TEMPURA

N°12

UN MAGAZINE SUR LE JAPON

JAPON RETOUR VERS LE FUTUR

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Manga de combat

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UK: 16£ - USA: 25,99$ - Canada: 25,99CAD

HIVER 2022

« NON, LES JAPONAIS NE VIVENT PAS AVEC LES ROBOTS »

ENTRETIEN AVEC JENNIFER ROBERTSON

PROPOS RECUEILLIS
PAR MATHIEU ROCHER

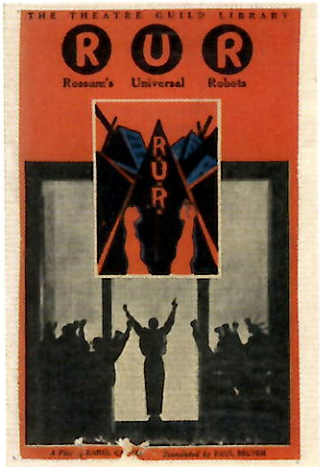
Symboles d'un Japon futuriste, les robots s'accrochent à l'image qu'on a bien voulu leur accoler. Mais pour combien de temps ? L'anthropologue américaine Jennifer Robertson, qui a vécu sur l'Archipel pendant plus de 25 ans, s'est intéressée à ce que ces « machines intelligentes » trimballent comme impensés. Professeure émérite à l'université du Michigan où elle a pris sa retraite en 2020, elle poursuit des recherches sur les représentations du sexe, du genre et de l'identité que convoquent la robotique, les robots et l'intelligence artificielle.

Pourquoi le Japon s'est-il tant intéressé aux robots ?

Le terme de robot a été inventé par un auteur tchèque, Karel Čapek, dans une pièce de théâtre de 1920 : *R.U.R.: Rossum's Universal Robots*. La pièce est passée au Japon en 1924 et le terme *robotto* s'est imposé. Mais avant le mot, on connaissait déjà des humains artificiels dans l'Archipel comme dans des légendes bouddhistes des XIIe et XIVe siècles. Plus récemment, dans les années 1960, les robots industriels sont arrivés au Japon alors que le pays voulait accélérer la reconstruction post-guerre. Face à la pénurie de main-d'œuvre, le gouvernement privilégiait l'automatisation à l'immigration. Parmi les premiers robots, ceux qui peignaient sur les chaînes de montage permettaient d'éviter aux ouvriers de respirer des produits chimiques toxiques. Ces robots ont été un moteur économique pour le Japon : jusqu'au début du XXIe siècle, 90 % des robots vendus dans le monde y étaient produits. C'est 50 % aujourd'hui alors que d'autres acteurs sont arrivés : la Corée du Sud, l'Allemagne, la France ou encore la Chine. La compétition pour fabriquer, exporter et employer les robots s'est accrue.

Vous parlez des robots industriels, mais c'est plutôt les humanoïdes qu'on met en avant pour parler de la robotique japonaise, non ?

Je dois souvent faire tomber le mythe que les Japonais vivent avec les robots – on n'en voit pas dans la rue –, et j'en profite pour souligner l'énorme différence entre les incroyables robots de la science-fiction et les capacités impressionnantes, mais très limitées, des vrais robots. En réalité, la grande majorité des robots utilisés quotidiennement au Japon, et ailleurs, sont des robots industriels et des appareils tels que



Acte 2, *Rossum's Universal Robots*, St. Martin's Theatre, Londres (1923).

Le robot Asimo, conçu par Honda.

des cuiseurs de riz, des fauteuils roulants, des aspirateurs et, en partie, des automobiles. Tout est question de définition. Théoriquement, un robot, par opposition à un automate, est équipé de capteurs et de logiciels, voire d'intelligence artificielle, qui lui permettent de naviguer et de s'adapter à son environnement. Alors, bien sûr, on pense d'abord aux humanoïdes. Mais ils sont fragiles, chers, et assez inutiles en pratique. Il vaut mieux les considérer comme des plateformes permettant de créer de nouveaux produits.

Pourtant, on se rappelle encore d'Asimo développé par Honda ou de Pepper[1]...

Oui, ce sont des ambassadeurs de marques qui ont réussi à créer l'impression de la popularité des robots, et pas seulement au Japon. Mes amis japonais, que je connais depuis 50 ans, n'ont jamais vu un robot, sauf à la télé. Ils n'ont jamais interagi avec et, comme la majorité des Japonais, ils habitent des maisons où des robots comme Asimo ou Pepper ne pourraient pas vivre. Il faudrait habiter un terrain de basket sans meubles pour leur créer un environnement favorable *(rires)*. Le grand public s'est arrêté aux images qui ont donné l'illusion que les robots autonomes existaient. Mais, par exemple, Asimo n'avait pas d'intelligence artificielle. Il bougeait grâce à un GPS ou une télécommande. C'était une illusion d'autonomie. Je contrarie de nombreuses personnes quand je dis cela, car je démantèle leur vision rêvée de l'avenir. Et puis, les robots japonais sont de plus en plus beaux, mais parallèlement, ils ont permis de développer des technologies plus inquiétantes.

Lesquelles ?

Le marché des ventes d'armes est devenu un secteur majeur pour la robotique. Pendant longtemps au Japon, l'université, l'industrie et l'armée étaient assez éloignées les unes des autres – du moins publiquement –, mais Shinzo Abe a poussé pour que les liens se tissent davantage, car c'est assurément le secteur le plus lucratif. La France, les États-Unis ou encore Israël ont montré que c'était un marché. Le Japon n'a jamais été complètement absent de cette industrie puisque les lunettes, les jumelles et les jeeps Mitsubishi étaient sur les champs de bataille. Mais désormais, au Japon, la robotique s'oriente de plus en plus vers les armes, les drones et les systèmes de surveillance. Dans les grands médias japonais, il y a une sorte de tabou sur ce sujet. On préfère présenter des robots heureux, amis des familles.

Quelles sont les applications récentes des robots qui vous ont intéressées ?

À mon sens, les robots sont pertinents quand ils font ce que les humains ne peuvent pas faire ou ne devraient pas faire. Quand on est servi par un robot roulant en forme de chat au restaurant, c'est amusant au début. Et puis, on réalise qu'un serveur humain est plus efficace *(rires)*. J'ai déjà mentionné que la plupart des robots humanoïdes sont des plateformes et non des produits finis. Par exemple, les composants d'Asimo ont permis de créer des exosquelettes qui soulagent les lombaires des infirmières. C'est intéressant, mais la difficulté de ce genre de projets, c'est qu'ils sont moins rentables que l'armement.

Où en est le projet que Shinzo Abe avait lancé, « Innovation 25 », qui voulait conduire à une société robotisée ?

Ce projet était prévu pour 2025 au départ, mais ça ne va pas arriver. Même Abe savait que c'était ridicule de tabler sur « 2025 », alors il a changé de nom : c'est devenu « Société 5.0 », puis « Révolution robotique ». Son idée était que la robotique préserverait la famille traditionnelle, menacée de disparition, entre le déclin du mariage et la baisse de la natalité. Il pensait que les robots ménagers libéreraient les femmes mariées des tâches domestiques et leur permettraient ainsi de faire

1 - Pepper, devenu populaire chez Softbank au Japon, a été conçu par la société française Aldebaran.

Mathieu Rocher est journaliste indépendant.

carrière – à condition que, contrairement à leurs maris, les femmes restent à la maison et télétravaillent. La proposition d'Abe souligne le fait que la robotique n'est pas un domaine neutre et qu'elle peut en fait renforcer le sexisme et une stricte division sexuelle du travail et de l'espace. La plupart des robots, et surtout les humanoïdes, sont sexués – comme ils l'étaient déjà dans la pièce de Karel Čapek.

Y voyez-vous une nouvelle illustration du sexisme au Japon ?

Au Japon, mais pas seulement, il y a encore de la naïveté sur la robotique et l'intelligence artificielle. Quand je dis qu'aux États-Unis elles ont été utilisées pour des discriminations sexuelles, du profiling racial ou de la discrimination par les accents, les roboticiens japonais que je rencontre me disent, « Nous n'avons pas ce genre de problèmes ». Parfois, on me dit même que j'y pense parce que je suis occidentale. Le sexisme est insidieux au Japon. 99 % des roboticiens sont des hommes et, selon mes observations, ils ne s'interrogent jamais sur la division genrée du travail et reproduisent les mêmes stéréotypes sur les robots[2].

Vous vous demandez également si on peut qualifier la préférence pour les robots d'eugénisme…

Le gouvernement japonais est efficace pour laisser penser, à l'intérieur du Japon et à l'extérieur, que le pays est ethniquement homogène[3]. Cette affirmation est devenue la base d'une intolérance notamment envers les enfants *hafu*[4] qui sont brimés à l'école. Pour autant, penser que les Japonais préfèrent les robots aux immigrants, c'est faux. Le gouvernement japonais le sait et recrute, par exemple, des infirmières étrangères qui restent trois ans et sont renvoyées chez elles, car on les fait échouer à un test de japonais. Dans l'intervalle, les institutions japonaises ont bénéficié de trois années de travail sous-payé de ces infirmières stagiaires. Actuellement, il y a une pénurie de près de 100 000 professionnels de santé au Japon, et les robots comme Pepper ne sont tout simplement pas en mesure de les aider.

Est-ce qu'on touche concrètement les limites de ce futur solutionniste ?

Oui, je ne pense pas que le remplacement des humains par des humanoïdes soit un futur plausible au Japon, malgré la propagande du gouvernement et des entreprises sur les vertus et les avantages d'une société robotisée et mono-ethnique. Parler d'un tel scénario, tout comme la nostalgie entretenue autour de l'ère Showa, permet aux dirigeants de détourner l'attention du public des problèmes actuels[5]. C'est particulièrement évident dans les *dramas* de la NHK. On idéalise une époque où la famille nucléaire hétéronormée n'était pas remise en question, où il n'y avait pas de mouvement LGBT ou d'activisme des minorités ethniques, où tout semblait plus simple et où les gens ordinaires travaillaient de manière désintéressée à la reconstruction de la nation[6]. Mais voilà, le Japon est toujours en récession économique et le yen n'a jamais été aussi bas depuis 25 ans. Il y a plus de pauvreté, de SDF, de violence domestique… sans parler de la situation de l'environnement. Convoquer la science-fiction en guise de politique intérieure est une façon de vous catapulter au-delà du présent et de ce qui pourrait être plutôt que ce qui est.

Est-ce que le Japon n'a tout de même pas concrétisé le mythe prométhéen de l'homme augmenté, par exemple avec Hal, l'exosquelette de Cyberine qui vous fait devenir plus fort ?

J'ai essayé Hal. J'étais équipée de capteurs le long de mes jambes qui transmettaient des signaux électriques de mon cerveau

2 - Pour plus de détails, lire le livre de Jennifer Robertson, *Robo Sapiens Japanicus: Robots, Gender, Family and the Japanese Nation*, University of California Press, 2017.

3 - Sur cette question, lire Tempura N°8, *Japon en crise d'identités*, Hiver 2021.

4 - De l'anglais *half*, enfants issus d'un parent japonais et d'un autre d'une origine ethnique différente.

5 - Sur cette question, lire Jennifer Robertson, « Imagineerism: Technology, Robots, Kinship. Perspectives from Japan », in *The Palgrave Handbook of the Anthropology of Technology*, mars 2022.

6 - Lire l'article de Clémence Leleu, *Showa, point de fuite*, dans ce dossier.

Jennifer Robertson essayant l'exosquelette Hal.

vers l'exosquelette. Je devais penser sans cesse : « Je veux marcher. » En quelques minutes, les capteurs ont pris l'information et le membre robotique s'est soudainement mis en marche ! J'ai failli perdre l'équilibre *(rires)*. Ce type d'exosquelettes robotisés ne peut pas encore être pertinent, car vous n'êtes pas libre de bouger comme vous voulez. En revanche, des déclinaisons pourraient assurer des rééducations en remplaçant un soignant fatigué.

Que pensez-vous des travaux d'Hiroshi Ishiguro qui fabrique des humanoïdes très détaillés ?

Hiroshi Ishiguro fabrique des androïdes – qu'il appelle des « geminoïdes » – dont les visages et les mains en silicone ressemblent à ceux des humains. Ils sont davantage destinés au divertissement qu'à des applications pratiques. De plus, ces géminoïdes sont immobiles (ils sont toujours assis) et ne sont pas dotés d'IA ; ce sont plutôt des dispositifs de téléprésence contrôlés à distance, et seul leur visage (sourcils, yeux, bouche) bouge. Ishiguro excelle dans la promotion de lui-même et de ses créations, et dans la présentation du Japon au reste du monde comme une société entièrement robotisée ; ce qui n'est pas le cas. Alors, il est considéré comme une aberration par les roboticiens que j'ai interrogés et qui travaillent sur des projets moins spectaculaires. Après le 11 mars 2011, certains laboratoires ont ainsi conçu des robots de sauvetage. Par exemple, le Matsuno Mechatronics Lab de l'université de Kyoto développe des robots ressemblant à des serpents, capables de se frayer un chemin dans les décombres après un tremblement de terre ou dans les débris radioactifs. Moins sexy, mais plus utiles que les androïdes d'Ishiguro.

Dans un article récent[7], vous discutez de la volonté des roboticiens japonais de placer de la conscience dans leurs machines. Ce pourrait être une étape décisive ?

Les roboticiens utilisent le terme « *kokoro* », plus chaud et plus flou que « conscience », pour rendre les robots plus familiers aux humains. Un exemple de robot censé véhiculer le « kokoro » est Mindar, créé par Ishiguro et exposé depuis août 2019 au Kōdaiji, un temple de Kyoto. Cet androïde récite des sutras préenregistrés et des homélies bouddhistes. C'était essentiellement un stratagème pour

Le robot Pepper conçu par la société Aldebaran.

attirer les touristes au temple, qui était une destination moins populaire que le temple sur pilotis Kiyomizu-dera, en bas de la rue. J'y suis retournée en septembre dernier et personne ne venait le rencontrer. La mode est passée.

Des robots doués d'émotion restent donc du domaine de la science-fiction ?

Le Pepper de SoftBank a été présenté comme un « robot émotionnel », mais qu'est-ce que cela signifie ? Il n'y a pas de définition fixe de l'émotion chez les humains ! Le concepteur du logiciel de Pepper devait programmer les caractéristiques les plus rudimentaires, essentialisées et stéréotypées des « émotions » et de leur expression faciale (comme la colère, la joie, la tristesse, etc.) que le logiciel robotique serait capable de « reconnaître ». Mais les êtres humains sont des créatures très complexes, et leurs expressions sont souvent en constante évolution, ce qui a totalement désorienté le robot. De nombreuses personnes dans le monde imaginent le Japon comme une fabuleuse société robotisée utopique. Le gouvernement et le secteur privé japonais ont fait un bon travail pour alimenter cette impression par le biais du Cool Japan[8] et d'autres initiatives. Le Japon est un pays remarquable pour de nombreuses raisons, mais pas en tant que « paradis de la robotique » ! Le discours sur les robots doit encore être dissocié de la rhétorique politique conservatrice, des applications militaires et de l'appât du gain capitaliste. Mais peut-être que je suis, là aussi, dans la science-fiction.

7 - « Technologies of Kokoro: Imagineering Human-Robot Coexistence », in *ICON, The Journal of the International Committee of the History of Technology*, juillet 2022.

8 - Démarrée au début des années 2000, campagne visant à promouvoir le Japon par le biais de sa pop culture (anime, manga, jeux vidéo) et de sa culture traditionnelle (gastronomie, jardins, festivals, etc.)

TEMPURA #12 Winter 2022
Interview with Professor Jennifer Robertson
(Robertson's original responses, translated into French for publication.)

Suggested citation: 2022 "Non, les Japonais ne vivant pas avec les robots. Entretien avec Jennifer Robertson (No, the Japanese do not live with robots. An interview with Jennifer Robertson)," *Tempura, unmagazine sur le Japon*, special issue "Retour vers le futur", No. 12 (Winter 2022) : 64-67. (In French)

Caption: Symbols of a futuristic Japan, robots cling to their past reputation. But for how long? Deciphering with the American anthropologist Jennifer Robertson.

Introduction

Born in Detroit, Jennifer Robertson spent her childhood in Japan and has lived there for over twenty years. Back in the United States, she studied art history before turning to anthropology for her Ph.D. She has been conducting ethnographic research on robots with a particular focus on Japan. Professor emerita at the University of Michigan, she retired in 2020. Now based in Seattle, she continues her research on the intersections of art and technology, the cultural history of popular eugenics, and on the representation of sex, gender, and ethnicity in robots, robotics, and AI. (Her website is https://professorjenniferrobertson.com/.)

1/Why are Japanese people so interested in robots?

Jennifer Robertson: The term robot was coined by a Czech author, Karel Čapek, in his 1920 play, *Rossum's Universal Robots*, or *RUR*. The play quickly achieved worldwide fame and was staged in Japan in 1924, and the term *robotto* became popular buzzword. But before that word, artificial humans were already familiar in Japan as in Buddhist legends from the 12th-14th centuries. Industrial robots in Japan arrived in the 1960s when the country wanted to speed up post-war reconstruction. There was a labour shortage and the government favoured automation over immigration. Among the first robots were those that painted and welded on the assembly line, which also protected factory workers from toxic fumes and dangerous work. Japanese companies continue to be dominant in manufacturing and exporting robots: until the beginning of the 21st century, 90% of the robots sold in the world were produced in Japan; now about 50% are manufactured there. South Korea, Germany, France* and then China, are also competing with Japan in making, exporting, and employing robots.

*Pepper, which has become popular with Softbank in Japan, was designed by the French company Aldebaran.

2/This presence of humanoids is indeed one of the trademarks of Japanese robotics...

Jennifer Robertson: In my publications and lectures, I often have to dispel the myth that the Japanese coexist with (humanoid) robots, and I also have to point out the huge difference between the amazing robots in science fiction, and the impressive but very limited capabilities of actual tangible robots. You don't see robots on the street in Japan! Most of them are in the factories. When people talk about robots they most often think of humanoids. Actually, the vast majority of robots in everyday use in Japan and elsewhere are industrial robots and appliances like rice cookers, commodes, wheelchairs, vacuum cleaners (hoovers), and in part, automobiles. In my work I also define what robots are because the word "robot" is often left self-evident. A robot (as opposed to an automaton) is equipped with sensors and software (including AI in some cases) that allows it to navigate and adapt to its environment via remote control or with some human supervision. Humanoids are fragile, expensive, and quite useless in practical terms, and are best regarded not as

“end products”, but as “platforms” for creating new products, like lumbar support exoskeletons and various kinds of mobility devices and sensors.

3/ Yet we've all seen the ASIMO developed by Honda or Pepper put forward by Softbank...

Jennifer Robertson: Honda’s ASIMO and SoftBank’s Pepper are complex technological devices but they are essentially “brand ambassadors.” SoftBank has sold Pepper at a fraction of its production cost and has given the robot to various companies and institutions, thus creating the impression of the robot’s popularity, and not just in Japan! Incidentally, both robots are no longer being made. My Japanese friends, some of whom I've known for 50 years, have never seen a robot except on TV. They have never interacted with them and they, like the majority of Japanese, live in small, cluttered houses where a robot like ASIMO or Pepper could not function. You would have to live in a basketball court-size home without any furniture to create a favourable environment for them to move around (laughs). Many advertisements and media reports on humanoid robots indulge the illusion that autonomous robots are in widespread use in everyday Japanese life. Moreover, the notion that robots are “autonomous” is also not questioned. But, for example, ASIMO has no artificial intelligence. It moves via GPS and remote control. As for Pepper, its ability to “converse” is extremely limited (and formalized) and any interaction with a human is via the tablet mounted on its chest. I seem to upset some people when I point this out because, in effect, dispelling the myth of autonomous robots effectively dismantles their dreamy view of the future! Again, the problem arises of conflating science fiction robots with real world robots! Japanese robots may be beautifully designed, in terms of hardware, but they are still clumsy, slow, and fragile, and don't have many useful capabilities—certainly nowhere near the capabilities of science fiction robots! And they have made it possible to develop more disturbing technologies.

4/Which ones?

Jennifer Robertson: The weapons economy is a big and growing marketplace for robotics. For a long time in postwar Japan, university, industry, and the military were kept far apart - at least publicly - but the late prime minister, Shinzo Abe, pushed for more linkages because weapons and surveillance devices are definitely the most lucrative sector for robotics. France, the United States, and Israel have shown that it is a huge and profitable market. Japan has not been completely absent from this industry as goggles, cameras and binoculars, and Mitsubishi jeeps were used on the battlefield long before robotic weapons. These commodities are referred to as “dual use” technologies as although regarded as civilian products, they have also been employed in military settings. Now, in Japan, robotics is increasingly and openly going into the production of weapons, drones, and surveillance systems. In the mainstream Japanese media however, there remains a kind of taboo about highlighting the “darker” side of robotics; they’d rather present happy, benign, family-friendly robots.

5/How does the Japanese government present robotics?

Jennifer Robertson: In Japan, PM Kishida is following Abe’s legacy in the sense that he believes that robotic technologies will “save” the Japanese economy. Although Abe promoted robotic technologies as an alternative to guest workers and immigrant labor, robots are far less capable than humans at successfully managing critical tasks, from elder care to cleaning up after the Fukushima nuclear reactor meltdown. Many foreign workers have been recruited “under the radar” for these jobs, including as interns and students.

6/What are the limits to this robotic future?

Jennifer Robertson: I don't think that humanoids replacing humans is a plausible future scenario in Japan, despite government and corporate propaganda about the virtues and benefits of a robotized society. That scenario is simply not feasible. For at least the past decade or two, there has been a pervasive “Shōwa period” (1926-89) nostalgia for the immediate postwar period. This is especially evident in NHK (Japan’s public TV station) dramas. What is romanticized is an imagined time when the heteronormative nuclear family was not questioned, when there was no LGBT movement or ethnic minority activism, when everything seemed simpler and ordinary people worked selflessly to rebuild the nation. *Details on this nostalgia in the article “Imagineerism: technologyd, robots, kinship” (*The Palgrave handbook of the anthropology of technology*/Macmillan, 2022. Downloadable pdf available from my website, https://professorjenniferrobertson.com/.

7/ So this « solutionist/solution provider » future is leading Japan into a dead end?

Jennifer Robertson: By talking about a robotized future society peopled by a “monoethnic” population is a way for pundits and certain politicians to downplay or deflect public attention from current events and problems. Japan remains in an economic recession and the yen is currently the lowest it’s been in twenty-five years. Rates of poverty, homelessness, domestic violence, and so forth are rising. Proposing science-fiction scenarios as domestic policy is one way of catapulting citizens beyond the present and into a fantasy realm of what could be rather than what is. The Japanese government is planning to establish a moon base in the very near future. And, along with their American counterparts, Japanese agencies are interested in travel to and the colonization of Mars. Recently, astronomers were excited about finding water on Mars because they speculated that this would facilitate the colonization of the planet. I can't help but think that we don't care enough about the quality of and equal access to (potable) water here on Earth! What sounds like a noble scientific quest—and there are many merits to space exploration and especially astronomy—but focusing on the possibility of extraterrestrial colonies simply camouflages disasters already playing out on Earth, from melting glaciers and deadly heat domes, to disappearing forests and choking air pollution.

8/Is Japan still at the forefront of robotic technology?

Jennifer Robertson: Japanese robots are physically aesthetically pleasing and well designed, and some, like Paro the seal robot, made of soft, synthetic fur, are even huggable. They look so safe, hygienic and unthreatening. But in contrast to their hardware, their software is much less impressive, and that is a problem. A useful comparison is with many Japanese websites, such as those maintained by government ministries and municipalities, and even by robotics labs. They tend to be crowded with a lot of text, often in small font, and not at all user-friendly. This (i.e., website design, software) is one aspect of Japanese technology that has yet to be critically researched by anthropologists! In this context, I would also encourage humanities and social science researchers interested in robotics to read the actual robotics literature and not to draw from science fiction, which is too often the case. Science fiction is a lot easier to read than the equation and jargon heavy scientific literature on robots!

9/What recent applications of robots have interested you?

Jennifer Robertson: In my opinion, robots are relevant when they do what humans can't do or shouldn't do. When you're served by a cat-shaped rolling robot in a restaurant, it might be novel and fun at first. And then you realize, "A human server is so much more efficient!“ (laughs). I’ve already mentioned how most humanoid robots are platforms and not end products. For example, ASIMO’s components have been used to create lumbar exoskeletons that help nurses lift and turn patients without suffering back and muscle injuries in the process. The various sensors that are created for use in humanoids, like haptics, optics, and/ or audio have been employed in other

technological devices and automobiles, among the most lucrative being weapons and surveillance systems.

10/ Is there a Japanese approach to robot development?

Jennifer Robertson: In the US, the possibility of fully autonomous cars has generated a lot of hyped-up attention in the media even though roboticists admit that there is no such thing as full autonomy. Not even humans enjoy total “free will”. In Japan, in contrast, it was never intended that robots would replace human drivers, but rather that robotic components should be integrated into the car as a safety feature and in a collaborative relationship with human drivers. Another example: in the US, many inventions later used in civilian society were first developed by and for the military, such as radar, television, and digital cameras. In Japan, robots and new robotic devices are often first introduced to the civilian population at public expos where researchers can observe machine-human interactions and then refine these devices for other types of applications, including military ones.

11/Does Fumio Kishida continue what Shinzo Abe did when he launched a programme for a robotic society by 2025?

Jennifer Robertson: Abe’s agenda for a robotized society, Innovation 25, was originally to have been realized in 2025, but it quickly became clear that this deadline was not feasible. Abe thus renamed the proposal "Society 5.0" and also referred to it as "robot revolution". Abe’s science fiction-like idea was that household robots would help preserve the traditional family which was in danger of disappearing as fewer and fewer women and men—but especially the former—were interested in heteronormative marriage, which remains the basic building block of the traditional family. In Japan, marriage is the “proper” context for childbearing and raising, and for decades, the decline of marriage has been accompanied by a falling birthrate. At the same time, the population is aging. Abe argued that household robots would free married women from domestic chores and thus allow them to have a career, with the caveat that unlike their husbands, women would remain at home and telecommute to work. Such a scenario has not at all been realized, nor will it be. Abe’s proposal underscores the fact that robotics is not a neutral field and can actually reinforce sexism and a strict sex and gendered division of labour and space. I might add that I have written and lectured a lot on the fact that most robots, and especially humanoids, are gendered – as they were in Karel Čapek’s *RUR*!

12/Do you see this as a new illustration of sexism in Japan?

Jennifer Robertson: In Japan, but not only Japan, there is still lot of naivité about robotics and artificial intelligence. When I say that in the US, robotics and AI have been used in ways that reproduce sex/gender discrimination, ethnic and racial profiling, or linguistic discrimination, some Japanese roboticists and also some humanities and social science scholars interested in robotics and AI, respond by saying that "we don't have these problems" or “we’re not interested in those issues”. Sexism is pervasive in Japan. More than 90% of roboticists are male and, what I learned from my fieldwork, they never critically question the sex and gendered division of labour and thus tend to reproduce the same stereotypes in the design and application of their robots.

*Details in Robertson’s book, *Robo Sapiens Japanicus: Robots, Gender, Family and the Japanese Nation* (University of California Press, 2018)

13/You may even wonder if the preference for robots can be called eugenics?

Jennifer Robertson: The Japanese government is effective in suggesting, both internally and externally, that the country is “monoethnic” or ethnically homogeneous. This assertion can (and has) become the basis of intolerance especially for children of mixed ancestry and also Okinawans and Ainu among other ethnic minorities in Japan, including resident Koreans, who are often bullied and harassed in school. The idea of Japan as a monoethnic nation was forged in the Meiji period (1868-1912), when the feudal regime was replaced by a constitutional monarchy that embarked on a program of internal unification and external colonialization. However, to think that the Japanese prefer robots to immigrants is not accurate, despite assertions and proposals by conservative politicians. Surveys that purport such, are often worded in a way with “choices” that simply reinforce a conservative position. In addition to labourers recruited under the radar, nurses and caregivers have been invited to apply for long-term employment in Japan pending a very difficult Japanese language test for which they are given three years to pass. Only a small minority have passed, and those who don’t pass need to return to their home countries. In the meantime, Japanese institutions have benefited from three years of the underpaid labor of these nurse interns! Currently there is a shortage of nearly 100,000 healthcare professionals in Japan, and robots like Pepper are simply not capable of helping out! The recent award-winning film, *Plan 75* (https://en.wikipedia.org/wiki/Plan_75), about the fictional “voluntary” euthanasia of elderly citizens, highlights current demographic trends. Already nearly 30% of the Japanese population (126.5 million) is over 65 years, and up to 90% in some rural communities. Many other post-industrial countries around the globe are facing a similar crisis.

14/Do you think that the reason Japan is so keen on robots is perhaps because it is the one of the few places where it is dominant?

Jennifer Robertson:

Japan currently manufactures nearly 50% of all industrial robots and is also gaining a foothold in the export of robotic components for weapons and surveillance systems. S. Korea is now the largest user of industrial robots. A big problem facing the robotics industry today is the shortage of semiconductors and chips due to the supply chain crisis coupled with fact that China, increasingly unpredictable, supplies 80% of the rare earth minerals needed for producing electronic devices. Japan and the US are in talks to jointly develop advanced memory chips to reduce their dependence on Chinese rare earths.

15/Didn't Japan make the Promethean myth of augmented man a reality, for example with Hal, a robot that develops your abilities?

Jennifer Robertson: I have tried out Cyberdyne’s HAL (Hybrid Assistive Limb) lower limb robotic exoskeleton which includes shoes. I was fitted with sensors along my legs that transmitted electrical signals from my brain to the exoskeleton. I had to think over and over, “I want to walk,” and at the same time refrain from walking. Within minutes, the sensors picked up the electrical signaling of my intention to walk, and the robotic limb suddenly, literally, kicked into gear! I nearly lost my balance (laughs). A lot of HAL PR photos and videos show young people in lower limb exoskeletons striding through the streets. However, it’s clear that their HALs are not actually activated, which would involve an attendant holding the laptop that connects bodies with HALs! Moreover, when wearing a HAL, you are not free to move as you wish, and it is very difficult to even think about walking normally while letting the robot do that for you. You resist at your peril! This type of robotic exoskeleton involves a lot of preliminary training and requires the use of walkers and even human assistants. These are some of the reasons why exoskeletons, which were also developed as “power suits” for the Japanese military, are no longer regarded as practical equipment for soldiers. More useful are fixed (immovable) exoskeleton-type robots that help people whose limbs, such as an arm, are paralyzed to exercise at a consistent speed and pace over a given

interval of time. Another useful and practical application of a robotic device, in this case a small humanoid or a robot that looks like a stack of tennis balls, is for the treatment of persons with "autism spectrum disorder." Many such individuals benefit from the steady, consistent eye contact, voice, and expressions provided by the robot (as opposed to a human therapist), which helps them develop social skills.

16/When ASIMO retired, Rikuko Nagashima said "he showed that robots and humans can live together". Do you agree? [Note: Nagashima is NOT a roboticist; she studies theories of communication]

Jennifer Robertson: Nagashima is not a roboticist, and in the article you cite (https://www.lemonde.fr/economie/article/2022/04/15/au-japon-une-nouvelle-generation-de-robots-chasse-l-autre_6122361_3234.html), she is commenting on how people nostalgically perceived the masculine-gendered ASIMO during his tenure at the Miraikan, a science and technology museum in Tokyo. The now retired child-size ASIMO was advertised as an unthreatening and friendly companion to humans. Of course, ASIMO was mainly Honda's brand-ambassador and his application was limited to, basically, kicking a soccer ball at daily performances at the science museum, and appearing in temporary department store displays. ASIMO PR emphasized not "co-residence" with humans, but compatibility with humans, and yet, even that was highly supervised in very specific, controlled settings. In 2007, I visited the lab where ASIMO was being made and shook his hand! After the demonstration, the roboticists asked me "what can we do with ASIMO?". They hadn't really thought of practical applications! ASIMO was basically a celebrity icon for the Honda brand. (This and many of my points in this interview are recounted in my book, *Robo Sapiens Japanicus: Robots, Gender, Family and the Japanese Nation*, 2018, University of California Press).

17/ What do you think of the work of Hiroshi Ishiguro who makes very detailed humanoids?

Jennifer Robertson: Ishiguro makes androids—he calls them geminoids--whose silicon faces and hands are human-like. Androids are a category of humanoid robots; humanoids are anthropomorphic in the sense that they have a body that resembles, but not exactly, the human body. That is, they have a head, torso, and some have limbs and are bipedal, others move on wheels. Ishiguro is regarded as an outlier by the roboticists I interviewed in Japan in that his androids are more for entertainment than for practical applications. Moreover, his geminoids are immobile (they are always seated) and are not equipped with AI; they are, rather, remotely controled telepresencing devices and only their faces (eyebrows, eyes, mouth) move. Ishiguro excels in promoting himself and his creations, and in presenting Japan to the rest of the world as a fully robotized society, which it's not. I've met him several times and was invited to lecture at his lab at the University of Osaka. The only "male" geminoid he made was modeled after himself! Again, apart from their "gee whiz" entertainment value, Ishiguro's androids themselves are platforms for creating new industries that produce various kinds of sensors and materials.

18/Is Ishiguro receiving criticism in Japan?

Jennifer Robertson: There's plenty of it, but we don't hear it. A lot of roboticists are working on more useful things and chose not to get involved in interpersonal disputes. After the triple disaster of 11 March 2011 (earthquake, tsunami, nuclear meltdown), a number of robotics labs have refocused on designing search-and-rescue robotic devices. For example, the Matsuno Mechatronics Lab at the University of Kyoto is developing snake-like robots that can navigate through rubble after an earthquake or through the radioactive debris. (That said, human crews have been employed at the Fukushima nuclear reactor site as they are much more versatile than any robot to date; the use of foreign interns for this dangerous job has been much criticized in Japan by watchdog

organizations.) Of course, Ishiguro's androids are "sexier" than rescue robots and also reinforce the naïve assumption of many consumers that real world robots are as humanly capable as science fiction ones.

19/In a recent article*, you discuss the willingness of Japanese roboticists to put *kokoro* in their machines. Is this a milestone?

Jennifer Robertson: Let me provide some context here. In the robotics literature, *kokoro* (heartmind, or heart + mind, soul) has been translated into English as consciousness, which not is not how it is understood in everyday parlance and in religious contexts. Roboticists use "*kokor*o" in this way in part to make robots more familiar to humans—kokoro is a warmer and fuzzier term than "consciousness"! One example of a robot purported to convey "kokoro" is Mindar, a part silicon, part metallic bodhisattva robot (designed by Ishiguro) on display since August 2019 at Kōdaiji, a temple in Kyoto. To make a long story short, the Android Kannon as Mindar is known—Kannon is bodhisattva with male and female manifestations—was essentially a ploy to attract domestic and foreign tourists to the temple, which was a less popular destination than the world-famous temple on stilts, Kiyomizu-dera, down the street. Mindar recites prerecorded sutras and Buddhist homilies. I visited Mindar on a weekend in September 2022. It is housed in an undistinguished building outside of the main precincts and in a corner of temple's parking lot. Two "shows" a day on weekends are scheduled, but there was no one waiting to attend. Clearly, the android bodhisattva is no longer a novelty.

*details in the article "Technologies of Kokoro: Imagineering Human-Robot Coexistence", in *ICON*, The journal of the international committee of the history of technology (2022). Pdf on my website.

20/ Emotional robots are still in the realm of science fiction?

Jennifer Robertson: SoftBank's Pepper was advertised as an "emotional robot" but what does that mean? There is no fixed definition of "emotion" in humans! To make this claim, Pepper's software designer needed to program the most rudimentary, essentialized, and stereotyped characteristics of "emotions" and their facial expression (such as anger, happiness, sadness, etc.) that the robotic software would be able to "recognize". But humans are very complex creatures and their expressions are often in constant flux, which, as it turned out, totally confused Pepper, causing the child-sized robot to freeze up and malfunction!

Many people around the world imagine Japan as a fabulous utopian robotized society. The Japanese government and corporate sector have done a good job of stoking this impression through the Cool Japan and other initiatives. Japan is a remarkable country and culture for lots of reasons but not as a "robotic paradise"! The discourse of robots (as opposed to tangible robots) has yet to be delinked from conservative political rhetoric, military applications, and capitalist profit mongering. But perhaps this delinking itself can only happen in science fiction!