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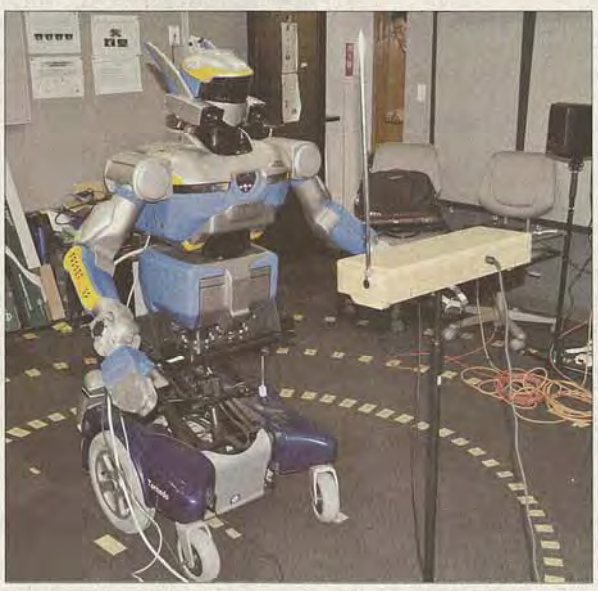

Photos by Christal Whelan

Clockwise from above: Guardian robot of Kobe—Tetsujin 28—erected four years after the 1995 Great Hanshin Earthquake as a symbol of urban revival at Wakamatsu Park in Kobe; Robot HRP-2 plays the theremin and sings opera at Kyoto University's Intelligence Science and Technology Department; and shooting the breeze at Cafe Poco-Pen in Osaka. Japanese android Fumiko, left, with French humanoid Nao in the arms of a human

Robot revolution

Pen in Osaka. Japanese android Fumiko, left, with French humanoid Nao in the arms of a human

Robot revolution

Significant otherness in Japan

culturescapes
by Christal Whelan

Tetsujin 28-go, Torayan, Tetsuwan Atomu—Japanese robots are international celebrities. Honda Co.'s humanoid, Asimo, keeps a tight but versatile schedule. At a fundraiser a few years back, the white robot conducted the Detroit Symphony Orchestra in a rendition of "Impossible Dream." Three months ago, he blithely headed to Warsaw for an appearance at the annual Science Picnic. In Japan, he recently delighted children in the disaster-hit Tohoku region by dancing and kicking a soccer ball.

Other robots, such as Aibo, Sony's robodog—now a fixture in the Smithsonian's permanent collection—display neat fusions of the organic and the mechanical. Upon purchase, Aibo cannot walk, but gradually develops a repertoire of sounds and movements through interaction with humans. In short, the puppy grows up: it barks, responds to 100 spoken commands, shows anger by changing its eye color from green to red, and offers a conciliatory paw.

Sony phased out the adorable canine just seven years after its release, but other animal robots—some even cuter—have stepped in.

Paro, the long-lashed, dark-eyed snow-white baby harp seal, seems to have secured a niche as a therapeutic companion for the elderly. Developed at the National Institute of Advanced Industrial Science and Technology by Takanori Shibata and covered with soft antibiotic fur, the 2.7-kilogram mechatronic seal is popular in care facilities across Japan, and increasingly in Europe and the United States since its release overseas in 2008. With five sensors, Paro responds to touch, light, sound, temperature and posture by moving its head, legs and tail to evoke primordial nurturing instincts in humans.

Paro has none of the hard surfaces characteristic of other would-be companion robots like, for example, Mitsubishi Heavy Industries' Wakamaru. Despite its extraordinary abilities to report news stories from the Internet, wirelessly contact family members or the hospital, and even offer reminders about daily medication, Wakamaru seems a distant presence in the home.

Now in its eighth generation, Paro's success does not derive from cuddly responsiveness and evocative cries alone. The real success may be that Paro is not meant to replace humans, but rather work in tandem with skilled caregivers.

Domestic life in Osaka: iRobot's vacuum cleaner Roomba on the heels of Sony's Aibo

The willingness—or even desire—in Japan to coexist with mechanical beings is hardly explained by Shinto animism, often cited as the nation's cultural basis. Nor can the impact of postwar robot icon Astro Boy account for the aspirations of humans who would readily live in symbiance with machines.

The concept of modern robots in Japan was triggered in 1924 by Czech playwright Karel Capek's hit drama *R.U.R.* (Rossum's Universal Robots), which was staged in Tokyo two years after its Prague debut. Capek used the Czech term robota, meaning serf labor, to refer to the synthetic, mass-produced factory workers in his play.

Capable of feeling emotion, these robots soon revolted against their human inventors, and eventually killed them.

However, classic Frankenstein plots so pervasive in Western narratives lack resonance in Japan, a country where the bond between an artisan and his tools has deeper, enduring roots. Tools are revered in Japan not because they are "alive," but because they are an extension of the craftsman's body. Through daily use, a worker infuses his tools with his soul so that they acquire a kind of life of their own.

This idea is common currency in Polynesia, where it is referred to as mana. Since a person and his tools make human livelihood possible, the product of this relationship is one of profound gratitude, a central value prevalent in Japanese culture that fosters a subjunctive mood. The tools are "as if" they are alive, but not mistaken for living things.

The impact of *R.U.R.* in Japan proved indelible, though the point of interest was not in the robotic revolution, but rather the relationship between technology and humans. *R.U.R.* marks the beginning of a robot boom that has never waned. Like the swordsmith who folds steel thousands of times, infusing his spirit into what becomes the blade, robots in Japan were never conceived as enemies; they are friends and companions for life, tied intimately to humans in what anthropologists describe as fictive kinship.

Four years after the Tokyo performance of *R.U.R.*, biologist Makoto Nishimura suggested building a jinzo ningen (artificial human, as robots were initially called in Japan), for the Grand Exposition in Commemoration of the Imperial Coronation in Kyoto in 1928.

His creation was arguably Japan's first modern robot. Gakutensoku, meaning "learning of natural law," was more than 3 meters tall. He was dressed in a toga and sat on an ornate altar, with a mace in hand that lit up when he raised his wreathed head to the sky. Through rubber tubes and compressed air, his cheeks puffed as if he was actually breathing.

Nishimura wanted to show that his robot was a part of nature. The Osaka Mainichi Shimbun quoted the biologist as saying, "If one considers humans as the children of nature, artificial humans created by the hand of man are thus nature's grandchildren."

A phenomenal success, Gakutensoku went on tour to parts of Asia and Europe, just like many of his descendents have done.

Osamu Tezuka, father of Japanese animation and creator of *Tetsuwan Atomu* (Astro Boy), had read *R.U.R.* Yet ultimately he too created the image of friendly technology that helps men, women and children. Tezuka formulated the Three Principles of Robot Law, and they echo those of renowned author Isaac Asimov's in his collection of nine short stories *I, Robot*.

Tezuka said that robots should never injure or kill humans; and that robots should serve humankind. But in his third law, Tezuka grants robots the right to live free and equal lives, which is a departure from Asimov's code, which says merely that robots should not destroy themselves.

Tezuka's generous granting of autonomy to robots is possibly because of a fundamental trust in tools and technology. Astro Boy, after all, symbolized an age when atomic power was seen as a symbol of hope for the future. The Expo '70 held in Osaka promoted the same narrative of robots as friendly, working machines.

This view still thrives today in the work of roboticist Hiroshi Ishiguro of Osaka University. No one has tried more than Ishiguro to realize Tezuka's third law. Ishiguro builds androids that look like normal people. He uses silicone rubber and pneumatic actuators to create subtle movements such as breathing, twitching and blinking. For Ishiguro, if robots can "pass" as humans, they are likely to be accepted as counterparts in society, paving the way for surrogate selves, or what he calls geminoids.

Last month marked a historical watershed in robot research in Japan. One of Ishiguro's androids made an appearance in a social setting, at Cafe Poco-Pen.

Geminoid F, or Fumiko, as she is known, costarred last year in the 20-minute stage drama *Sayonara*, playing the role of an android. However, in this small cafe in Osaka, Fumiko was a hostess, albeit with certain restrictions due to a permanent sitting position and limited movements of the head, torso and arms. Controlled remotely by an unseen human operator with a microphone, the telepresence android took orders and conversed with customers.

One of Ishiguro's biggest challenges with androids is to create sonzaikan, the sense of the presence of a person, not a human impersonator or, at best, skillful ventriloquism.

Despite Japan's extraordinary expertise in robotics, the country was unprepared to use them in scenarios resulting from the March 11 Great East Japan Earthquake. Instead, iRobot's PackBot and Warrior from the United States assumed leading roles in missions. Although Quince, a Japanese robot for nuclear and biological disaster relief, was sent to the No. 2 reactor of the Fukushima No. 1 nuclear power plant to set up a gauge to measure contaminated water flooding the basement, it got caught on the staircase landing and failed to reach its destination, according to a Tokyo Electric Power Co. spokesperson.

The only useful Japanese robot appeared to be the Active Scope Camera, an 8-meter snakebot equipped with a fiber-optic camera that slithered along the ground and over rubble to relay images.

According to Hiroshi Okuno, a professor who specializes in robotic audition at Kyoto University, the myth of nuclear safety has long stunted the development of rescue robots in Japan. Beyond research, the training of skilled operators of robots is essential.

The Rescue Robot Contest began in 2001, with the idea to sharpen the public's sense of disaster preparedness and to train young people in the principles of rescue through remote-controlled robots they have designed themselves. Although many of the designs look like piles of junk on wheels, they are creative and require considerable skill to maneuver—skills that are ultimately transferable.

At the contest, rescuers sit at terminals out of view of an 8-meter rescue space. The aim is to rescue small cloth dummies quickly and gently. Fitted with sensors, these small figurines monitor the quality of a rescue.

The Rescue Robot Contest is one way to combat complacency and take disaster preparedness to heart. Readiness is all.

Information

■ Rescue Robot Contest will be held today, 10 a.m.-5 p.m. at Kobe Sanbo Hall near JR Shin-Kobe Station in Kobe. For more information, visit the Web site www.rescue-robot-contest.org

■ Android Fumiko will costar in play "Sayonara" at Kyoto Art Center Free Space on Oct. 1 at 6 p.m. and Oct. 2 at 3 p.m. For more information, visit the Web site www.kac.or.jp

Whelan is a cultural anthropologist and author who resides in Kyoto.