

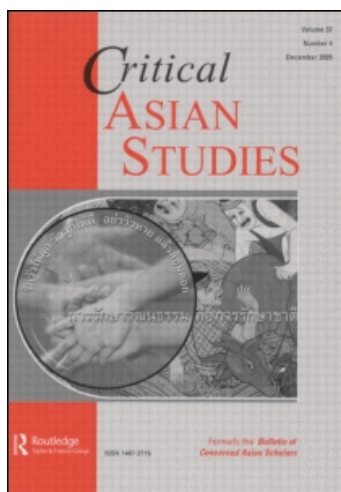
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## ***ROBO SAPIENS JAPANICUS***

### **Humanoid Robots and the Posthuman Family**

**Jennifer Robertson**

**ABSTRACT:** Japan accounts for nearly 52 percent of the world's share of operational robots and leads the postindustrial world in the development of humanoid robots designed and marketed specifically to enhance and augment human society. *Innovation 25*, Prime Minister Abe's visionary blueprint for remaking Japanese society by 2025, with the aim of reversing the declining birthrate and accommodating the rapidly aging population, emphasizes the central role that household robots will play in stabilizing core institutions, like the family. In addition to exploring the cultural logic behind the development of autonomous, intelligent, evolutionary humanoid robots, I argue that new bio- and robot technologies are being deployed to reify old or "traditional" values, such as the patriarchal extended family and socio-political conservatism.

*We do not want to build machines [robots] that do what humans cannot do, rather we want to build machines that do what humans can easily do.* — Hashimoto<sup>1</sup>

#### **Why Robots, Why Now?**

In January 2007, Yanagisawa Hakuo, the Japanese health, labor and welfare minister, proclaimed that "women were birthing machines" (*onna ga umu kikai*), sparking a clamor for his resignation from the Diet. Feminists and left-leaning politicians pointed out the disturbing parallels between Yanagisawa's comment and the pronatalist ideology of the wartime state in the late 1930s, summed up by the imperative slogan, "give birth and increase [the popu-

lation]” (*umeyo, fuyaseyo*). Although he described Yanagisawa’s remarks as “inappropriate,” Prime Minister Abe Shinzō — who is married but childless — supported the minister, rationalizing that he was merely expressing his concern about the looming population crisis caused by a declining birthrate. The birthrate presently stands at about 1.3 children per married woman, and over 21 percent of the population of 127.8 million people (which includes permanent foreign residents) is over 65 years of age; that percentage is expected to increase by 2050 to over 40 percent. The latest estimates produced by the health ministry project that the population will shrink to 110.68 million in 2035 and to 89.93 million in 2055.<sup>2</sup>

The New Japan Women’s Association (*Shin’nippon fujin no kai*) attributes the low birthrate to several overlapping factors: the shrinking family budget, the high cost of educating children, the dearth of public childcare facilities and after-school programs, excessively long working hours and unpaid overtime work, and the replacement of regular employees with “just-in-time workers.”<sup>3</sup> Others have also noted that Japanese women’s refusal to marry or to marry very late — the average age of marriage is now around twenty-nine years — and their reluctance to have children, constitutes a form of resistance or protest against a social system that continues to regard women as second-class citizens.<sup>4</sup> The majority of Japanese women in their twenties and early thirties choose to continue to work and to live with their parents in order to economize.<sup>5</sup> Yamada Masahiro, who coined the phrase “parasite single” (*parasaito shinguru*) in a rather disparaging reference to these women (and men), observes that women’s standard of living falls dramatically once they marry. Not only do they have to do all the housework, but they are sure to lose two thirds of their disposable income. When asked, in a recent survey published in the *Mainichi*, a national daily newspaper, what would make them decide to have more children, the most common answer (43 percent) was “places where it’s easy to work, even for people with children.”<sup>6</sup>

Since the late nineteenth century, the Japanese state<sup>7</sup> has explored and experimented with strategies to raise the rate of marriage and birth. In the wartime period (and especially 1930–45), these included withholding birth control and employing hundreds of thousands of Korean laborers forcibly brought to

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1. Hashimoto 2003, 6.
  2. “Nineteen prefectures to see 20 percent population drops by ’35,” *Japan Times*. 30 May 2007.
  3. NJWA views 2004.
  4. There is a vast literature on the theme of women’s status. A very useful overview of that subject is Thernstrom, ed. 2005.
  5. Nishi and Kan 2006; Usui 2005, 58; Zielengziger, 2007.
  6. Yamada 1999; “Poll on low birthrate: Women want workplaces easy to work for mothers,” *Mainichi Shinbun*, 22 August 2005.
  7. Following Corrigan and Sayer (1985), I use “state” in the singular as shorthand for several dominant agents and agencies — the government, the corporate sector, the military-industrial establishment, the major media — that, while not seamlessly, collectively produce and reproduce the status quo.

Japan (which in 1910 had annexed Korea as a colony), “freeing” married women to concentrate instead on becoming “birthing machines” instead of factory workers.<sup>8</sup> Their conscripted husbands were even given furloughs so that they could return home to have procreative sex with their wives. In postwar Japan, where induced abortion was legalized in 1948, strategies have included romanticizing weddings; providing married couples with tax incentives for giving birth; inaugurating a series of “New Angel Plans” to increase the number of day care centers; encouraging corporations to liberalize maternity and paternity leave policies; and, in 2006, expanding insurance coverage for fertility treatments.<sup>9</sup>

Until recently, high-profile politicians and bureaucrats, like Yanagisawa, have avoided recapitulating wartime pronatalist rhetoric. He himself is not old enough to remember the “fertile womb battalions” (*kodakara butai*), as mothers were called, to remind them that their patriotic duty to the country was to give birth often. Rather, born in 1935, the minister may have been one of the chubby children shown off by their mothers as national offerings at the many eugenics-inspired fertility awards ceremonies staged countrywide.<sup>10</sup>

Beginning in the 1980s, the Japanese state inaugurated a program of replacement migration from among South Americans (primarily Brazil and Chile) of Japanese ancestry (*nikkeijin*). However, various real and imagined problems with the *nikkeijin* and other migrant workers,<sup>11</sup> have limited the legal foreign labor force with residential status to fewer than 200,000, or less than 1 percent of the total labor force. This is a far cry from demographic estimates made in 1995 that over 600,000 immigrants a year for the next fifty years were needed to keep the labor force at its 1995 level of 87.2 million.<sup>12</sup>

Former prime minister Koizumi Junichiro chose to ignore these estimates, and responded as follows to the question of how widely Japan should open its domestic labor market to foreign workers:

If [foreign workers] exceed a certain level, it is bound to cause a clash....

Just because there is a labor shortage does not mean we should readily allow [foreign workers] to come in.<sup>13</sup>

To make a very long story very short, the Japanese state is continuing a post-war precedent of both pursuing automation over replacement migration and disregarding women as a talented and vital labor force, although its agents are quick to blame women alone for the low birthrate. Today, nearly 60 percent of married women under the age of fifty work for wages outside of the home both out of necessity and from a desire to have a professional career, although they are increasingly relegated to part-time work and earn 68 percent of men’s wages.<sup>14</sup> Without more assistance from their overworked husbands, who often

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8. Havens 1975.

9. Usui 2005; “Fertility treatment coverage upped,” *Japan Times*, 19 August 2006.

10. Robertson 2002.

11. For further information on *nikkeijin* and foreign “guestworkers,” see Roth 2002.

12. Economic Survey of Japan 2006; Kondo 2000.

13. Quoted in Kashiwazaki and Akaha 2006.

spend up to four hours a day commuting, and organized day care facilities, they are postponing pregnancy or stopping at one child. Moreover, since the majority (75 percent) of Japanese families live in nuclear households, in-laws and parents are unavailable to offer voluntary childcare services. The remaining 40 percent of married women — whose employment could offset some labor shortage problems — are tied down with time-consuming household and family responsibilities.

The precedent of and preference for automation is one of the major reasons why Japan accounts for over half of the world's share of industrial and operational robots, including humanoid household robots that are being developed to care for children and the elderly, to provide companionship, and to perform domestic tasks. Over the course of my interviews with roboticists in early 2007, and on the basis of the ballooning literature on humanoid household (or partner) robots, I concluded that humanoid robots are also regarded as preferable to foreign laborers, and especially to foreign caretakers, for the reason that unlike migrant and minority workers, robots have no cultural differences or historical (or wartime) memories to contend with. In other words, in addition to “cultural differences,” foreign workers (especially those from Asia) embody and represent memories that, even unintentionally, may agitate the state, which continues to perpetuate the myth of Japan as a homogeneous nation and to cultivate a willful amnesia with respect to the history of Japanese imperialist aggression in Asia.<sup>15</sup>

It also occurred to me that the declining birthrate and the rapidly aging population are not really being seriously addressed by the state as political, social, economic, or historical problems — or a combination thereof — but as *biotechnological problems* requiring *biotechnological solutions*. Thus, in part to redress the dismal demographic forecast, Japanese bioengineers (among others) are working on developing an artificial uterus (or “ectogenetic chamber”) — a relevant topic but one that I will not discuss here.<sup>16</sup>

The premium placed on biotechnology as domestic policy is clearly evident in *Innovation 25*, Prime Minister Abe's visionary blueprint for revitalizing and roboticizing Japanese society — and the household — by 2025. He released the proposal to the public in February 2007, and I will analyze it more closely below. Already in Japan there is a market for “intelligent,” autonomous humanoid robots that can: operate power shovels and forklifts (Enryuu), patrol premises and extinguish fires (ReBorg-Q, Guardrobo D1), replace human service sector employees (Actroid, Asimo), babysit and tutor children (PaPeRo, Wakamaru),

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14. Matsukura, Ogawa, and Retherford 2006; Usui 2005.

15. See also Robertson 2005; Hein and Selden, eds. 2000.

16. Most prominent in Japan is the work of the late Dr. Kuwabara Yoshinori at Juntendo University in Tokyo. Whereas Kuwabara worked with goat fetuses, Dr. Hung-Ching Liu of Cornell University has created an artificial uterus out of endometrial tissue and has experimented successfully with human fetuses. Her goal is to create the means to artificially carry an embryo to full term (Dolendo 2006). See also Rosen 2003. See Aristarkhova (2005) for a cyberfeminist perspective on ectogenetic chambers.

housesit (Nuvo), nurse the infirm and elderly (Ri-man), provide companionship and entertainment (ifbot, Pino, Posy, Robovie), and even provide sex (Kaori).<sup>17</sup> By 2016, the size of the household robot market is expected to top 18.6 million units.<sup>18</sup> Japanese robots are forecasted to be in this century what Japanese automobiles were in the last century.<sup>19</sup>

### What Is a Robot? Is a Robot a Person?

What exactly is a robot? The word itself was coined by the Czech playwright Karel Capek from the word *robot* or forced labor. His play “R.U.R., Rossum’s Universal Robots,” which premiered in Prague in 1922, was about a factory in the near future where synthetic slaves, or robots, were mass produced for export all over the world. The play was performed in Tokyo in 1924 under the title “Jinzō Ningen” (Artificial Human), sparking a “robot boom” in popular culture that has continued to this day, from Tetsuwan Atomu (The Atom) — the cartoon robo-Pinocchio who debuted in the 1950s — to the androids who dominate animation films like “Ghost in the Shell” (Kōkaku kidōtai, 1995).<sup>20</sup>

In practical usage, a robot is an autonomous or semiautonomous device that performs its tasks either according to direct human control, partial control with human supervision, or completely autonomously. Industrial robots look like pieces of machinery, whereas to be called a humanoid, a robot must meet two main criteria: it has to have a body that resembles a human (head, arms, torso, legs) and it has to act like a human in environments especially designed for the capabilities of the human body — like an office or a house.

There is considerable debate among roboticists about how human-like humanoid robots should or should not look. Mori Masahiro’s “theory of the uncanny valley” (*bukimi no tani*) is widespread in robotic circles (fig. 1a). Mori is a roboticist who focuses on humans’ emotional response to nonhuman entities. Basically, he argues that a thing, like a prosthetic hand, that looks very real but lacks the feel and temperature of a “living hand” creates a sense of the uncanny or sudden unfamiliarity. Conversely, robots like Wakamaru, who has only a general resemblance to the human body but who speaks and gestures like humans, generates a sense of familiarity (fig. 1b). Mori thus recommends that engineers retain the metallic and synthetic properties of robots so as to avoid the creepiness factor and forestall any cognitive-emotional confusion among humans.<sup>21</sup> Most roboticists have done so with few exceptions, such as Hara Fumio and Ishiguro Hiroshi, who are working on “face robots” and androids, respectively, that can “pass” as humans. Whereas Hara is working on facilitating emotional in-

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17. Information on these and other humanoid robots is easily obtained by Googling their names. The literature on them is much too vast to list here.

18. Available online at [http://www.robocasa.com/pdf/press\\_release.pdf](http://www.robocasa.com/pdf/press_release.pdf) (accessed 1 June 2007).

19. Korea and China are close behind Japan in developing household robots.

20. Schodt 1988, 29. *Jinzō ningen* and *robotto* are the two Japanese terms for “robot,” although the former is rarely used today.

21. Mori 1970.

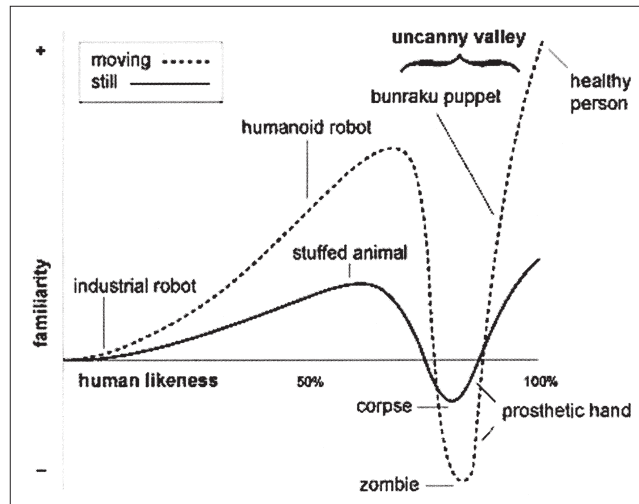


Fig. 1a.  
A diagram of  
Mori's theory of  
the "Uncanny  
Valley." ([http://www.cnet.com.au/i/r/2006/Games/uncanny\\_valley1\\_422x330.jpg](http://www.cnet.com.au/i/r/2006/Games/uncanny_valley1_422x330.jpg))

interactions between humans and humanoids (or "morpho-functional machines"), Ishiguro believes that android "clones" offer an improvement on teleconferencing because they project the physical presence of humans and not just their image and voice.<sup>22</sup> It is rationalized that the creation of "soft-bodied" systems will facilitate human-machine communication and interaction and will stimulate the development of new biocompatible materials, including artificial muscles, tendons, tissues, as well as biosensors.

The sense of familiarity of metallic-looking humanoids is also achieved by making them look childlike. The artlessness of their external appearance deflects attention from their complex technological artifice. Humanoid robots like Asimo and Wakamaru are the result of a confluence of disciplines and technologies: computer science (hardware and software), biophysics, neuroscience, electrical and mechanical engineering, nanotechnology, information technology, alternative energy resource development, metallurgy, photography, physiology, automotive design, and many others, as I will discuss later, such as child development studies. Humanoid robotic technology has also generated new spin-off technologies (and markets), including the synergistic

development of bodyware technologies in fields such as micro-mechanics, solid state sensors, electrics [*sic*], hydraulics, novel actuators and power systems, advanced materials, computational architectures, embedded systems, innovative energy sources and storage, as well as mindware technologies such as recognition and generalization, reasoning, learning and memory, cognitive processes, artificial intelligence.<sup>23</sup>

Among the new and old Japanese manufacturers of humanoid robots are Honda (Asimo), Mitsubishi Heavy Industries (Wakamaru), Flower Robotics (Posy), Vstone Corporation (Robovie), Sohgo Security Services (ReBorg-Q, Guardrobo D1), Sanrio (Actroid), Toyota (Partner Robot), NEC (PaPe Ro), Busi-

22. Hara and Kobayashi 2003; Ishiguro and Minato 2005.

23. Sandini, Caldwell, and Fontaine 2007.

ness Design Laboratory (ifbot), ZIP (Nuvo), and private and public universities, including Waseda University (Wamoeba, Wabian, Wendy) and the University of Tokyo (HRP, Kaz, Kotaro).

The cute and catchy names of many humanoids — such as PaPeRo, Wakamaru, Posy, Pino, Robovie — also create an affinity to the “cute characters” who have inhabited Japanese popular culture long before “real” humanoid robots appeared.<sup>24</sup> The robots cost a lot more than their comic book counterparts; prices for humanoids range from \$10,000 (PaPeRo) to \$50,000 (Asimo). Wakamaru, who is one-meter tall, weighs thirty kilograms, and is gendered male, was named after Ushi no

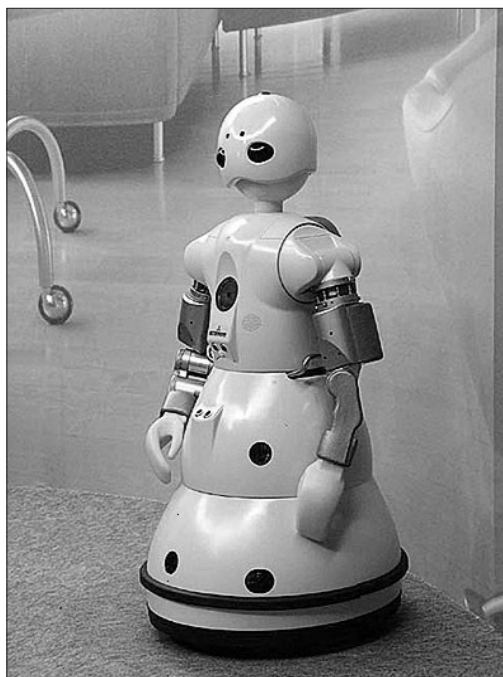


Fig. 1b. Wakamaru. ([http://itc.ua/img/ko/2003/17/wakamaru\\_1\\_copy.jpg](http://itc.ua/img/ko/2003/17/wakamaru_1_copy.jpg))

Wakamaru, a legendary samurai hero. His shape resembles a samurai in formal wear (*bakama*). One hundred of the banana-colored robots were sold to consumers in central Tokyo in 2005 for around \$14,000 each. Unfortunately, Mitsubishi is not releasing data on the daily interactions between the human owners and the Linux-powered robot.<sup>25</sup>

The Japanese use the word “character” (*kyarakutā*) as a categorical term for endearing cartoon or toy mascots — like Hello Kitty (recently reincarnated as a robot) — almost all of whom have distinctive and individualistic personalities. The ifbot (*sic*) robot (fig. 2), for example, is packaged with the following information about its past, hobbies, personality, and so forth:

Height: 45 cm.

Weight: 9.5 kg.

Age: 5

Gender: ?<sup>26</sup>

Home: Planet Ifbot (several thousand light-years from the earth)

24. See Yomota 2006.

25. Currently, most humanoid robots are Linux-powered. For the most part, their software is made in America, and their hardware in Japan. Almost all of the ethnographic research on household robots to date is on Aibo, Sony’s dog-robot, which was discontinued in March 2006. See Kubo 2006. Over 150,000 Aibo were sold, 80 percent in Japan, averaging \$2,000 each. Sony also discontinued its diminutive humanoid entertainment robot, QRIO (Quest for Curiosity), at the same time for reasons related to the restructuring and downsizing of the company under its new British CEO, Howard Stringer.



Things likes: sweet dump-  
lings and other sweets  
Things dislikes: spiders,  
earthquakes, water  
Hobbies: talking, studying  
about earthlings  
Personality: shy at first, but  
brisk and outgoing once the  
ice is broken

ifbot's past: ifbot is from  
Planet Ifbot's royal family,  
and will one day be the ruler  
of Planet Ifbot. ifbot had  
never been to the Planet  
Earth, and of course had  
never seen any earthlings  
(humans). On the day of the

fieldtrip to Planet Earth, ifbot was very excited. But the spaceship ifbot was on suffered an accident and ifbot was separated from his robot classmates. The shock of the accident caused ifbot to lose his memory....And now, ifbot has arrived at your house.<sup>27</sup>

The term "character" has several meanings: a fictional or imaginary person or entity; a quality or aspect that defines the apparent individual nature of a person or a thing; and the inherent complex of attributes that determines the nature of a person's actions and reactions. In Japan, humanoid robots like ifbot not only have character, but they are regarded as and referred to as "persons" — not "as if" they were persons, but as persons. This is readily evident in the use of certain suffixes, such as *kun* (for boys) and *chan* (for girls and boys), which indicate endearment, familiarity, cuteness, and/or child or diminutive status. Thus, Wakamaru is also referred to on Mitsubishi's website as *Wakamaru-kun*.

The meaning of the word "person" does not automatically include "human." Generally, "person," in both English and Japanese (*bito*, *jin*, *nin*) means a human being.<sup>28</sup> Legally, however, a "person" may statutorily include a corporation, partnership, trustee, or legal representative. A *bōjin*, for instance, is a juridical person. Moreover, "person" is also a grammatical category of pronouns and verb forms, such as the "third person" (*daisansha* — *sha* or *mono* is another

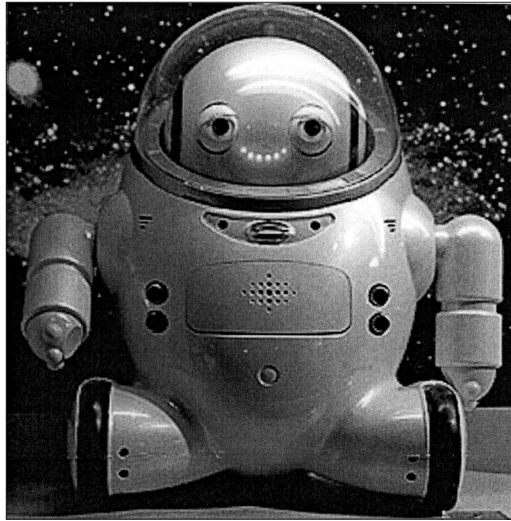


Fig. 2. Business Design Laboratory's ifbot. ([http://www.vieartificielle.com/images\\_nouvelle/270106\\_hello2.jpg](http://www.vieartificielle.com/images_nouvelle/270106_hello2.jpg))

\* See glossary p. 398 below.

26. Although ifbot's gender is left undetermined in this part of the profile, the robot is gendered "male" in the part detailing his past!

27. That ifbot "lost" his memory would seem to underscore my earlier point about robots' lack of vexatious memories, making them preferable to Asian migrant workers and caretakers. Available online at [www.business-design.co.jp/en/product/0001/](http://www.business-design.co.jp/en/product/0001/).

28. In Japanese, the word for human being(s) is *ningen*, literally "person between."

Japanese word for “person”). To reiterate then: the issue here is not about personification, but about the person-ness of, or personhood attributed to, robots.

In addition, two key cultural factors influence the way in which Japanese perceive robots. First and foremost is Shinto, the native animistic beliefs about life and death. Monotheism has never had a home in Japan, and unlike the three major monotheisms, Shinto lacks complex metaphysical and theological theories and is primarily concerned with notions of purity and pollution. Shinto holds that vital energies or forces called *kami* are present in all aspects of the world and universe. Some *kami* are cosmic and others infuse trees, streams, rocks, insects, animals, and humans, as well as human creations, like dolls, cars, and robots.<sup>29</sup>

The second factor concerns the meanings of life and living — life and fertility are especially celebrated in Shinto. *Inochi*, the Japanese word for “life,” encompasses three basic, seemingly contradictory but interarticulated meanings: a power that infuses sentient beings from generation to generation; a period between birth and death; and, the most essential quality of something whether a living thing or a made object, such as a puppet.<sup>30</sup> Thus robots, humanoid and otherwise, are “living” things within the Shinto universe, and in that sense, are very much a part of the natural world. By the same token, the creation of humanoids — or artificial life — is not at all imagined as a matter of “playing God.”

A third factor that I perceive as informing robot personhood is part not of Japanese culture but rather of archaeological theory, and involves the material-cultural condition of and for personhood. I find archaeological theory especially useful to the study of (humanoid) robots because archaeologists proceed from an analysis of remains or materials — which could include electrodes, ceramics and metals — to a construction of personhood. Anthropologists in contrast most often take the person qua human as their primary point of departure. As Chris Fowler, an archaeologist at the University of Newcastle, explains:

The person will be described as a temporary incorporation of different aspects (e.g., in European culture, the mind, body and soul). These aspects can be located in bodies and bodily materials of different kinds. Numerous ethnographic accounts describe how qualities similar to the mind or spirit are transferable between bodies, and encapsulated by the bodies of things, animals and places as well as humans. Bodies are transformed — constituted, revised and de-constituted — through exchanges between them which often serve to demonstrate inextricable connections between the human and material world...[M]aterial bodies are produced through predominant structuring principles which we can interpret into metaphors or narratives. Both human bodies and non-human bodies are the media for these narratives.<sup>31</sup>

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29. Many journalists, roboticists, and scholars writing about the robot-friendliness of Japan cite Shinto as an important factor.

30. Adapted from Morioka 1991, 85–87.

31. Fowler 2000; see also Fowler 2004.

Fowler's ideas are strikingly similar to how Japanese roboticists describe the joint production or cocreation of new knowledge through the interaction of humans and humanoids. Integral to the conception of robots as persons, and to their creative interaction with humans, is the theory of "embodied intelligence," to which I now turn.

### Embodied Intelligence

The word "platform" appears regularly in the robotics literature in reference to some sort of framework that allows software to run, such as the body of a robot. What distinguished Japanese robots early on — and now almost all roboticists have followed suit — is the concept of "embodied intelligence." Roboticists point out that intelligence cannot merely exist in the form of an abstract algorithm but requires a physical instantiation, that is, a material body. In robotics, embodied intelligence blurs the conceptual distinction between life and cognition, and between living and intelligent behavior. Embodiment here refers to a dynamic coupling of a robot with its environment; this dynamic coupling is the very source of emergent autonomous behavior — "autonomous" referring to the fact that a robot's behavior is not initiated by some external control system. As I will discuss shortly, the process of "emergence" is emphasized in the research on embodied intelligence.

Robotics is a truly interdisciplinary field, and social scientists who specialize in child development are very much involved in the design and creation of humanoid robots. This is because, as they explain, embodied intelligence in humans develops as children interact with their environment through their sensory-rich bodies. Their little brains recognize the statistical regularities of these interactions, which form a basis for patterned and learned behavior. In short, children develop by building on previous experiences, and particularly social experiences. Finally, since symbols and languages — especially instructions or encouragement from parents and other humans — are an intricate part of the regularities in the social environment of human children, the embodied developmental process leads to an intelligence unmatched in artificial systems. Likewise, the process of embodied development offers a means for robots to achieve a richer artificial intelligence.<sup>32</sup>

### Theory of *Ba*

Although "platform" is a generic term in robotics, it has a specific resonance in Japan in connection with the theory of *ba*, or place or topos. The concept and theory of *ba* (which is often used interchangeably with *basho*) is closely associ-

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32. Kuniyoshi et al. 2004; Prince and Mislivec 2001. As I was writing this article, roboticists at Osaka University and the Japan Science and Technology Agency unveiled (in June 2007) their brand new child robot, CB2 (Child-Robot with Biometric Body), which emulates the physical and vocal behavior of a 1- or 2-year-old infant and that will facilitate, in turn, studies of child development — just as child development studies enabled the creation of CB2! Available online at <http://www.wordpress.tokyotimes.org/?p=1591>.

ated with the work of Nishida Kitarō (1870–1945), generally regarded as the founder of modern Japanese philosophy. According to Nishida, *ba* — he uses *basho* — encompasses a non-dualistic concrete logic meant to overcome the inadequacy of the subject-object distinction. He proposes instead a dynamic tension of opposites that, contrary to Hegel, never resolves in a synthesis. This notion of *ba* is also concomitant with self-determination: as Nishida declares, “a self-determining entity cannot be located in something other than itself.” Moreover, the place (*ba*) of dynamic tension and the self-determined self are always in an incomplete or emergent state. Nishida’s theory of *ba* and self-determination stand in stark contrast to the logic of “Western” rationality (and perhaps monotheistic thinking more generally), which is based on a separated self (subject), where an object is observed as definitely separate by the subject who occupies the position of observer. The theory of *ba* proposes instead that a living system lives and maintains self-consistency by the *contingent* convergence of the separated self and the non-separated self.<sup>33</sup>

Among the Japanese roboticists employing *ba* theory in the field of robotics and embodied intelligence is bioengineer Miyake Yoshihiro, whose research group is working on a “Co-creation System.”<sup>34</sup> As explained on his website:

In our research group, “duality of self” was proposed as a hypothesis for realizing co-creation. This hypothesis assumes that our human intelligence is composed of two different processing modes. One is the process of “explicit self” and the other is “implicit self.” This explicit self is concerned with self-consciousness and realizes intelligence with completeness. In other words this intelligence is our causal operation in formal logic. On the other hand, the implicit self is concerned with embodiment with active incompleteness. This realizes the interaction between the system and the indefinite actual world. Here, the interface between these two processes emerges by “mutual constraint.” We regard this emergence as a co-creative process of intelligence.<sup>35</sup>

Japanese roboticists like Miyake believe that artificial systems should be *incomplete*, by which they mean a kind of “active incompleteness” that occasions an emergent cocreated reality between an artificial system (such as a humanoid robot) and humans in real time.

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33. Huh 1990; Inoue 2003; Kopf 2004; Nishida 1988. Nishida’s theory of *ba* has been adapted and applied pragmatically by Shimizu Hiroshi, a leading biophysicist who founded and directs the Ba Research Institute at the Kanazawa Institute of Technology. Shimizu has been working for many years on philosophical issues about the nature of self, representation, and the environment. Shimizu addresses the fundamental question of how an organism can function in a world in which it both forms part of the environment and is determined by it. A 1995 article by Shimizu on the theory of *ba*, published in *Holonics*, is cited as a foundational text for roboticists working on embodied intelligence. See <http://www-csli.stanford.edu/events/CogLunch/special-980316.shtml>.

34. Miyake is based at the Department of Computational Intelligence and Systems Science, Tokyo Institute of Technology.

35. Available online at <http://www.myk.dis.titech.ac.jp>.

It is in this context that I thought up the title of this article, *Robo sapiens japonicus*. It seems to be the case that in Japan the possibility that humans and machines will meld into a new, superior species is most actively pursued. The bones of the ancestors of *Homo sapiens sapiens* were discovered in Tanzania's Olduvai Gorge; Japan is a cyber-Olduvai Gorge, where the newest forms of human(oid)s are emerging.

At the present time, the vast majority of humanoid robots are being created for use in three main overlapping sectors: research, service, and entertainment. In addition, advertising is a significant application for humanoids. Sony uses Asimo, for example, to showcase the company's superior technologies and to attract capital for future research and development. Research, service, and entertainment — and advertising — are all connected and form a *ba*, or space of cocreation. The convergence of all four applications is well-illustrated by Robocup, the annual robot soccer tournament inaugurated in 1993 with the goal of creating by 2050 a humanoid team that can best human players. Similarly, at Expo 2005 in Aichi prefecture, Japan, roboticists were able to closely observe tens of thousands of visitors participating in "robot interaction experiments," as a result of which, a "variety of research and performance improvements...[were made]...that will advance the research and development of personal robots."<sup>36</sup> Robot engineers clearly use the sites of humanoid robot-based services and entertainment, from exhibition halls to the home, as *ba* in the sense elaborated earlier, and visitors to robot exhibitions and users of household robots are intimately involved in a cocreation system. In fact, Japanese society itself, by extension, is a giant *ba* for robot research and development.<sup>37</sup>

### Nostalgia and Reactionary Postmodernism: The Limits of *Ba* Theory

Roboticists have applied the theory of *ba* to transcend the binary (binarist) thinking that limits and even impedes imaginative approaches to embodied intelligence. However, roboticists are also products of their current sociocultural milieu, which, I realized from my interviews and their writings, they tend to take for granted. I suggest that the genuinely creative possibilities of *ba* theory are compromised, if not precluded, by the conservative, and even somewhat reactionary, sociocultural agenda that is implicit in applications of robot technology, such as the image of the kind of family robots will share with humans. In a nutshell, this agenda involves the recuperation of the extended family model as a means of securing a stable sociocultural and national identity. It is important to remember that the field of humanoid robotics was spurred by problems facing Japanese society, especially the declining birthrate, rapidly aging population, and shrinking labor force. Moreover, social alienation and isolation, diagnosed

36. Available online at <http://www.incx.nec.co.jp/robot/english/childcare/expo.html>.

37. In the United States, the military (DARPA, Defense Advanced Research Projects Agency) invests deeply and is deeply invested in robotic technology, although one can reasonably speculate that data from entertainment and household robot experiments are also being utilized by Japan's new Ministry of Defense.

as a consequence of lives overly mediated by information technology such as the internet, cell phones, and virtual reality games, are also identified as serious problems that humanoid robots will supposedly help to resolve.

It is safe to generalize (at least at this stage in my research) that the image of Japanese society many roboticists have in mind is of a timeless, ideal-type (or “traditional”) model that serves as a foil against which to measure contemporary social transformations and demographic trends. None of these trends is actually contextualized or analyzed in terms of the constellation of historical, political, socioeconomic conditions that occasioned their emergence. Rather, they are simply treated as surface abnormalities rather than indicative of a deeper malaise within the sociocultural system itself. Women who choose not to marry or to give birth, for example, are referred to disparagingly as “selfish” or “parasites.” What is missing in the sociocultural applications of robotics and ba theory is any sense of how real people struggle with the trials and tribulations that confront them on a daily basis.

As noted earlier, these transformations and trends are treated as biotechnological problems that can or should be redressed or resolved through biotechnological means. Roboticists in general do not seem interested in addressing, nor do they seem particularly attentive to, what I will simply call “progressive” issues, like sex and ethnic discrimination, human rights, and equal opportunity. Rather, in my view — and this may seem counterintuitive — they seem to perceive humanoid robots as instruments of nostalgia: as a means to restore, but in an even better and more efficient way, “the good old days,” when society was (outwardly at least) characterized by hyper-conformity. The differences posed by women, by resident ethnic groups, by foreign workers are not affirmed, but rather are disconnected from any account of how cultural, historical, political and socioeconomic constraints position these various groups in asymmetrical power relations, including vis-à-vis robot technology.

As I see it, and aim to show, robotics today in Japan represents an ethos of biotechnological progress conjoined with an ethos of revanchism. Or, differently put, robots (and robotics) are being enlisted to perform a kind of hi-tech salvage anthropology that can be used to mobilize ethnic-national sentiments and to reify an invented tradition of the patriarchal extended family as a microcosm of Japanese society. I describe this complex of motives as “reactionary postmodernism,” in which images and forms of the past, including invented traditions, are mined for their nostalgic and novel impact.<sup>38</sup>

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38. My use of “reactionary postmodernism” is informed by the insightful analyses of Hal Foster (1983) and Susan Foster (1985). According to Hal Foster, reactionary postmodernism stands in contrast to “resistant postmodernism,” which “is concerned with a critical deconstruction of tradition” and not “an instrumental pastiche of pop- or pseudo-historical forms, with a critique of origins, not a return to them.” Moreover, unlike reactionary postmodernism, resistant postmodernism “seeks to question rather than exploit cultural codes, to explore rather than conceal social and political affiliations.” Potter 1996, 7.

## Traditional Household (*ie*)

Before continuing, I must provide a brief introduction to the Japanese household and family, as it is the *ba* in which humanoid robots will participate in cocreation activities with humans. A traditional virilocal extended family consists at least of grandparents, parents, and children. Ironically, it is only with the greatly increased life expectancy since 1945 — which now averages over eighty years for both sexes — that the ideal of the traditional extended family could become a possible reality, even though it has not. As noted above, nearly 75 percent of all households today are nuclear.<sup>39</sup>

It is not just that the high cost of housing and the small size of dwellings make it virtually impossible to house more than the nuclear family under one roof. It is also the case that the postwar “peace” constitution promoted such new values as independence and self-interest making married children less willing to have their parents live with them — although today unmarried children seem to prefer living with their parents, as noted earlier. The same Prime Minister Abe who envisions a roboticized future is also spearheading a campaign to revise the postwar constitution. He not only seeks to insure that Japan may once again maintain armed forces with offensive capabilities, but his regime is also seeking to codify a revanchist view of Japanese society. “Love of country,” Abe’s literal translation of *aikoku* or patriotism, is being promoted and individual freedoms are being downplayed.

Anthropologists refer to the Japanese nuclear family as a “stem family” because although resembling its Euro-American counterparts, it retains the potential to expand to include several generations and to generate branches. A househead is basically a designated caretaker. Moreover, a Japanese household (*ie*) includes people who are not biologically related to a given family. Historically, such members were adopted to add depth and strength to the household, which is, ultimately, an economic, corporate entity that must be reproduced in perpetuity. Theoretically, an entire village could be one large extended family in this manner. And, during the wartime period, the entire nation-state was conceptualized as an extended family (*kazoku kokka*).

It is as adopted members of a household that humanoid robots are being conceived and marketed, and it is as adopted members that household (or partner) robots are envisioned as securing the future of the traditional extended family. The very low birthrate makes the continuity of the *ie* more difficult, and humanoid robots are imagined to play an essential role in perpetuating it. Theo-

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39. Available online at [www.ipss.go.jp/ss-seikatsu/](http://www.ipss.go.jp/ss-seikatsu/).

40. Ojima, Miwa, and Yabuno 2002. Illustrations by Yabuno Ken, a well-known graphic artist, and poem-like captions by the editorial section of the publisher. *Ba* theory is also cited in the *The Book of Wabot* series.

41. This is my translation of “*kazoku no kizuna o musubu robotto*.” The “official” English subtitle is “the robot ties between family.” In general, the English translations in *The Book of Wabot* are both awkward and inaccurate. I have provided my own translations unless noted otherwise.

retically, there is no reason why humanoids could not become heads of households!

Humanoid robots are also intended to help (re)forge interpersonal relationships along with the social ethics and sense of mutual reliability that supposedly have become casualties of Japan's postmodern, information technology-saturated society. In fact, this is the main message conveyed in *Wabotto no bon* (The book of Wabot), a new, seven-volume booklet series in Japanese and English produced by Waseda University roboticists, several of whom I interviewed early in 2007. "Wabot" is the nickname for "Waseda robot." The series aims to introduce the public to robot technology in accessible terms and to highlight the desirability of living symbiotically with humanoid robots.

An excerpt from the first volume of the *The Book of Wabot* is illustrative. Spanning the top of pages 7 and 8 is a cartoon illustration of a woman and a man, each with a light gray cloud above their heads, typing on laptops, ostensibly to each other. They are apart (he on page 7, she on page 8) with their backs to each other; a gray thunderbolt fills the space between them. The man's cheeks are flushed in apparent anger and his expression is grim; the woman's spiral eyes make her appear crazed. Her furious frustration is further symbolized by the puff of smoke, spiral, crescent, star, zigzags, and curlicues surrounding her. The poem-like caption reads:

Cell phones, the internet...We had all felt connected to each other by them, but...

In reality there is sadness somewhere, something is not right

There is an inchoate empty feeling

If only someone were close by....Touched in the heart....

Spanning the bottom of pages 7 and 8 is a very different scene. Encircled by a green ring, the couple now face each other, their faces animated with good cheer. Wabot, who has a round head sprouting one curly hair, and a cube torso, from which extend arms and legs, is shown running back and forth between the couple, conveying their messages. A picture of Wabot's head, looking a lot like a "Smiley," appears on the two laptop screens. The caption alludes to the diplomatic skills of Wabot, which are praised throughout the volume (and the series as a whole):

Hearts that were separate and scattered can become one

Become warm. A fire suddenly flares

Forgotten warmth can be regained

With the help of Wabot-kun.<sup>40</sup>

These ideas are further elaborated in volume 3 of *The Book of Wabot*, which is subtitled, "Robots that bind together families."<sup>41</sup>

## WABOT-HOUSE

The WABOT-HOUSE (*sic*) laboratory, in rural Gifu prefecture, is designed to function as the prototype for a "Robot City," which is imagined as a symbiotic society where robots and human beings share the same sphere (*ba*) of living "embraced by the natural environment."<sup>42</sup> Still under construction, the 2,700 square meter WABOT-HOUSE complex consists of three separate buildings or *ba*, de-



signed by an interdisciplinary group of Waseda University faculty that also includes architects and artists. The three units comprise a ba for humans, one for robots, and one for humans and robots to live symbiotically. The robots can travel between the last two ba by way of an elevated wooden walkway.

Earlier I noted the relationship between Shinto and the notion of robots as living persons who are part of the natural world. Significantly, in this connection, the ba for humans was modeled after Ise Shrine, home of Amaterasu ōmikami, the sun goddess and mythological ancestor of the imperial family. As the architect, Ojima Yoshio of Waseda University, explains:

I imagined the materials and architectural style of Ise Shrine when designing this [A-frame] house....I used the same Kiso cypress wood for the central pillar....The scientific use of solar energy for the house represents both the sun goddess, Amaterasu ōmikami, and the source of life itself.<sup>43</sup>

The deceptively simple, spacious house, which also resembles a traditional farm house (*gassbozukuri*), is surrounded by a newly planted organic garden of native plants.

The ba for robots only — and my guide, one of the lab's roboticists, emphasized the "robots only" part by pointing out that the facility had no toilets or running water— has a ceiling that can be raised or lowered depending on the experiment at hand. Like the ba that humans and robots share, this three-story building is outfitted with the most advanced robot technology to date. It was to have been built by robots themselves, although this was not actually achieved due to issues related to cost efficiency. The dual-residency ba is equipped with a "shield" of electromagnetic devices, including GPS, which will enable the robots to locate themselves in three-dimensional space and also to develop virtual personalities as they interact with their human ba-mates. Wireless LAN will allow them to communicate with each other, with humans, and with "robots all over the world." This symbiotic living and working space is also conceptualized as basis or ba where the eventuality of robots being granted civil rights and holding citizenship can be realized.<sup>44</sup>

### ***Innovation 25: Reactionary Postmodernism as Domestic Policy***

WABOT-HOUSE is a spin-off of the five-year Humanoid Robotics Project initiated by METI (Ministry of Economy, Trade and Industry) in 1998. Capitalized at 4 billion yen, the objective of the project was to provide seed money to a consortium of twelve corporations and seven universities that were given the mandate of developing humanoid robots.<sup>45</sup> This initiative in Japan was a slightly more

42. Available online at <http://www.wabot-house.waseda.ac.jp/html/e-overview.htm>. I visited the facility in March 2007.

43. Ojima 2007, 4–5.

44. Komatsu 2004, 22–23. Komatsu notes that civil rights and citizenship for humanoids are contingent upon the installation of anti-viral software and "regular medical examinations," lest the robots become infected with computer viruses or damaged by hackers.

45. For a list of the constituent universities and corporations, refer to the Humanoid Robotics Project website: <http://www.mstc.or.jp/hrp/main.html>.

transparent extension of earlier, secret projects launched in the mid 1980s by corporations like Honda, which went public with their humanoid Asimo in 1999. The fruits of the Humanoid Robotics Project are now being parlayed in many directions, including domestic policy, under the aegis of NEDO (New Energy and Industrial Technology Development Organization), “Japan’s largest public resource and development management organization for promoting the development of advanced industrial, environmental, new energy and energy conservation technologies.” Founded in 1980, NEDO was reorganized in 2003 as an Incorporated Administrative Agency.<sup>46</sup>

Upon his election in 2006, Prime Minister Abe assembled a cabinet-level committee charged with drawing up a blueprint for a “beautiful” (*utsukushii*) innovative, new, roboticized Japanese society.<sup>47</sup> The proposal, titled *Innovation 25*, sketches a vision of what Japan should be like a mere eighteen years from now. Released to the public in February 2007, with surprisingly little fanfare, the proposal (which is accessible online) has attracted the attention of a number of bloggers, cited below, all of whom are quite critical of Abe’s image of the country’s future. I would describe his vision as “retro-futurist,” a benign expression for reactionary postmodernist.

*Innovation 25* opens with a definition of innovation:

It is said that the word “Innovation” is derived from the Latin “Innovare” (renew) (= “in” [within] “novare” [change]). In Japanese, the word is rephrased to mean technological renovation and management reorganization or simply renovation or renewal, but innovation also means using new technology and ways of thinking in existing materials and structures to create new value and to make significant changes in society.<sup>48</sup>

Subtitled, “Making the future; Toward the challenge of limitless possibilities,” *Innovation 25* emphasizes the roles that biotechnology and robotics will jointly play in securing the stability of both the Japanese economy and Japanese

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46. Available online at <http://www.nedo.go.jp/english/introducing/profile.html>.

47. The seven members include the chair, Kurokawa Kiyoshi (b. 1936), an MD, medical school professor, and top administrator and prolific essayist; Eguchi Katsuhiko (b. 1940), president of PHP (Note: PHP, a think-tank established in 1946 by the late Matsushita Konnosuke, who founded Panasonic, stands for Peace and Happiness through Prosperity, which expresses the ultimate ideal of the PHP Group, namely, “to bring peace and fulfillment to human society by assuring both spiritual and material abundance.” In 2004, PHP drafted a prototype for a new constitution for Japan.); Okamura Tadashi (b. 1938), vice chair, Japan Business Federation and chairman of the Board, Toshiba Corporation; Kanazawa Ichirō (b. 1941), president, Science Council of Japan and National Center of Neurology and Psychiatry; Sakamura Ken (b. 1951), professor, Graduate School of Interdisciplinary Information Studies, University of Tokyo; Terada Chiyono (b. 1947), the sole female member and vice chair of Kansai Economic Federation and president of Art Corporation; Yakushiji Taizō (b. 1944), member of Council for Science and Technology Policy, and former vice president and currently visiting professor, Keio University ([http://www.kantei.go.jp/foreign/innovation/member\\_e.html](http://www.kantei.go.jp/foreign/innovation/member_e.html)). I interviewed Professor Yakushiji on 2 March 2007 in his Kasumigaseki office.

48. Available online at [http://www.kantei.go.jp/foreign/innovation/okotae1\\_e.html](http://www.kantei.go.jp/foreign/innovation/okotae1_e.html).

social institutions. However, as I have argued and will illustrate further, the rhetoric of “innovation” deployed in *Innovation 25* is misleading; “renovation” is perhaps a more accurate term, for it is not *new* values but rather *renewed* values — and especially those represented by the traditional patriarchal extended family — that constitute the “significant changes” recommended in the proposal.<sup>49</sup>

The committee responsible for producing *Innovation 25* reports to Takaichi Sanae, a cabinet minister with several diverse portfolios. Apart from being one of the few (Japanese) women to hold a high profile political position, Takaichi is minister of state for Okinawa and Northern Territories Affairs; Science and Technology Policy; Innovation; Gender Equality; Social Affairs; and Food Safety. In her preface to *Innovation 25*, Takaichi explains that the proposal is a challenging manifesto for [bio]technological reform and that it outlines a “reform/renewal” (*kakushin/sasshin*) of the Japanese social system itself. Moreover, she declares, *Innovation 25* paves the way to “a life that will become so much more convenient (*benri*), safe (*anzen*) and comfortable (*anshin*).” She cautions that “the road ahead to realize this vision for Japan will not be an easy one...[especially because] fostering innovation to create a new Japan will challenge and disrupt conventional wisdom and value systems that we have cultivated over a long time.”<sup>50</sup>

Contrary to Takaichi’s remarks, the so-called “new Japan” described in *Innovation 25* is “new” only in the state-of-the-art biotechnological means employed to achieve an otherwise very traditional (or reactionary postmodernist) model of society.<sup>51</sup> Conventional wisdom and value systems are not challenged at all; rather, as I have already mentioned, progressive political agendas, including women’s issues and ethnic diversity, are summarily ignored and dismissed.

I have space here to summarize only a few of the key points in *Innovation 25*, and will focus on one section that is an illustrated, detailed sketch of a day in the life of the “Inobe family” — their fabricated last name is a shortened form of *inobeshon* (innovation) [see glossary p. 398]. Illustrations are an important component of *Innovation 25*, which includes a section that provides a cartoon summary of its main points. Although the prime minister’s website provides an

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49. In this connection, I elaborate on what I call the politics of renewal — or strategic dehistoricization — in Robertson 2005.

50. These quotations are from Takaichi’s prefaces to the original proposal itself ([http://www.kantei.go.jp/foreign/innovation/message1\\_e.html](http://www.kantei.go.jp/foreign/innovation/message1_e.html)) and to the interim report on the proposal ([http://www.kantei.go.jp/foreign/innovation/interimbody\\_e.html](http://www.kantei.go.jp/foreign/innovation/interimbody_e.html)).

51. The rubric “new” (*shin*) in reference to Japan is significant: ideologues since the Meiji Restoration have all laid claim to a vision of “new Japan” (*shin’nippon*).

52. Here, “flower arrangement” is referred to generically by the romanized *furawā arenjimento*, instead of as *ikebana*, the Japanese “school” of flower arrangement. This is one example of how, throughout the Inobe story, non-Japanese practices or usages are referenced, perhaps in an attempt to impart a sense of future difference. For example, the Inobe’s television screen is described in inches and not centimeters.

53. All information about the Inobe family is from <http://www.kantei.go.jp/jp/innovation/chukan/inobeke.html>.

English summary of *Innovation 25*, the bulk of the report, including all of the cartoon illustrations, is available only in Japanese.

### A Day in the Life of the Inobe Family

What follows is my translated and paraphrased excerpt from *Innovation 25*'s somewhat haphazardly written, typo-filled virtual ethnography of the Inobe family, who are introduced as constituting *the* typical Japanese household of the future, that is, eighteen years from now. The family consists of a heterosexual married couple, their daughter and son, the husband's parents, and a male-gendered robot.

The day-in-the-life narrative begins by introducing the eldest member of the family, Ichirō,

a 77-year-old retired manager of a medium-sized company, who spends fifteen hours a week teaching classes on nanotechnology and science at all levels of schools, from elementary to university. He is married to 74-year-old Masako who used to help out at Ichiro's company and when he retired, took up "flower arrangement."<sup>52</sup> Masako also volunteers at local events. Naoyuki is the 50-year-old son of the elderly couple and current Inobe househead. After graduating from college he joined a large corporation but resigned twenty years ago [in 2005] in order to found a hi-tech venture corporation with colleagues who were part of his internet circle. That project failed but Naoyuki learned from his mistakes and now his new firm is flourishing. His wife Yumiko is a year older than he. She was able to continue working via the internet at an interior design company after her marriage and through two pregnancies thanks to her company's maternity leave policy. Taiki, their 22-year-old son, is a senior in college and has to decide whether to attend graduate school in China or in the United States, where he had been an exchange student during high school. Misaki, their 17-year-old daughter, is an exchange student at a high school in Beijing.

The robot is the newest member of the household. His name, Inobē, coined by Naoyuki, was also derived from inobēshon. Inobē is five years old and the size of an elementary school student. He is connected to the household's and regional networks, and can converse to an impressive extent with family members<sup>53</sup> (fig. 3).

The Inobe household is a futuristic model of the traditional virilocal extended family, and Inobē-kun the robot plays a critical role in actualizing it.

Following the introduction of the Inobe family, the fictional ethnography proceeds to record each member's daily routine, be-

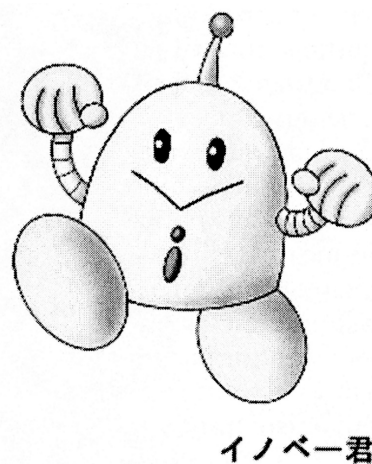


Fig. 3. Inobē-kun. (<http://www.kantei.go.jp/jp/innovation/index.html>)

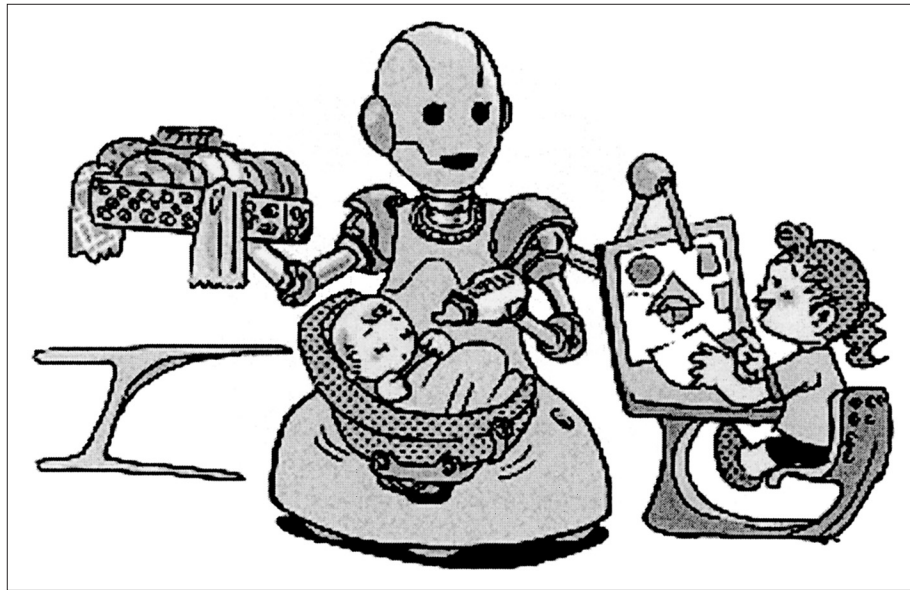


Fig. 4. “Housewife” robot as imagined in *Innovation 25*. (<http://www.kantei.go.jp/jp/innovation/chukan/20daihyourei.html>)

gining at 6:30 when the elderly couple arises, and ending at 23:00, when the LED lights in the house dim and then turn off automatically. In the interest of space, I will focus only on several parts of the Inobe story that feature the househead’s wife, Yumiko, who has the closest relationship with Inobē-kun. This is not surprising as household robots are imagined to serve as surrogate housewives; that is, as devices through which a human housewife distributes her personal agency<sup>54</sup> (fig. 4). Implicit in the humanoid robotics literature is the notion that a married woman who is freed from housekeeping and caretaking chores will be more able and willing to have more children — that she will become the “birthing machine” eulogized by Yanagisawa, the Health and Welfare minister, quoted at the outset.

At 7:00, Yumiko, Naoki and Taiki arise. [The elderly couple are already up.]

The extended family eats breakfast together in front of a 103-inch flat-screen display, which is actually a composite of many different screens enabling each person to watch their preferred program wearing headphones.<sup>55</sup> But this morning, they are all watching Misaki in a broadcast from Beijing, and they all talk and laugh among themselves (fig. 5).

At 17:00 Yumiko finishes “teleworking” in her home office and has a conversation (*kaiwa*) with Inobē-kun. She asks the robot: “Have you finished cleaning the house?” Are there any messages?” Have you started preparing the bath?” Inobē-kun answers, “The whole house is clean except

54. See, for example, Yamato 2006.

55. Regarding headphones, the future is presented in *Innovation 25* as a time when Japanese will not have to learn a foreign language because a headphone will have been developed that provides simultaneous translations in both directions.

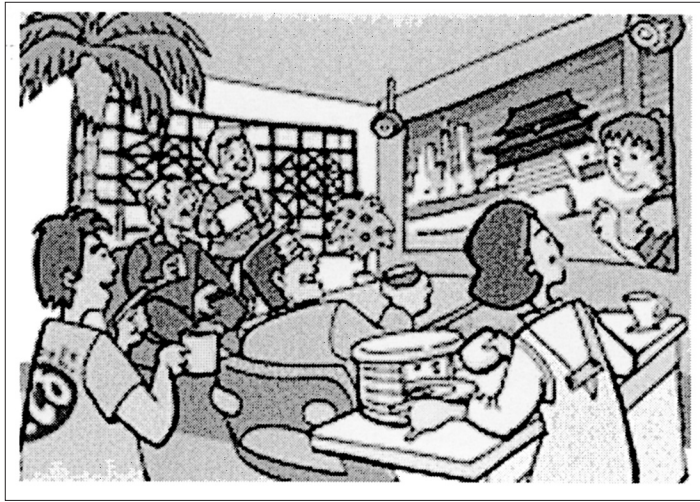
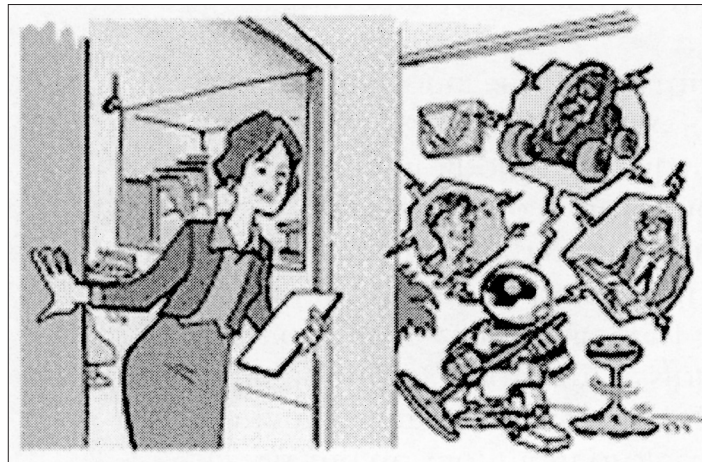


Fig. 5: The Inobe extended family. (<http://www.kantei.go.jp/jp/innovation/chukan/inobeke.html>).

Fig. 6: Yumiko and Inobē-kun conversing. (<http://www.kantei.go.jp/jp/innovation/chukan/inobeke.html>)



for mama's [i.e., Yumiko's] office. Granpa will be home at around 18:00, and there was a message from Grandma saying that she would be home at 17:00 so she should be here any minute now. I'm thinking (*omotte iru*) of preparing the bath at 18:00. Papa said he would be home at 19:00" (fig. 6).

Unlike his predecessor, this Inobē-kun can easily manage everyday conversations due to advances in artificial intelligence, which has provided robots with an ability to learn. Although many of their neighbors have leased robots, the Inobe's bought theirs as soon as it was on the market.

Echoed in *Innovation 25* is the notion emphasized in *The Book of Wabot* series that the kitchen table cum home-entertainment center around which the Inobe's gather in the morning is "an *irori* (hearth) of today":<sup>56</sup>

In the Japanese home of long ago, there were no telephones or televisions. And children lived together with their parents and even grandparents. For these extended families the *irori* was where everyone gathered

56. Kanemori 2007, 16.

around to sit and talk with one another. The irori was where the family formed a happy circle.<sup>57</sup>

The cartoons accompanying the Inobe ethnography (figs. 5 and 6) unequivocally illustrate both the ideal-type extended family and the wholly conventional gender roles that are both reified and reinforced in *Innovation 25*. Yumiko, in a pink apron, fixes breakfast for her husband, son, and in-laws (fig. 5), and although able to telework from home, she continues to be the primary person responsible for overseeing household chores and caretaker duties, albeit with the assistance of Inobē-kun, her surrogate, and, on occasion her mother-in-law who (elsewhere in the ethnography) does some last-minute grocery shopping.<sup>58</sup> Whereas the household's robot enables Yumiko both to work for wages (at home) and to manage domestic tasks, the fact that Naoyuki is self-employed allows him the liberty to go home early if nothing urgent is pending at the office. As prescribed in the Inobe ethnography, "spending time with one's family stimulates innovative thinking" in men who are employed outside the home. However, apart from "innovative thinking," Naoyuki's longer hours at home are not spent sharing housework and caretaking responsibilities with Yumiko (and Inobē-kun). Unlike his father, Naoyuki does enjoy being a chef on occasion, but neither he nor Yumiko even entertain the thought of teaching their son how to cook.

### Epilogue: Posthuman Families

The virtual ethnography of the Inobe family in *Innovation 25* has provoked a number of criticisms on Japanese blogs. As one critic, a housewife and mother of two who manages a website on social issues, fumed:

There's absolutely no reality to the image of everyday life [in the proposal]. It reads like a twenty-year-old science fiction novel! Am I the only person who doesn't share [Prime Minister Abe's] view of an ideal future (*risō no mirai*)? If the Japanese have become spiritually and intellectually impoverished it's because they leave things up to machines in the name of convenience; they've lost the ability to gain knowledge from the natural environment.<sup>59</sup>

Another blog that regularly and wittily criticizes both the status quo and the Abe regime describes the day-in-the-life account of the Inobe family as having no value as a future forecast, and that it can be dismissed as sidebar filler in a newspaper or an item for blogging (as in this case).<sup>60</sup> Similarly, technical consultant Kobayashi Akihito writes on his website that the science-fiction-like account of the Inobes makes him uneasy, and that as a vision of Japan's near future, *Innovation 25* is trivial and cartoonish.<sup>61</sup>

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57. Komatsu 2004, 2.

58. Note that in fig. 6, Inobē-kun looks nothing like the robot of the same name in fig. 3.

59. Available online at [http://studio-m.at.webry.info/200703/article\\_2.html](http://studio-m.at.webry.info/200703/article_2.html).

60. Available online at [http://www.nogutetu.com/2007/02/post\\_135.html](http://www.nogutetu.com/2007/02/post_135.html).

61. Available online at [http://blogs.itmedia.co.jp/akihito/2007/02/post\\_d66a.html](http://blogs.itmedia.co.jp/akihito/2007/02/post_d66a.html).

Nevertheless, however much the prime minister's vision of the future reads like blog-worthy if dated science fiction, *Innovation 25* is the platform on which the state has based the new national budget. Three trillion yen (US\$26 billion) have been earmarked for distribution over the next ten years to promote robot technology, which is widely thought to be the industry that will "rescue" Japan.<sup>62</sup> METI has set aside over 2 billion yen (US\$17.4 million) in its 2007 budget to support the development within eight years of intelligent robots that rely on their own decision-making skills in the workplace.<sup>63</sup>

But these facts do not invalidate the criticisms of *Innovation 25*, which in my view, should be closely and critically examined. I have argued that *Innovation 25* and *The Book of Wabot*, two didactic proposals for a future Japan where humanoids and humans live in symbiotic harmony, not only map out a world of simulations but also simultaneously erase any possibility of fostering a critical sense of history. Yet, there is much more than what appears to be cultural parody in both documents.<sup>64</sup>

Both *Innovation 25* and *The Book of Wabot* develop a view of the Japanese family and its members as "posthuman." Posthuman most generally refers to humans whose capacities are radically enhanced by biotechnological means so that they surpass those of "ordinary — or unenhanced — humans." The posthuman condition is a staple of Japanese *manga* (comics) and *anime*. In "Ghost in the Shell," for example, the characters replace their own bodies with robotic bodies. Of course, posthumanism as I have just defined it is nothing new: human bodies today have prosthetic limbs, immune system "re-programmers" in the forms of drugs, artificial hearts, titanium bones, and a whole host of inserts and implants.<sup>65</sup> And those of us living in more affluent societies can hardly imagine living without e-mail and cell phones, ipods and television, cars and airplanes, and so forth. However, our biotechnological enhancement and convergence with machines is happening much faster and more completely than we perhaps realize. We are all converging with machines, but perhaps this trend is actualizing more explicitly and relentlessly — and is even more desired — in Japan.

I think that it is safe to claim that the Japanese state is the first to attempt to organize and orchestrate society around the advent of humanoid robots who will both compensate for the declining and aging population and make replacement migration less necessary (or even unnecessary). During my interviews with roboticists, I often shared my impression — which brought a bemused look to their faces — that implicit in the conception, creation, and deployment of household robots is the image of Japan as a giant gated community. The exact expression I used was *gijutsuteki sakoku*, or "technologically closed country," a

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62. See, for example, Nakayama 2006.

63. Available online at <http://www.pinktentacle.com/2006/08/intelligent-robots-by-2015-says-meti/>.

64. I have benefited here from Sholle's (1992) discussion of reactionary postmodernism.

65. Haraway 1991.



reference to the isolationist policy of the Tokugawa shogunate which selectively closed off Japan and the Japanese to the rest of the world between the early seventeenth and late nineteenth centuries. Already at least one Japanese scholar — who is also an architect — has referred to the new hi-tech vertical mini-cities, like Roppongi Hills and Tokyo Midtown, and to the many high-rise condominiums containing over 500 dwellings that are sprouting up in Tokyo, as “gated communities.” She points out that these residents-only complexes include sports and day care facilities and are protected by advanced security systems: “These high-rise buildings are kind of gated communities in reality, though most of Japanese people are not conscious of that.”<sup>66</sup>

Such high-rise condominiums are idealized in *Innovation 25*. Prior to moving to their new single family dwelling, the Inobes used to live in just such a self-contained “tower condominium” that was home to two thousand households. “Such residences,” the proposal explains anachronistically,

were part of the government’s “compact city” [*konpakuto sbiteika*] agenda at the time. These giant housing complexes included day care centers, medical clinics, and even schools — there was never any need to worry about the children having an accident during their commute to school. An irrigation system was incorporated into the structure so that many plants and much greenery could be cultivated.<sup>67</sup>

Ironically, in connection with “gated communities for humans,” the WABOT-HOUSE complex is described in *The Book of Wabot* as follows: “At first glance this space might be seen as a prison for robots. However, it is actually the first kingdom [*ōkoku*] on earth just for robots.”<sup>68</sup>

My image of a roboticized Japan as a “technologically closed country” — like WABOT-HOUSE, at once a prison and a kingdom — unconsciously anticipated the announcement, in mid May 2007, of the government’s plans to set up an experimental “ubiquitous internet zone,” where “everyone and everything [will] ...be connected anytime and anywhere by internet technology.”<sup>69</sup> The newspaper copy of this “technologically gated community” reads as if it were lifted directly from the account of the Inobe family in *Innovation 25* (and especially from the sections that I did not include here, such as details about the “wear label” (*uearaburu*) that tracks everyone’s location and also serves as a credit card):

The government will set up a special zone next fiscal year to test “ubiquitous” internet technology in situations as varied as providing medical services for the elderly, preventing car accidents and buying vegetables, officials said Saturday.

The Internal Affairs and Communications Ministry hopes the experiment will lead in a couple of years to groundbreaking telecommunications technologies and nationwide consumer-friendly services, the officials said.

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66. Junko Abe-Kudo, [http://gated.parisgeo.cnrs.fr/index.php?option=com\\_content&task=view&id=67&Itemid=38](http://gated.parisgeo.cnrs.fr/index.php?option=com_content&task=view&id=67&Itemid=38).

67. Available online at <http://www.kantei.go.jp/jp/innovation/chukan/inobeke.html>.

68. Ojima 2005, 30.

The special deregulation zone for achieving the ubiquitous network — a system allowing everyone and everything to be connected anytime and anywhere by internet technology — is expected to be set up in an area where there is less radio wave interference.

The most likely candidates are Hokkaido and Okinawa. According to the ministry officials, the test will involve a number of private businesses, such as telecommunications carriers, broadcasters, electric machinery makers, automakers, venture firms, and other companies.

In the zone, people will be able to buy vegetables after checking the names of producers and how the produce has been grown by simply holding their mobile phones over products carrying IC tags.

Efforts to prevent traffic accidents will include setting up sensors along streets to monitor pedestrian movements, sending the data to onboard terminals in cars to control their speed.

Senior citizens living alone will receive medical assistance via sensors and wireless networks. Blood pressure and pulse data will be continuously sent to hospitals, where doctors will take prompt countermeasures when abnormalities are detected.<sup>70</sup>

Nearly twenty years ago, Donna Haraway envisioned a posthuman future — the “cyborg path” — as liberating, especially with regard to overcoming a Western philosophical history of excessively dualistic thinking. Haraway’s cyborg is an individual who is neither entirely technological nor totally biological, and neither male nor female in any absolute sense.<sup>71</sup> However, as I discussed in the context of Nishida Kitarō’s theory of ba, “excessively dualistic thinking” has never been an issue in non-monotheistic Japan and yet the “cyborg path” may not be particularly liberating there in the sense Haraway imagined. Although the roboticized society portrayed in *Innovation 25* is the Abe regime’s rose-tinted blueprint for the future, this utopian proposal has the potential to morph into a dystopian scenario. As eulogized in *Innovation 25*, the posthuman or cyborg path may offer unprecedented convenience to the majority of Japanese, but that convenience is accompanied by the state’s almost total surveillance power over every aspect of the individual, inside and out. With their built-in web servers and live video feeds, household robots are part of one of the fastest growing markets in Japan: surveillance and observation. Of the sixty-two household robots now commercially available, “entertainment robots are the most popular, followed by surveillance, educational, research, nursing, and cleaning robots.”<sup>72</sup> Of course, as in the case of PaPeRo, several of these functions are maintained by any one robot.

It seems clear that the state has already embarked on the construction of a (gated) cyber-ba for a future roboticized society spurred on by the specter of a

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69. “‘Ubiquitous’ internet zone to test IT lifestyle,” *Japan Times*. 13 May 2007.

70. Ibid.

71. Haraway 1991, 181.

72. Available online at [http://www.robocasa.com/pdf/abstract\\_and\\_general\\_overview.pdf](http://www.robocasa.com/pdf/abstract_and_general_overview.pdf).

rapidly declining, graying population. In part, it appears that Japanese women exercising their constitutional right as sovereign individuals by not giving birth have exacerbated this demographic trend. How will — or should — they respond individually and as a constituency to a utopian proposal that resurrects the same old patriarchal extended family and simply postmodernizes it with the addition of a household (or more accurately, a housewife) robot? In addition, recent reports in the mass media suggest that any discomfort about the surveillance cameras and devices already in place on the streets and in schools and department stores, are offset by the “peace of mind” (*anshin*) that they provide.<sup>73</sup> And convenience, safety, and reassurance are exactly what Minister of Innovation Takaichi declared was the “dream” embodied by *Innovation 25*.

A seductive ideology of convenience and peace of mind lies at the core of reactionary postmodernism. The deployment of humanoid robots is being imagined in ways that underscore how much more simple and reassuring it is to eliminate the existence of “something” — whether that “something” be wartime memories, history, immigrants, individualism, privacy, autonomy, and so forth — than to actually deal with the difficulties that “something” presents. By the same token, robot technology also further perpetuates the willful amnesia of the state with respect to the problematic legacy of Japanese imperialism, wartime atrocities, and ethnocentrism. The twinned ideologies of convenience and peace of mind in the name of security forgive such strategic forgetting and even indulge it.

In presenting a multifaceted, historicized account of the emergence of *Robo sapiens japonicus*, I have raised some pressing questions about the way in which demographic trends are being both recognized and addressed. I have also analyzed critically the types of ideological forces informing both the compilation of *Innovation 25* and the future trajectory of robotic technology in Japan. There is a lot of *inconvenient* thinking the Japanese — and all of us — have to do about the place and extent of biotechnology in our daily lives. Even the roboticists involved with creating WABOT-HOUSE admit that there must always be a gap — “not too big, not too small” — between dreams of the future and everyday realities lest the former overwhelm and occlude the latter.<sup>74</sup> The publication of *Innovation 25* suggests that there is a gap no longer.

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73. Negishi, Nakamura, and Shimizu 2006. In June 2007, all the major news services reported that the Self-Defense Force’s Intelligence Security Corps monitored civil groups, journalists, film directors, and even high school students who attended antiwar rallies between November 2003 and February 2004, sparking protests among Japanese. Anti-crime and accident-preventing surveillance measures, however, seem to provoke fewer worries about the state’s invasion of privacy. See the collection of reports on RFID (radio frequency identification) tags used in Japan for taking attendance in school and for tracking people and vehicles in [http://ubiks.net/local/blog/jmt/archives3/cat\\_60.php?page=all](http://ubiks.net/local/blog/jmt/archives3/cat_60.php?page=all).

74. Hashimoto 2003, 26–27.

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□

## Glossary

*bito, jin, nin* 人

*sha, mono* 者

*ba* 場

*basbo* 場所

*inobēshon* イノベーション (innovation)

*inobē* イノベー (Inobē, the robot's name)

*Inobe* 伊野辺 (Inobe, the family's name)