

ASIEN

The German Journal on Contemporary Asia

C 13206

ISSN 0721-5231

Nr. 140 | Juli 2016

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DGA
DEUTSCHE GESELLSCHAFT FÜR ASIENKUNDE E.V.
GERMAN ASSOCIATION FOR ASIAN STUDIES

Essay

An Oscar for Wakamaru: Robots, Gender, and Performance

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Summary

Beginning with an introduction to the robot Wakamaru, followed by the origins and current definitions of the word “robot,” this essay interrogates the differences between sex and gender in humans and humanoids, with a focus on Japanese robots. I compare the gender technologies employed in the all-male Kabuki theatre, which emerged in the early 1600s, and in the all-female Takarazuka Revue, founded in 1913, and elucidate their influence on the attribution and “performance” of robot gender. I argue that human actors and humanoid robots alike simultaneously call attention to the mutable artifice of gendered identities and recuperate the binary construction of gender, reinforcing in the process heteronormative conventions of being in the world.

Keywords: robots, androids, gender, cross-dressing, theatre, Japan

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* I would like to thank Cosima Wagner, Freie Universität Berlin, and Susanne Brucksch, German Institute of Japanese Studies (DIJ), Tokyo, for inviting me to contribute to their timely special issue on STS (science, technology, and society) in Japan. This special issue of *ASIEN* demonstrates the importance of Japan as a site for exploring new vectors of technology and intersections of the humanities and sciences, and for generating new methodologies and theoretical approaches in STS studies. Collectively, the contributors decenter the mostly Eurocentric focus of STS. Parts of this article are included in a chapter on robot gender in my forthcoming book, *Robo sapiens japonicus: Robots, Eugenics, and Posthuman Aesthetics* (University of California Press). My research on this topic was supported by a John Simon Guggenheim Memorial Foundation Fellowship (2011–2012), an Abé Fellowship (Social Science Research Council, 2010–2012), and a Faculty Research Grant, Center for Japanese Studies, University of Michigan (2012, 2015).

Introduction: Robots and gender

I teach, at the University of Michigan, a class on sex and gender in Japan that includes a section on gendering robots. When I show the students a picture of Wakamaru (Figure 1 below), a humanoid robot, almost all of them see a “fembot” on account of its petticoat-like shape.

Figure 1: Wakamaru robots in *I, Worker*. Momoko is on the left, Takeo on the right.



Source: Photograph by Brett Davis taken in 2010, Osaka, Japan; from the website: <http://robotsonstage.com/> (accessed 2015-11-30).

Actually Wakamaru, manufactured by Mitsubishi Heavy Industries (MHI), is male-gendered. His conical body combines the shape of *yoroi* (medieval samurai armor) with that of the *hakama*, or pleated “skirt” worn over a man’s kimono. The canary-yellow¹ humanoid is named after the immortalized twelfth-century samurai, Minamoto Yoshitsune (1159–1189), whose childhood name was Ushiwakamaru. Wakamaru debuted at the 2003 ROBODEX event, held in Yokohama. “Wakamaru-*kun*” was conceived as a communication and companion robot for household use.² The boy-bot’s name is often followed by the masculine prefix *kun* — at least it was. When I first began research on Wakamaru, the MHI’s Japanese website attached the masculinizing suffix *kun* to his name, and their English site referred to Wakamaru as a “he.”, Since 2010, Wakamaru has been described, sans suffix, on the MHI website as “neither set to male nor female” (MHI 2016a). Suspiciously, the “Wakamaru story” on the MHI English website has the robot’s name, “Wakamaru,” inserted in a

1 Yellow was selected as the color for Wakamaru’s body because it “attracts attention, is invigorating, and has strong connotations with happiness” (MHI 2016).

2 Priced at around US\$14,000, one hundred Wakamaru robots were sold in the fall of 2005. In 2009 MHI closed down most of its robotics division and has only intermittently manufactured updated models of Wakamaru since. The robot is now rented to businesses and museums as a customer greeter, used as an experimental platform in robot laboratories, and even appears on stage in Japan, as I discuss in this article (Robonable 2009).

different typeface in places where “he” or “his” would have been used before (MHI 2016b).³

As Wakamaru illustrates, robot gender and the gendering of robots is, in part, culturally specific (as demonstrated by Wakamaru’s shape) and even controversial. The gender of some androgynous robots, like the canister-shaped childcare robot PaPeRo (NEC Corporation 2016), is assigned by consumers in the course of naming their new companion. Other robots, like Posy and Guard Robot D1 (discussed later on) are specifically designed as “female” and “male” respectively, based on their designated professions and social roles. But before continuing in this vein, some necessary background information is called for, beginning with the origins of the word “robot,” and followed by working definitions of the keywords “sex” and “gender.”

The English word robot derives from the Czech *robota*, or drudge laborer. Coined by litterateur Karel Čapek (1890–1938) and his artist brother Josef (1887–1945), the word first appeared in the former’s play, *R.U.R. (Rossumovi Univerzální Roboti [Rossum’s Universal Robots], 1920)*. A science fiction melodrama with comical passages, *R.U.R.* is about a factory (Rossum’s Universal Robots) that exists in the near future where artificial humans are mass produced from protoplasmic batter to be exported all over the world for use as tireless workers. To make a long story much shorter, newer model robots are provided with emotions and, now able to experience anger at their exploitation, revolt en masse. They kill all but one human, a traditional artisan. Since the formula for the batter has been destroyed, robots cannot reproduce themselves in the factory. Instead the artisan encourages one new model couple, who he calls “Adam and Eve,” to go ahead and repopulate the world with their own kind.

Čapek describes the R.U.R. robots as indistinguishable from flesh and blood humans. Two distinct categories of robot bodies are assembled at Rossum’s factory: female and male. The factory’s director explains why female models are needed, in effect distinguishing sex from gender. He notes that the factory is simply responding to customer demand for robots that will conform to gendered occupations; female robots are needed as “waitresses, shop-girls, secretaries” (Čapek 2004 [1921]: 22).⁴ Čapek’s robots thus reinforce the self-evident (and binary) construction of the sexual and

3 I took a screen shot of this page, fearing that the MHI webmaster would again make disappear the traces of Wakamaru’s originally male gender! Perhaps my lectures and articles in English and Japanese on robot gender (Robertson 2010, 2011, 2013) have provoked a defensive posture on the part of roboticists? Screenshots can serve to archive ephemeral websites.

4 Rossum’s robots are provided with nerves and intestines that are produced in spinning mills. Thousands of these artificial humans are then baked and dried before being shipped off as a readymade work force to destinations around the world. Despite their distinguishing genitalia, the female and male robots are not sexually attracted to each other; however the newer models with emotions, like Adam and Eve, prove to be an exception.

gendered division of labor in society. As will be elaborated on, Japanese robots are similarly also gendered, and for much the same reason.

Gender is often used in everyday speech as a more polite euphemism for sex, but sex and gender are not the same thing; it is important when analyzing gender to distinguish it from sex. There are at least two kinds of human bodies: the female body and the male body. That said, female and male bodies themselves are distinguished by a great deal of biological variability, from their outward appearance, or phenotype, to their biochemical constitution and their physical capabilities. The latter include menstruation and lactation in females, seminal ejaculation in males, and orgasm in both.⁵ Gender is not simply a “natural” feature or characteristic of biological female or male bodies. It refers to sociocultural and historical conventions of deportment, costume, posture, gesture, speech, and so forth that have been attributed and ascribed to, learned, and performed by female and male bodies. The conventions and cosmetic effects that constitute gender are usefully conceived as “cultural genitals” (Kessler and McKenna 1985 [1978]: 155), for they, rather than biological genitals, serve as markers of femaleness (and femininity) or maleness (and masculinity) in everyday life. This is true on stage as well, as demonstrated in Japan by the all-male Kabuki theatre and the all-female Takarazuka Revue.

Gender(ed) performances of human and robot actors

The Takarazuka Revue was founded in 1913 by the business tycoon and later politician Kobayashi Ichizō (1873–1957). Actors who perform as women are known as *musumeyaku* (young woman’s role player), and those who perform as men are called *otokoyaku* (man’s role player).⁶ In contrast, Kabuki actors who perform as women are called *onnagata* (literally, woman form/model), and, generally speaking, those who perform as men are referred to as *tachiyaku* (literally, upright/standing role). The *onnagata* role was created during the premodern Edo (or Tokugawa) period (1603–1867), when biologically female women were banned from public performances by the Tokugawa shogunate in the early decades of the seventeenth century on the grounds that they contributed to unlicensed prostitution. The

5 Human babies are separated at birth into two categories, female and male, based on the appearance of their genitals (usually the presence or absence of an identifiable penis). If that appearance is indeterminate, the “intersexed” infant’s genitals are often surgically altered to fit a medically normative definition of femaleness or maleness. Of course, even the practice of determining the “proper” female or male appearance of a given baby’s genitals is informed by gender ideology. Perhaps ironically, in my view, the relatively newly coined “medical disorder” of gender dysphoria, or gender identity disorder, reinforces the separation of sex and gender as well as the conventional definitions of female/feminine and male/masculine. Some physicians provide pharmaceutical and surgical means bringing the biological body into alignment with the prevailing social and ideological perception of gender.

6 See Robertson (2001 [1998]) for detailed information about the Revue and Kabuki regarding their different methods of performing gender.

authorities were less concerned about prostitution than controlling the sex industry through a licensing system, and creating designated venues for it. Because of the tenacity of the folk belief in the symbolically polluted, and thus less aesthetic aspects, of the anatomical female body, male *onnagata* were perceived as performing an ideal type Woman or feminine beauty — one that females in the entertainment industries, including geisha, sought to emulate.

In contrast, even though he described the Revue's *otokoyaku* as more charming, suave, and considerate than biological males, Kobayashi did not suggest that males should emulate and adopt these characteristics offstage. Rather, his rationale for casting biological females as handsome men was akin to their majoring in men's studies. That is, when they retired from the Revue to marry, as was the expectation, *otokoyaku* in particular, Kobayashi believed, made ideal wives by knowing exactly what their husbands expected of them.⁷ No symmetrical, corresponding claim can be made for Kabuki *onnagata*, who have never been promoted as ideal husbands offstage. Moreover in the premodern past, and up until the 1930s, Kabuki *onnagata* often lived everyday lives as women; today, most perform *onnagata* as one of a repertory of diverse roles.

Takarazuka and robots share a common history. In February 1932, at the height of the first wave of robot mania in Japan, the Revue performed a comedy titled *Robotto no tawamure* (*The Robot's Playful Joke*). The play spoofs the trendy practice of the time of robots being displayed in public halls and department stores, by exposing one such robot as a costumed human. *R.U.R.* had already been translated in 1923 and was performed in 1924 at the Tsukiji Small Theatre (Tsukiji Shōgekijō) under the direction of the leftist dramaturg Hijikata Yoshi (1898–1959).⁸ Another backdrop to the Revue's robot comedy was Fritz Lang's (1890–1976) revolutionary silent film *Metropolis* (1927), which debuted in Tokyo in 1929 to enthusiastic audiences.⁹ The screenplay by Thea Von Harbou (1888–1954), Lang's wife at the time, is an allegory of class struggle that resonated in industrializing societies like Germany and Japan.

Metropolis is about a corporate dictatorship, existing in the form of a city-state, in 2026, one populated by decadent “haves” whose existence is totally dependent on

7 Of course Kobayashi had only limited control over the influence that the actors exerted on Revue audiences. As I have elaborated in my book on Takarazuka (Robertson 2001 [1998]), many female fans were empowered in some way by observing biological females performing men's roles on stage; to what extent they are acting on the knowledge of the separation of sex and gender roles is difficult to assess. What is clear, however, is that the Revue inspired a butch-fem subcultural style, but this remains an unacknowledged connection to the society existing offstage. In this connection, I was intrigued to learn that the first same-sex marriage license issued by Shibuya City (Tokyo) was to a former Takarazuka *otokoyaku* and her partner.

8 Hijikata titled his production *Jinzō Ningen* (*Artificial Human*) after the 1923 translation of *R.U.R.* by Uga Itsuo.

9 A useful resource (with a few factual errors) on the reception of *Metropolis* in Japan is Michael Organ's "Metropolis Film Archive" (2014).

impoverished and oppressed “have-nots” who are relegated to a bleak life in underground factories and slums. Rossum’s robots are nowhere in sight. Rather, scruffy men work in teams, operating the giant steam engines fitted with clocks and valves — relentless and exhausting labor that both dehumanizes their existence and fuels the utopian superstructure. Briefly, the director/dictator’s son falls in love with Maria, an underground missionary, whose *élan vital* is transferred to a Robot Maria by a mad scientist working to undermine the good woman’s influence on the downtrodden workers. He does not succeed in the end. As the main image in posters advertising the film, the (evil) Robot Maria influenced the image of robots among contemporary Japanese writers and artists (Inoue 1993). The image of the robot on the cover of the Takarazuka script book for *Robotto no tawamure* (1932) also closely resembles Maria.

Robot laws versus gender(ed) practices

The method of gender attribution utilized by roboticists today draws from the dramaturgical conventions employed by Takarazuka actors, as illustrated by the Revue’s most popular and frequently reprised show: the *Rose of Versailles* (*Berusayu no Bara*, or *Berubara*). *Berubara* is based on Ikeda Riyoko’s 1974 ten-volume comic book series of the same title. Ikeda seems to have been inspired by an earlier comic, *Princess Knight* (*Ribon no Kishi*, literally Prince of Ribbon), created in 1953 by cartoonist Tezuka Osamu (1928–1989). Princess Knight, or Sapphire, is raised as a son, having been born to a royal couple in need of a male heir. Sapphire — like Oscar, the transgendered protagonist of *Berubara* — switches costume-cum-gender several times in the story before finally emerging as a married woman at the end.

Posters and/or figurines of Tezuka’s world famous cartoon robot, Tetsuwan Atomu (Astro Boy), are displayed in every robot laboratory I visited, and, I was told, in almost all robot laboratories in Japan! Tezuka grew up in Takarazuka City; his mother was a fan of the Revue and took her son along with her when attending. Like his contemporary Isaac Asimov (1920–1992), Tezuka was a scientist (physician) who pursued a career in writing science fiction. Both men formulated laws of robotics that remain influential among roboticists today, although Asimov’s three laws (actually, four) are known more widely than are Tezuka’s ten laws. I have closely compared the two sets of laws in another article (Robertson 2014) already, and thus will not do so again here. Suffice to say that whereas Asimov’s laws are universal and abstract, and underscore human exceptionalism, Tezuka’s laws of robotics are focused more centrally on human–robot coexistence in a heteronormative familial setting.

In Tezuka’s story, Astro Boy was created as a doppelgänger of the deceased son of a roboticist who rejected the boy-bot after realizing that he would never mature like a human son. Crazy with anguish and anger, he sold Astro Boy to a circus from

which the boy-bot was later rescued by a friendly scientist, and provided with his own robot nuclear family: a set of parents, a brother and sister, and a pet dog. Other cartoon and animation robots are often members of human families, as in the case of the hugely popular Doraemon, who is especially popular among a younger generation of roboticists. Doraemon is a blue and white bipedal robotic cat with a huge smile. He travels 200 years back in time to the 1960s in order to change the circumstances of the Nobita family so that they will enjoy a better future.¹⁰ Whereas the robot Doraemon is invited into the Nobita family as a member, Astro Boy, nearly two decades earlier, is provided with his own robot family. In short the conventional nuclear family is cast as a desirable setting for robots who, in turn, reinforce the Japanese *ie* (patriarchal household), itself a system that sustains a gendered social hierarchy.¹¹

Two of Tezuka's laws address the gendered appearance of robots in a way that, like the Takarauka Revue actors, recapitulates a conservative and conventional status quo in Japanese society. Law 6: Male and female robots shall never change roles. However Law 7 would seem to allow a gender change, provided it is sanctioned: Robots shall never change their appearance or assume another identity without permission (Mushi Purodakushon 1977; Schodt 2007:108). There is a clear correspondence between Tezuka's gender laws and the rules dictating the parameters and limits of a Takarazuka actor's stage gender, as is neatly demonstrated in *Berubara*.

Arguably the Revue's trademark production, *Berubara* has been restaged dozens of times in over 1,500 performances since its debut in 1974, most recently in 2015. Different versions have been directed with Ikeda Riyoko's collaboration. *Berubara* dwells on the adventures of Oscar, a female raised (on the orders of her father) as a boy in order to ensure the patrilineal continuity of a family of generals. The character represents the slippage between sex and gender — and sexuality — and several times during the play, Oscar switches from man to woman. Significantly, Oscar has been acted by *otokoyaku* exclusively, whose own stage careers in the Revue have followed a similar trajectory — namely biological females assigned to perform as social men. Clothing, vocalizations, and cosmetics are the means to Oscar's (and the *otokoyaku*'s) commutable gender, or cultural genitals. *Berubara* is one of the Revue's most reflexive productions in that the relationship between Oscar and her/his father is analogous to that between the *otokoyaku* and the Revue's patriarchal directors; indeed Kobayashi himself insisted on being called "father" (Robertson 2001 [1998]: 16, 74).

10 Doraemon is the creation of Fujiko Fujio, the joint penname of two cartoonists, Hiroshi Fujimoto (1933–1996) and Motoo Abiko (1934–). Doraemon's name is a combination of *nora/dora* (stray cat) and *emon*, the suffix of a (popular premodern) male name. The cartoon was published between 1969 and 1996.

11 I have written at length on the relationship between robotics and the *ie* system (Robertson 2014).

Like Takarazuka (and Kabuki) actors on stage, the bodies of (a majority of) robots are purposefully gendered to fit a particular role. Although a Takarazuka female performing as a man and a Kabuki male performing as a woman are acting assigned roles, they nevertheless simultaneously a) uphold the conventional, zero-sum, dichotomous conceptualization of the relationship of sex and gender, and b) undermine that conventional conceptualization by demonstrating that females can in fact excel at masculinity, and males at femininity. However humanoid robot bodies are equipped with cultural genitals from the outset to represent either femaleness (femininity) or maleness (masculinity). Their genders, which are actually comparable to human biological sex in being (initially) fixed, are determined by the social roles that they are intended to perform, and reinforced by such variables as shape and color. For example Alsok's Guard Robot D1 (Figure 2a) is a male-gendered security robot; it is big, bulky, and "uniformed" in dark blue hues like a police officer. In contrast Flower Robotics' Posy (Figure 2b), modeled after a flower girl at a church wedding, was intended to serve as a receptionist (Burein Nabi 2002). Unlike the visored Guard Robot D1, the cherubic Posy has two almond-shaped eyes, a pert nose but no mouth, a page boy "haircut," puffy cheeks, and a willowy neck. She is slender, colored white, and sports a sleeveless gossamer dress. Androids and gynoids are, in turn, made to pass as particular human males and females.

Figures 2a and 2b: Left: Alsok's Guard Robot D1; right: Flower Robotics' Posy.



Sources: Flower Robotics (2015) and Robotics Today (2015).

Wakamaru's Oscar

In 2008 the renowned playwright Hirata Oriza cast Wakamaru robots (see Figure 1) in *Hataraku Watashi (I, Worker)*, an allegory of human–robot domesticity and coexistence. The play is a mere 20 minutes long, the battery life of the robots. A robot couple, Momoko (female-gendered) and Takeo (male-gendered), are employed as resident domestics in the home of a childless and dysfunctional human married couple, Mayama Ikuo and Mayama Yūji.¹² Part of the play involves musings about Yūji's reluctance to work, behavior that is mimicked by Takeo — “even though,” the male robot comments, “robots were created to work” (Hirata 2010: 41). Suffice it to say that *I, Worker* underscores the emphasis on the idea in the Japanese robotics industry that robots are not inherently dangerous and, moreover, that they are, in fact, quite capable of being domesticated. Unlike their *R.U.R.* forbearers, Momoko and Takeo do not even think about revolting. *I, Worker* was a scientific experiment as much as it was a play. For Hirata and his collaborator, roboticist Ishiguro Hiroshi, theatre is a real-time, real-world laboratory, a research site where human–robot interactions can be generated within banal, ordinary, everyday scenarios.

Wakamaru was cast in *I, Worker* in view of his sophisticated technology. The 1 meter tall, 30 kilogram conical yellow robot on wheels is billed as a communication robot. Equipped with infrared and ultrasonic sensors on his forehead, and a camera atop his head, Wakamaru can navigate through environments meant for humans. Although, as I have noted, Wakamaru was conceived as a male-gendered robot, he, like the Takarazuka and Kabuki actors, is cross-dressed in *I, Worker*. Takeo wears a bowtie to signify his male gender, and Momoko an apron to signify her female gender.

Wakamaru has a head with two ovaloid eyes on top of a moveable neck, and two moveable arms with mitten-like hands. His head has two parts that fit together like a ball and socket; the top part, which has an undulating profile, nods and rotates, allowing for a range of gestural communication. There is a rucksack-like battery on his back. Wakamaru rolls at a top speed of 1 kilometer per hour. Most importantly for Hirata's dramaturgical purposes, Wakamaru recognizes faces and short sentences and can synthesize speech. In *I, Worker*, Wakamaru operates semi-autonomously; an operator backstage watches for programming glitches for the duration of the play.

In addition to their clothing and use of feminine and masculine speech conventions, the robots' movements, the direction of their gaze, and the gesturing and placement of their arms and hands, are all choreographed to generate a gendered “presence” (*sonzaisei*). Momoko and Takeo both speak in monotonous synthetic voices, but

12 I have previously presented papers on the subject of robot dramaturgy; this material, which presently exists as an unpublished manuscript (Robertson 2015), is incorporated into my new book, *Robo sapiens japonicus: Robots, Eugenics, and Posthuman Aesthetics* (University of California Press, forthcoming).

Momoko's is pitched higher and she speaks more slowly than Takeo does. Both apologize by hanging their heads down, and indicate doubtfulness by tilting their heads to one side. However, Momoko's arms are never far from her body and their movement is curvilinear. She often crosses her hands in front of her, which in addition to being a "feminine" posture makes her body look smaller. These feminizing techniques are also used in the Takarazuka Revue and Kabuki theatre. Momoko tends to stare and to gaze off for long periods of time, and smiles more than Takeo, an effect enhanced by the angle of her head and strategic stage lighting. Like the Takarazuka *otokoyaku*, Takeo's movements are more geometric; when he is still his arms and hands hang by his side, creating the effect of a more open, masculine stance. It is not surprising that these feminizing and masculinizing gestures and poses draw from the binary construction and reification of gender perfected by the all-female Takarazuka Revue. Hirata has collaborated in the past with the Revue, and a former *musumeyaku* stars in one of his more recent robot plays, *Ginga Tetsudō no Yoru (Night on the Galactic Railroad, 2013)*, based on the 1927 novel by Miyazawa Kenji (1896–1933).

Earlier I pointed out that many humanoid robots are gendered female or male from the outset on the basis of their intended or anticipated profession or role. However that does not mean that their gendered appearance remains fixed and inalterable. As the originally male-gendered Wakamaru demonstrates, following the example of Kabuki and Takarazuka Revue actors, robots can also be "regendered" or cross-dressed. As with theatre actors, this is an *assigned* (and not self-initiated) regendering. A similar example is provided by Geminoid-F, a female humanoid, or gynoid, produced by Ishiguro Hiroshi's laboratory — the "F" is for "female." She appears in Hirata's very short, dreamy, locationless play *Sayonara (Goodbye, 2010)*, which was recently remade as a much longer movie that debuted in Tokyo in November 2015.¹³ Cast as a caregiver, Geminoid-F reads comforting poetry in Japanese, German, and French to a young woman who is terminally ill. Offstage in real society, Geminoid-F is being "trained" as an intake nurse: she will collect medical histories and give patients information about what to expect during their hospital visit. In 2011 the gynoid's makers received questions from consumers as to why they were training only female-gendered robots to serve as nurses, so they decided to regender Geminoid-F. By changing her female cultural genitals, namely

13 Unlike the locationless play, the movie, which I saw in November 2015 in Tokyo, is set in post-Fukushima Japan. A massive explosion at a nuclear power plant has made Japan uninhabitable. The young woman is suffering from advanced radiation poisoning. Japanese citizens who have escaped serious injury are ordered to evacuate to other countries. Whereas the play, and indeed the woman's life, ends on an ambiguous note, the film continues to follow the gradual breakdown of the robot — perhaps in part to stretch out what was originally only a short play. The introduction of the woman's boyfriend as well as other human characters, in addition to many gratuitous scenes featuring the woman's nude body and its eventual decomposition after her death, also add length (but not profundity).

her hairstyle and clothing, and by lowering her voice, they created *Kurokawa-kun*, a robot *otokoyaku*.

Figure 3: Geminoid-F and her cross-dressed version, *Kurokawa-kun* (screenshot)



Source: Diginfo (2011).

As hinted in the title of my article, and in the subheading to this particular section, *Wakamaru* and *Geminoid-F* should certainly earn Oscars for their cross-gendered performances!

Conclusion

Technology and robotics are not neutral fields, and are infused with values that transcend their usefulness and convenience. Because robots are very sophisticated, very expensive machines, robotics laboratories necessarily rely on high levels of

both state and corporate funding. Consequently the field of robotics both mirrors and embodies state and corporate ideologies and priorities. Moreover roboticists — the vast majority of whom both in Japan and elsewhere are male — may perceive human female and male bodies as “specific forms of livability in the world” (Sheets-Johnstone 1992: 49), but unlike most feminist researchers they do not interrogate their society’s sex–gender system.¹⁴ Socialized within a given society, roboticists mostly take for granted not only the prevailing sexual division of labor but also stereotypical gender configurations.¹⁵ Of course, just because a roboticist is female does not mean that she questions or problematizes normative gender conventions existing among humans and robots. Unless proactively self-reflexive, all roboticists are prone to reproduce and reinforce in their creations the social structures and gender(ed) relations that they have taken for granted as “natural” and self-evident. Contrary to C. P. Snow’s oft-cited assertions in a 1959 lecture, “The Two Cultures and the Scientific Revolution,” in which he posited that the humanities and sciences were “mutually incomprehensible” (Snow 1998), the “gender lens” through which I have investigated both the theater and the laboratory has in fact revealed significant homologies and shared norms.¹⁶ Snow’s critique has also informed debates about divisions in the Japanese academy (Tachibana 1998).

In commentary relevant to robotics, critical theorist Manuela Rossini notes that that “the inventors and scientific users of biomedical technologies are also *imagineers*, not just of bodies but of cultural configurations and social arrangements as well”

14 Reporting on gender inequality in American science, Meg Urry (Professor of Physics and Astronomy and Director of the Yale Center for Astronomy & Astrophysics, Yale University) points out that: “Every major criterion on which scientists are evaluated, for hiring, promotion, talk invitations or prizes, has been shown to be biased in favor of (white) men. These include authorship credit, paper citations, funding, recruitment, mentoring, and tenure” (Urry 2015: 472). The situation in the Japanese academy is no different. Homma, Motohashi, and Ohtsubo — three female scientists — report that “the percentage of [Japanese] female professionals trained in Science, Technology, Engineering, and Mathematics (STEM) is at 13.8 percent, the lowest among developed countries (Homma, Motohashi, and Ohtsubo 2013: 428). Otake Mihoko proposed and developed, in 2005, the website “Women in Robotics and Automation towards Human Science, Technology, and Society” (<http://women.ws100h.net/>), which has not been updated since 2007. The site was originally started by advocates from FRAU, the network for female researchers in robotics and automation in Japan, of which Otake was a member. See also Otake et al. (2006).

15 To be a feminist does not require a female body, although feminism, and the feminist movement, arose from the condition of being female both historically and at present.

16 Snow’s lecture was first delivered as the Rede Lecture in May of 1959 at Cambridge University and subsequently published, in two parts, in the June and July 1959 issues of *Encounter*, a literary magazine. It is included in *The Two Cultures* (Snow 1998), a volume of his collected essays. Snow, a chemist, used the lecture as a platform to condemn a British school system that, he asserted, privileged the humanities (especially Latin and Greek) at the expense of scientific education. Consequently, he maintained, graduates would be at a disadvantage in harnessing the opportunities of postwar scientific research and development. At the time, Snow applauded German and American schools for offering training in both disciplines. Since then, as revealed in the 2013 Office of Economic Co-operation and Development (OECD) global rankings based on students’ proficiencies in math and science training, Germany leads the pack while the United States has fallen out of the top 20 (Chappell 2013).

(2003: 1). However, as I have illustrated here and elsewhere (Robertson 2010), the act of imagining per se does not necessarily yield fresh or progressive results. Hirata Oriza, along with Takarazuka and Kabuki playwrights, as well as Ishiguro Hiroshi and other roboticists, collectively create imaginary scenarios in which their characters and creations, whether human or robot, perform assigned gender roles. As I have shown, the markers that denote female and male gender, femininity and masculinity, are the same for humans and robots: voice, gesture, costume, and so forth. Takarazuka and Kabuki actors and humanoid robots alike simultaneously call attention to the mutable artifice of gendered identities and recuperate the binary construction of gender, reinforcing in the process heteronormative conventions of being in the world. Today, same-sex civil unions and marriages are, along with LGBTQ (Lesbian, Gay, Bisexual, Transgender, Queer) issues, increasingly part of mainstream society in much of the (democratic) postindustrial world. Popular theaters like Takarazuka and Kabuki, and the robot plays of a respected playwright, would, on the surface at least, seem to correspond with the emergence of a more liberal and progressive ethos. This is not however the case in reality, for the reasons that I have given. Unlike their human counterparts, Wakamaru and Geminoid-F do not have a private life in which to exercise a self-chosen orientation. However with the right script and enlightened direction, they may have a future as gender(ed) radicals.

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