions of both the good and evil Marias in Fritz Lang's film *Metropolis* where the real Maria is a compassionate, caring female, and her robotic double is an alluring *femme fatale*. Often, when male roboticists refer to the beautiful artificial females they are developing, they refer to the robot's future use in a nurturing role. In his press interviews and academic papers, Professor Kosuge spoke not of the fantasy aspect of his PBDR robot, but instead he predicted that it could be used sometime in the future to provide care for the sick and elderly and companionship for people who were lonely.

In 2011, this type of crossover female robot with her dual roles as both helpful aide and pretty partner got a star-turn in the theater. Audiences at Ars Electronica in New York and in Melbourne watched *Sayonara*, a twenty-minute play by Oriza Hirata in which a young terminally ill girl sits facing a female caretaker who reads haiku and other short Japanese poems to her. The caretaker was actually an electronic robot, and her lines were spoken by an actress. In the play, after the girl dies, the caretaker keeps reading the poetry aloud and is sent away where she will continue to recite her lines in a place without humans. *Ars* (and robots) *longa, vita brevis*.

In the early twenty-first century, the availability of increasingly sophisticated software, sensors, and silicone made it possible for men to continue working at creating robot females that fulfilled both roles as the beautiful perfect partner and the nurturing caretaker. The eerie robot used in *Sayonara* was named Geminoid F. It was designed in 2010 by Japanese engineer and roboticist Hiroshi Ishiguro, director of the Osaka University Intelligent Robotics Communications Laboratory in Japan who worked with the Japanese Kokoru Company, makers of animatronics and ultrarealistic androids.

Geminoid F, with its composite European and Japanese face, was created using a live model, a young woman in her twenties who sat in front of a computer with cameras and face-tracking software that captured her head and mouth movements and reproduced them on the robot. The robot could be remotely controlled by a human operator and had the capacity to change facial expressions, smile, and frown. Its hands and face moved, though not its lower torso. In the play, the poetry-reciting caretaker had previously worked for an elderly client, and at the time Ishiguro's Geminoid F was in reality being tested for use in hospitals.

Both men and women roboticists have continued to work at creating intelligent, empathetic personal robots that will have future caretaking roles, but it is largely men who have created ultrarealistic female interactive robots. These robots created in Japan and Korea are often in the guise of pretty young females for use in research and in roles such as receptionists. Their ultimate goal as roboticists, wrote engineers Karl F. MacDorman and Hiroshi Ishiguro in 2005, was to create robots “indistinguishable from humans in external appearance and behavior”—robots, they felt, which were ideally suited for experiments on human behavior and to serve as future caretakers.⁴ (In academia, there were no references to creating realistic robots to serve as sexual playmates.)

Ishiguro was in the forefront of developing these lifelike female robots (he also created a robotic double of himself). In 2005 he introduced his female robot Repliee Q1 at the Prototype Robot Exposition in Aichi prefecture and later said that the name “Repliee” derived from the French word “to replicate” and also from the “replicants” or androids in Ridley Scott's 1982 film *Blade Runner*. To create the robot, Ishiguro used silicone molds of a female model's body and then metal and polyurethane body parts covered by the soft silicone skin. The robot, which was modeled on the Japanese newscaster Ayako Fujii, moved its mouth, spoke, blinked or fluttered its eyelids, and shifted its torso as though responding to approaching people. Like the Jaquet-Droz Lady Musician automaton two centuries earlier, its chest also rose and fell so that it looked like it was breathing.

A year later, in 2006, Ishiguro developed Repliee Q2 (plate IX), also known as Uando, again in collaboration with Kokoro Co. Ltd. Like its predecessor, the android had humanlike qualities created by endowing it with a shifting posture, blinking, the appearance of breathing, and it could also make some

- character Chi, a humanoid computer that is childlike but amusingly teachable by a young man. She is initially without clothes and an innocent, yet her on-off switch is located near her genitals.
- 26 Perhaps, as Steven Brown writes, the director Oshii suggests that the young girls themselves are complicit rather than innocent: they also embraced cultural constructions of beauty that transformed them into nonhuman, artificial-looking dolls. Stephen Brown, “Machinic Desires: Bellmer’s Dolls and the Technological Uncanny in *Ghost in the Shell 2: Innocence*,” in *Mechademia 3: Limits of the Human*, ed. Frenchy Lunning (Minneapolis: University of Minnesota Press, 2008), 244.
 - 27 Brown, “Machinic Desires,” 230, 234.
 - 28 Masahiro Mori, “*Bukimi no tani* [The Uncanny Valley],” originally published in Japanese in *Energy* 7, no. 4 (1970): 33–35. English translation by Karl F. MacDorman and Norri Kageki, *IEEE Robotics and Automation Magazine* 19, no. 2 (June 2012): 98–100.
 - 29 As another form of the helpful, electronic, disembodied female voice, in 2011, Apple introduced Siri, its iPhone female personal assistant, and in 2014, Windows introduced its own personal assistant Cortana for use on Windows phones. Cortana was named after the highly intelligent, skilled, and sexily naked holographic female AI character in the Halo video game series.
 - 30 Jonze in a *New York Times* story is quoted as saying about Watts in connection with *Her*, “Alan Watts talks about it. Everything’s in a constant state of change, and to try to be the same as the way you were the day before is painful.” Logan Hill, “A Prankster and His Films Mature,” *New York Times*, Movies section, November 1, 2013.

Chapter 5: Engineering the Perfect Woman

- 1 Auguste Villiers de l’Isle-Adam, *L’Ève future*, trans. Robert Martin Adams, *Tomorrow’s Eve* (1982; Champaign: University of Illinois Press, 2001), 68.
- 2 *Ibid.*, 81.
- 3 *Ibid.*, 64.
- 4 Mary R. Melendy, *The Perfect Woman/Perfect Womanhood for Maidens-Wives-Mothers* (1901; K. T. Roland, 1903), 28.
- 5 *Ibid.*, 28, 52.
- 6 *Ibid.*, 27
- 7 *Ibid.*, 28.
- 8 Carol Marvin has also cited romantic poetry in nineteenth-century electrical journals which metaphorically identified women with technological objects and called women, “telephones.” Marvin, *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century* (New York and London: Oxford University Press, 1988), 30.

Chapter 6: Dancing with Robots and Women in Robotics Design

- 1 Hannah Dela Cruz Abrams, *The Man Who Danced with Dolls* (Westborough, MA: Madras Press), 2012.
- 2 With underbody sensors, the robot—lacking legs and matching only the movements of the upper body—could follow the male dancer’s lead and predict which way he would move through his hand pressure on its back. In the following years, Professor Kosuge and his group introduced a male dance partner as well.
- 3 For manufacturers of realistic, robotic sex dolls, of course, the gendered nature of the dolls was unequivocal.

- 4 Karl F. MacDorman and Hiroshi Ishiguro, 2005 essay, cited in “The Uncanny Advantage of Using Androids in Social and Cognitive Science Research,” *Interaction Studies* 7, no. 3 (2006): 314–315. In the decades ahead, male roboticists continued to work on developing lifelike female robots. In 2006, the young female robot EveR-1 was developed by the Korean Institute of Industrial Technology based at the Korean University of Science and Technology (KITECH). The robot made use of speech recognition and voice synthesis software, and its entire body was covered with artificial skin. A later model, EveR-3, introduced in 2009, had wheels for locomotion, and EveR-4, introduced in 2012 in Korea, had an artificial tongue and legs but could not walk and was envisioned for work in theme parks or as a receptionist. In 2014, Hiroshi Ishiguro introduced female androids named Kodomoroid and Otonaroid at a Tokyo exhibit. Kodomoroid acted as a newscaster, and when she flubbed her lines, she said, “I’m a bit nervous.”
- 5 MacDorman and Ishiguro, “The Uncanny Advantage,” 315.
- 6 Yuri Kageyama, “Robots Dance, Play at World Expo.” Reprinted in usatoday30.usatoday.com/tech/news/robotics/2005-06-09-robot-expo_x.htm, accessed August 5, 2011.
- 7 Masahiro Mori, “The Uncanny Valley,” originally published in Japanese in *Energy* 7, no. 4 (1970): 33–35. English translation by Karl F. MacDorman and Norri Kageki, 2012.
- 8 Mori argued that rather than developing and using realistic robots, it was better to keep robots artificial looking, made of metal or synthetic material, to avoid the feeling of the uncanny valley—the feeling of alienation and distancing. Later studies suggested that the elderly fare better with mechanical rather than humanoid-looking robots because there is little danger of confusion.
- 9 Mark Seltzer, *Serial Killers: Death and Life in America’s Wound Culture* (New York and London: Routledge, 1998), 271, cited in Caroline Evans, *Fashion at the Edge: Spectacle, Modernity, and Deathliness* (New Haven and London: Yale University Press, 2003), 175.
- 10 MacDorman and Ishiguro, “The Uncanny Advantage,” 297.
- 11 *Ibid.*, 298–299, 301, 303, 314. In 2009, Christoph Bartneck, working with others including Ishiguro, again argued in favor of developing highly realistic androids and cited weakness in the hypothesis that “a highly realistic robot is like less than a real human.” Christoph Bartneck, T. Kanda, H. Ishiguro, et al., “My Robotic Doppelgänger: A Critical Look at the Uncanny Valley,” *Proceedings of the 18th IEEE International Symposium on Robot and Human Interactive Communication ROMAN 2009* (Toyama, 2009): 269–276. For their study, they looked at Hiroshi Ishiguro and his robotic copy of himself, Gemanoid H11. MacDorman’s work is discussed in “Too Scary to Be Real, Research Looks to Quantify Eeriness in Virtual Characters,” IU News Room, Bloomington, Indiana University, September 21, 2009. <http://newsinfo.iu.edu/news/page/normal/11945.html>
- 12 MacDorman, “Too Scary to Be Real.”
- 13 The participants consisted of forty-five Indonesians (thirty-seven male and eight female) aged seventeen to sixty, though the majority were in the younger range. The participants were given questionnaires and asked to rate thirty-one images in random order on a nine-point scale of human likeness—very mechanical to very human, very strange to very familiar. The experimenters noted that the morphed images that were rated as uncanny were static, even though Mori had observed that movements increase the effect of the uncanny valley (MacDorman and Ishiguro, “The Uncanny Advantage,” 301–305, 308).