The London School of Economics and Political Science

"Touch Future x ROBOT": Examining Production, Consumption, and Disability at a Social Robot Research Laboratory and a Centre for Independent Living in Japan

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Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

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Abstract

This thesis contributes to anthropological discussions on the relationship between production and consumption by engaging in multi-sited ethnography that investigates the design of social robots in cutting-edge Japanese research laboratories and also explores the day-to-day lives of Japanese disabled people who are potential consumers of such devices. By drawing on these disparate groups, located in disparate sites, this thesis traces connections but also disconnections as it analyses the 'friction' between the technical problem-solving of researchers and the organized activist politics of disabled people. It investigates the rationales of robot research, messy and multiple, as well as the material and political impetus behind the 'barrier free' movement for independent living. Social robots hold a special interest in Japan because not only do many people, both inside and outside of Japan, believe that the nation has a unique cultural interest and affinity for robots, but, with an ageing population, the Japanese state has looked toward social robots as potential care-givers and as a solution to the 'demographic crisis'. Through the engagement of both science and technology studies and disability studies, this thesis focuses on the theme of problems to show how the problem-making approach of robotics researchers, which identifies problems of the body as a disability to be solved by a technical fix in the form of a robot, contrasts with the perspective from disabled people themselves, who see disability as a problem of society and the environment rather than the individual and the body.

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List of Abbreviations

ADL	Activities of Daily Living
ANT	Actor-Network Theory
CIL	Centre for Independent Living
CP	Cerebral Palsy
ERATO	Exploratory Research for Advanced Technology
HCI	Human-Computer Interaction
HRI	Human-Robot Interaction
ILC	'Independent Living Centre' (pseudonym for the specific centre for independent living where I did my fieldwork)
IYDP	International Year of Disabled Persons
JIL	Japan Council on Independent Living Centers
JSPS	Japanese Society for the Promotion of Science
JST	Japan Science and Technology Agency
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labour and Welfare
MIC	Ministry of Internal Affairs and Communication
NPO	Non-Profit Organization
PC	'Private Corporation' (pseudonym for one of the robot laboratories)
STOP-IN	The "nursing dispatch project" attached to ILC
SRD	Social Robot/Dementia [project]
STS	Science and Technology Studies *or* Science, Technology and Society
TOP	'Take-off Point' (pseudonym for the daytime community centre attached to ILC)
UCW	Universal City Walk
USJ	Universal Studios Japan

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Notes on Naming and Language Use

I have based my transcription of Japanese terms on the modified Hepburn system of romanization.

For Japanese persons, when using their full name, I have used the Japanese custom of family name followed by given name. The exceptions are where it is been standard to write an individual's name in the English order (given name first) and/or the individual has used this order to describe himself or herself, in which case I have tried to be consistent with this preference.

All names of informants are pseudonyms. For most Japanese persons, I have given a family name suffixed with the respectful -san, except in cases of professors where I have attached the English title instead. For Europeans and Americans, I have used given names.

Introduction

This is a dissertation about social robots, especially humanoid or anthropomorphic robots, made in Japan, in many cases to aid people who are disabled in some way. It is about the relationship between different bodies—human, robotic, natural, artificial, built, fixed, autonomous, skilled, (dys)functional, (ab)normal, (dis)abled, (in)dependent— and different kinds of "problems". What exactly is a "problem" with the body? And what are the possible solutions to such problems?

Japan has historically been, and continues to be, at the forefront of the development and deployment of robotics. These robots have predominantly been used for manufacturing, where Japanese industry, representing 46% of world-wide demand for robots, has taken the lead (Japan External Trade Organization 2006; Schodt 1988). But recently interest has shifted to the use of robots in the service and care sectors/industries, applications that require intense human interaction, prompting some to use the term "social robot" (Duffy et al. 1999). In particular, care for the elderly is seen as a good potential use for social robots because of an acknowledged demographic crisis, especially in Japan, which has an increasing elderly population and depleted labour force (Japan External Trade Organization 2006; Robertson 2007). Due to low fertility and a long life expectancy (both of which are among the most extreme on the planet) Japan is now the world's "greyest country" (Wu 2004). Robots are being developed to provide care and companionship for elderly people, who are often disabled and potentially lonely. Most projects are in their infancy, but the plan to introduce a wide range of social robots into Japan is enthusiastically supported by government agencies, such the Ministry of Economy, Trade and Industry (METI), which has provided developers with 50% financing (Japan External Trade Organization 2006). Humanoid robots have been developed by many of Japan's most well-known corporations such as Honda*,* Mitsubishi, NEC, Hitachi, Sony, Fujitsu, Toshiba, Panasonic and Toyota.

Apart from the economic and demographic rationales, the prominence of robots in Japan is often linked by Japanese and foreign commentators, the mass media, roboticists, and also anthropologists to an apparent affinity between Japanese culture and robots (for example see Allison 2006; Geraci 2006; Hornyak 2006; Kitano 2006, 2007; Low 2009; Reuters 2003; Robertson 2007; Schodt 1988; Tabuchi 2008; The Economist 2005). This cultural affinity is expressed in at least two ways. First, unlike the (arguably) more negative portrayal of robots in Western science fiction, many friendly, benign, and helpful robots appear in Japanese popular cultural forms such as *manga* (Japanese-style comics) and *anime* (animated film and television series). Secondly, Japanese religion and spirituality has a strong animist slant, whereby spirits, deities, and "souls" can occupy a wide range of non-human things including animals, trees, mountains, and human-made tools. As such, it is a small leap to imagine that robots could potentially be "animate", even possess a form of spirituality, if they were designed and constructed in the right way. The combination of these two cultural particularities means that Japanese have a uniquely positive outlook towards robots, even a "love" of robots (Hornyak 2006; Schodt 1988). And since Japanese both need and like robots, it is inevitable that they will soon be a major part of Japanese society.

Phrased in this way, we have a rather clean narrative of social robots in Japan, though one that will ultimately come to be complicated in a myriad of ways through my description of fieldwork with two distinct groups: first, roboticists, the producers and developers of social robots, working in cutting-edge research laboratories; and second, disabled people, the consumers of care and the potential users of social robots and other assistive technologies, who are members of what is called a "centre for independent living". On the one hand, this thesis will investigate the motivations, practices, influences and reasoning among the researchers who create such robots, and, on the other hand, it will examine the needs, lifestyle, aspirations and politics among disabled people who, while not the elderly people identified in the demographic narrative above, are nevertheless often included as intended users of robots. The rest of this introduction will lay out the context of social robots in Japan, outline the main analytical issues that provide the framework for the body of the thesis, describe the methods and practicalities of the fieldwork undertaken, and provide a brief chapter outline.

The Robot Kingdom: Social Robots and the Japanese Context

Japanese Science and Technology: Robots for the Future

Japan is, according to the Statistical Handbook of Japan 2011, ranked second to the United States among all developed countries in terms of expenditure on science and technology (Statistics Bureau, Japan 2011). The Statistics Bureau reports that total research and development (R&D) spending in 2009 totalled 17.2 trillion yen (approximately 142 billion pounds), 3.62% of GDP. Businesses spent 12.0 trillion yen, approximately 69.5% of the national total, while institutions of higher education spent 3.5 trillion yen (20.6%). Universities and colleges spent over 90% of their R&D expenditure on natural sciences for basic and applied research, while businesses budgeted over 70% of their R&D expenditure to development.

Aside from the raw numbers, the presentation of the 2011 edition of the Statistical Handbook is also enlightening. At the very top of the section on *Science and Technology/Information and Communication*, there is a photograph of a large, white, humanoid robot[1] (in the form of an anthropomorphic bear) holding a human in its arms and standing beside what appears to be a hospital bed.

1 A humanoid robot is a robot with a body shape resembling a human being (or in this case a human-like cartoonish animal).

Figure 1: The RIBA Nursing Care Robot

The caption reads:

> *RIBA (Robot for Interactive Body Assistance), the world's first nursing-care robot, developed jointly by the RIKEN-TRI Collaboration Center for Human-Interactive Robot Research. With its human-like arms, it can perform a sequence of moves to carry a person, from lifting the person up from a bed or wheelchair to moving and setting the person down, thus lightening the caregiver workload (Statistics Bureau, Japan 2011).*

Here at the beginning of a chapter of the government's official summary of all the statistics for Japanese science and technology, it is a cute social robot that cares for elderly and disabled people that has been chosen as an appropriate image and symbol. Does this perhaps suggest that such robots might hold a special place for those involved in Japanese science and technology?

Perhaps fittingly, Japan has been called "the Robot Kingdom" (Schodt 1988). Some trace the history of humanoid robots in Japan to the development of *karakuri ningyō*, wooden automota from the 19th century (Hornyak 2006). In the contemporary era, as I have noted, Japan is an international leader in robotics and has by far the greatest number of robots per capita in the world (Japan External Trade Organization 2006; Schodt 1988). Research on humanoid robots goes back at least to 1970 with the

WA-BOT (**Wa**seda Ro**bot**) robot developed at Waseda University. The original WA-BOT was a bipedal (though rudimentary) robot that had some ability to communicate. Further, also in 1970, Masahiro Mori published his immensely influential article on the "Uncanny Valley", a phenomenon whereby small imperfections in an otherwise incredibly human-like appearance in a non-human (for example, in a robot) cause people to have intensely negative emotional reactions to that appearance (Mori 1970). Mori caused a great stir when he suggested that roboticists should not attempt to make robots too human-like, for fear of falling into this "Uncanny Valley", an example of the early and serious thought that was put towards designing humanoid robots.

Spiritual and Cultural Affinity

The same Masahiro Mori who was pondering the "Uncanny Valley" also published a book in 1974 (published in English in 1981) that explored the relationship between Buddhism and robot development (Mori & Terry 1981). He reflected on his own Buddhism and its role in the philosophy of robot design, and even went so far as to argue that robots have a "buddha-nature" (Mori & Terry 1981: 13). Mori's reflections exemplify the claim that there is a unique harmony between robots and Japanese religious/spiritual thinking.

Perhaps more than Buddhism, robots may be said to accord to Shinto animism. Within Shinto, *kami-sama* ("spirits", "gods", or "deities") abound, and they exist in many kinds of natural phenomena such as trees, mountains and rocks. According to Japanese folk religion, spirituality and life (the "soul" or *tamashii*) can exist in artificial objects as well; traditionally this happened through masterful and long use, the "spirit" or "soul" (*tamashii*) of a powerful *samurai* flowing into his sword, the *tamashii* of a skilled craftsman flowing into his tools. But, as the reasoning goes, conceptually this principle can be applied to robots, so that they too could conceivably have life (*inōchi).* This is in contrast to the creation of life in the Christian tradition as the exclusive purview of God (Takashi & Garage 2007). According to one analysis, while Western artificial intelligence (AI) is related to the Christian need for salvation, purification from the body into an immortal virtual mind/soul, in Japan, where religiosity and ritual is fundamentally connected to the natural world, robots with bodies are viewed more positively (Geraci 2006). Similarly, in the Christian tradition, there is a tendency towards what we might term the *Frankenstein* phenomenon, whereby the creation of robots is hubris that leads to abomination and damnation. As such arguments tend to go, those culturally influenced by Christianity (i.e. Euro-American Westerners) are therefore prone to ethical scepticism, even moral panic, towards humanoid robots. Conversely, without this particular "religious baggage", Japanese people do not have the same fears, as long as the robots are designed suitably. In other words, with an ironic twist on the usual dichotomy between the "civilised" West and the "primitive" Rest, it is the West that plays the role of irrational, superstitious Luddites to Japan's enlightened pursuit of technological progress[2].

The following passage from a paper by Naho Kitano, a Japanese robot ethicist, makes all these points quite succinctly:

> The belief of spiritual life cannot be mixed with the idea of the subjectivity of the robot as explored in Western Science Fiction stories...the spirit of an object in Japan is harmonized and identified with its owner, so a robot appearing closely attached to its owner and serving in ordinary life for many years is likely to be regarded as possessing its own spirit. Such immanence in Japan is mentioned with reference to things of everyday life, to ideas, and common attitudes, and it is thus hardly spoken of. Japanese animism gives a sense of the world appearing as something contingent, but not as static matter that is possible to comprehend transcendentally, which is a conspicuous feature of Western thought. The immanent perception of the existence of spiritual life is not mere individual subjectivity. It brings the manner of how to relate yourself to the world (Kitano 2006: 80).

Anthropologist Anne Allison, in her study of globalised Japanese toys and popular culture, also draws a link between religious animism and contemporary machines/commodities (Allison 2001,

2 Interestingly, Helmreich (2000) shows how folk ideas of religion and spirituality are also adopted by American artificial life scientists who use Western Creation myths when they speak of themselves as "God" creating a (virtual) "world" in an act of "genesis".

2006). She argues that in Japan there is an "aesthetic proclivity, a tendency to see the world as animated by a variety of beings, both worldly and otherworldly" (2006: 12). This "aesthetic proclivity" has its base in religious (Shinto and Buddhist) ideas in Japan, so that "fed in part by folkloric and religious traditions, an animist sensibility percolates the postmodern landscape of Japan today in ways that do not occur in the United States" (2006: 12). It is necessary to pay attention to her language here; she uses the term "aesthetic proclivity" to deliberately avoid making the issue one of "beliefs" about religious or spiritual phenomena. There is arguably a different relationship between religion, belief, and practice in Japan than what we commonly associate with Christian (and other Abrahamic) religions (Reader & Tanabe 1998). An anthropologist of Japanese religion, Kawano, points out "there are many more ritually active people than those who say they believe in religion or *kami* or *hotoke* [Buddha(s)]" (Kawano 2005: 2). According to surveys, most Japanese do not consider themselves to be religious believers, and yet they still visit shrines and temples at regular intervals (Kawano 2005: 2). Kawano argues that "neither meaningless formality nor mere custom, ritual potentially, rather than automatically, provides contemporary urbanites with culturally significant ways of constructing meaning and power" (2005: 2). It is through such processes that we can understand the existence of the "aesthetic proclivity" towards animism, an "animist unconscious," which Allison specifically links to robots (2006: 13). Within this "animist unconscious" "the sensation of (human/organic/spiritual) life" is invested in material artifacts and commodities, and therefore, according to Allison, Japan contradicts the Weberian idea of a disenchanted modernity (2006: 12–13).

In turning towards the second of Japan's cultural propensities towards robots, popular culture, it is instructive to note that Allison also draws a link between the aesthetic proclivity she describes and various aspects of Japanese popular culture, in particular the robot character "Astro Boy" *(tetsuwan atomu*). Astro Boy is a cute, helpful robot that fights for peace and justice, and therefore robots are shown to be friendly and useful companions to humans. In many ways, Astro Boy is a symbol of and symbol for robotics in Japan.

Astro Boy is the most notable and famous example of benign robots in popular culture, but he is also one of Japan's most famous and beloved popular culture characters in general. It is difficult to adequately convey this popularity, but the fact that Allison mentions the character specifically is no coincidence. In Japan, comics known as *manga* are incredibly popular across the entire demographic spectrum. Varied and diverse, *manga* are not just for young boys and many are written specifically for girls and for adults. They are ubiquitous and have "permeated every crevice of the contemporary environment" (Kinsella 2000: 4). While the "cultural politics" of manga is in a state of never-ending negotiation (Kinsella 2000: 5), *manga* is often considered a legitimate art form and some *manga* artists legitimate artists. At the top of the list of such artists is the creator of Astro Boy himself, Osamu Tezuka. Something of a legend in Japan, he is considered to be the grandfather of modern *manga* and, in Japan, his artistic talent is often compared to that of Leonardo da Vinci (Schodt 2007: viii). Surveys in Japan often have him ranked as one of the greatest people of the twentieth century, alongside John F. Kennedy, Mahatma Gandhi, and The Beatles (Schodt 2007: viii).

While Astro Boy is the most famous example of a popular and positive representation of robot character, he is not the only example. Another is *Doraemon*, also one of Japan's most well-known and beloved characters. *Doraemon* is a blue robot cat from the future, who comes back in time to help a young boy named *Nobita-kun*. Appearing in all kinds of merchandise, movies, games, television programs, *Doraemon* is popular with women as well as men.

With such positive characters in addition to a strong spiritual affinity for robots, many believe it is no wonder, then, that Japanese "love" robots. And it is therefore no wonder that Japanese enthusiastically develop robots. It is, ostensibly, what many Japanese want.

Social Robots to Assist Elderly and Disabled People

Before moving on to discuss the work on social robots which is currently underway in Japan, it may be useful to explore briefly what a social robot actually is and what it is designed to do. While my fieldwork was conducted in Japan, robotics research is an international field. Likewise, the concept of "social robot" is not confined to Japan, and instead relates to very general issues concerning the relationship between humans and machines. Irish roboticist Brian Duffy and his colleagues define any social being as "an agent capable of interactive, communicative behaviour" and a social robot as "a physical entity embodied in a complex, dynamic, and social environment sufficiently empowered to behave in a manner conducive to its own goals and those of its community" (Duffy et al. 1999). Similar themes are developed by American roboticist, Cynthia Breazeal, in her notion of the "sociable robot" (Breazeal 1999, 2003). Breazeal urges "designers to address the emotional and inter-personal dimensions of social interaction" (Breazeal 1999: 19). By implementing synthetic emotions, she suggests that designers make robots that can be treated "as friends instead of as appliances" (Breazeal 1999: 25). Such development takes place within what is known as Human-Robot Interaction (HRI), a research field that UK roboticist Kerstin Dautenhahn (2007) describes as being "at the intersection of psychology, cognitive science, social sciences, artificial intelligence, computer science, robotics, engineering and human-computer interaction" with the "a primary goal of research" being "to investigate '*natural*' means by which a human can interact and communicate with a robot" (2007: 103 emphasis added). According to Dautenhahn, research in "Human-Robot Interaction involves many exciting challenges both with respect to the technical challenges, as well as with respect to the human-centred aspects involved" such as "people's expectations of, attitudes towards and perceptions of robots, multi-modal interaction modalities, acceptability and believability of interaction, robot behavior that is comfortable and acceptable to humans, etc." (Dautenhahn 2007: 108).

As we see here, one of the main applications that social robots are being developed for is the provision of care for elderly (and also disabled) people. Such robots are often called "assistive robots". Further, such "assistive robots" also frequently and explicitly include *both* elderly and disabled people as intended users. The combination of elderly and disabled people as intended users is illustrated in the following brief survey of papers from robot researchers (and these articles often include phrases such as "elderly and disabled people" or "the disabled and elderly", sometimes even in the title of the article). In Japan, as early as 1994, Kawamura and Iskarous could identify a movement to design robots to assist elderly and disabled people (1994). More recently, here are just a few examples of some of the published research done in Japan: Jia et al. (2003) who describe a telecare robot system; Noritsugi et al. (2008) who developed a "pneumatic rubber artificial muscle"; Koshizaki and Masuda (2010), who describe a meal assistant robot that can use chopsticks; Kiguchi (2006), who describes a robotic exoskeleton to assist in upper-limb movement; Tamura (2004), who argues that interacting with and/or caring for Sony's AIBO (a robotic dog now discontinued) can be beneficial therapy for elderly people with dementia; Sankai (2006), who presents a robotic/bionic suit called HAL; and Iwata and Sugano (2009) who developed a "symbiotic robot TWENDY-ONE" to provide attendant care and support in the kitchen. Outside Japan, similar research has been carried out in countries as diverse as Korea (Park et al. 2001), Germany (Schraft et al. 1998), the United States (Dubowsky et al. 2000), Italy (Dario et al. 1999), Finland (Harmo et al. 2005) and New Zealand (Broadbent et al. 2009). In fact, the 2012 International Conference on Social Robotics (ICSR), held in Chengdu, China in October, was based on the theme of "wellness", including as one of its main topics "robots to assist the elderly and persons with disabilities"[3] Dautenhahn specifically highlights five areas of current interest in the field:

3 http://icsoro.org/ Accessed on 2012/06/04

1. long-term interaction between humans and robots
2. the potential use of robots in education, therapy, rehabilitation and supporting the elderly
3. social learning and skill acquisition by robots via human teaching and imitation
4. designing robots that can cooperate and collaborate with people in human-robot teams
5. robot perception, detection, and interpretation of human activity so that robots can understand the subtleties of interaction.

The Demographic Crisis

The development of such assistive robots is driven by a social policy imperative: with an ageing population, there is a growing demographic “crisis” that, on the one hand, means a looming labour shortage, and, on the other hand, means an increased number of elderly people requiring care. While this is an issue that many developed countries face (and many of the international, non-Japanese articles mentioned above make the same case for the necessity of their robots), it is most dire in Japan. As explained previously, Japan is the world's “greyest country” (Wu 2004).

There are also kinship issues that arguably make Japan unique. Traditionally in Japan, under the remnants of what is called the *ie* household system, elderly people were cared for by their family, that is their children and in particular the eldest son (Thang 2001; Wu 2004). As such, many traditional households also include the husband's parents. But this arrangement is increasingly rare with changing family roles and increased nuclearisation (Thang 2001; Wu 2004). In a future with a low ratio of young to old people, this system seems to be infeasible (Wu 2004). Meanwhile, there is also a strong stigma against institutionalisation. Homes for the elderly are seen as foreign and Western, and children who send their parents to these facilities are considered, under notions of filial piety, to be ungrateful and undutiful (Bethel 1992). While there are reasons to question whether the image of such "traditional" arrangements ever accurately represented the majority of Japanese families, the ideology remains strong (Kuwayama 2001; White 2002). In fact, "the state in Japan became more significant in welfare provision from the 1920s, reaching a peak in 1973. However, as the cost of a comprehensive welfare policy in an ageing society became apparent, policy-makers quickly reverted to one that sought to place more of the burden back on the family, legitimated by reference to traditional customs" (Neary 2002: 199). As such many elderly will either be living with relatives who cannot or will not care for them, or else they will be living by themselves without full-time support. The development of advanced social robots can ostensibly ameliorate this demographic "crisis" because social robots can be companions for lonely elderly and assist in physical and cognitive tasks inside and outside the home (which will also ease the care burden on young Japanese and encourage them to (re)produce).

Analytical issues: Production/Consumption and Diversity

The fact that such a solution is found in technological means is an attractive policy option, as anthropologist Jennifer Robertson (2007, 2010a, 2010b) points out, for a Japanese state wishing to maintain the social and political status quo. Robertson, based in part on her interviews with Japanese roboticists, believes that social robots fit with a conservative political agenda. She argues the notion that social robots can be used to mitigate the demographic crisis is in direct competition with the idea that substantial changes in social organisation—specifically increased immigration and a radical reconsideration of dominant and patriarchal gender roles—are necessary. Rather than admit foreign immigrants, who are seen as culturally incompatible and may also recall Japan's colonial and wartime past (since these immigrants are likely to be from Asia), the Japanese state prefers "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" (Robertson 2007: 372). Further, she argues that robots, caretakers and domestic workers, are intended to maintain ideas of kinship that keep women out of the workforce while encouraging these women to marry and raise children (who will then grow into productive workers—presumably male—and fund the health care and pension systems). Robertson therefore points to "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 [that] constitutes a form of resistance or protest against a social system that continues to regard women as second-class citizens" (Robertson 2007: 370). According to Robertson, the rationale of social robots (as understood by robotics researchers and the state) is that they can act as a kind of techno-social policy saviour, a "reactionary postmodernism" in her terms. In this way, social robots can rejuvenate the Japanese nation by re-enforcing, and expanding on, Japan's globally dominant position in consumer electronics technology, one of the country's great post-war "success stories" (Partner 1999), while simultaneously fixing a vexing social policy problem. Robertson argues that a further effect of such social robot production is to reify dominant and hegemonic values. For example, she argues that (overwhelmingly male) roboticists build their common sense understandings of gender into their robot designs, eliding the contingent relationship between body and gender, and therefore actualise a kind of technology-enforced sexism (Robertson 2010a).

Robertson's analysis of Japanese social robot development, while in some senses quite distinct from my own, provides a useful launching point for my discussion in this section. In particular, I want to highlight two areas that she focuses on: the reifying nature of production and the matter of diversity (*contra* homogeneity) in Japan. Together, these two points are the crux of her critique. In this section, I will likewise discuss two key issues that provide much of the analytical framework for this thesis: the contrast between accounts of (reifying) production and accounts of (free-playing) consumption, and the question of diversity in Japan as it relates to my fieldwork specifically.

"Production" and "Consumption": fieldwork in two contexts

In conducting the research for this thesis, I incorporate aspects of two kinds of studies, which I loosely term studies of production and studies of consumption. Studies of production, for example production in the laboratory, tend to focus on how things (artifacts, knowledge systems, statements, discourses, structures) get made, the processes of production which reify certain values or ideologies. Studies in consumption tend to focus on the free-play of consumers and individuals to subvert dominant meanings through use, the processes of consumption which are open-ended and impossible to control. Both seem to have problematic aspects. Studies in production tend to implicitly "cage" people with the incredible power of the thing that gets made; studies in consumption seem to have the opposite effect, over-emphasising freedom and multiplicity of meaning.

A number of ethnographies have examined science and technology within the laboratory (Forsythe & Hess 2001; Helmreich 2000; Knorr-Cetina & Harré 1981; Latour & Woolgar 1986; Lynch 1985; Rabinow 1996; Traweek 1992). But I argue that these studies tend to fall into the pattern of production studies. While invaluable in charting the discourses and practices that go into the construction of facts and artifacts, there is a tendency to see the laboratory as privileged. In Latour and Woolgar's now classic *Laboratory Life*, they argue that the laboratory creates order out of disorder through the stabilisation of a scientific statement, a "statement of fact" (Latour & Woolgar 1986: 243). Once outside the laboratory, these constructed "products", the statements of fact, cannot be questioned. Or, at least, "the cost of challenging the reified statement is impossibly high" (Latour & Woolgar 1986: 243). Just as Stefan Helmreich argues that American artificial life researchers build their own male, middle-class, white, and Christian "assumptions and lived experiences...of what constitutes creation, life, primitivity, individuality, kinship, and economics" (Helmreich 2000: 105) into ostensibly neutral and scientific artificial life programs, in the case of social robots in Japan, we might imagine that dominant ideas of kinship, gender, ethnicity, Shinto or anything else will be built into the very fabric of the robot (as Robertson, in part, argues above). And in this unshakeable material form, the implication often seems to be that these ideological constructs will be mechanically (re)produced in the outside world.

In contrast, studies in consumption often give the quite opposite impression. Although earlier work broadly theorised "culture" as the main driver of consumption, most notably Douglas & Isherwood (1979), more recent accounts, not least in light of "the critique of culture" in the 1980s (Clifford & Marcus 1986; Clifford 1988), tend to give the impression that artifacts, material culture, commodities, etc., come with relatively little meaning, which is then generated creatively by consumers and/or through acts of consumption (Friedman 1994; Miller 1987, 1997a, 1998, 2009, 2013a). In such work, even the act of production is in some ways an act of consumption, insofar as "in material culture we are concerned as much with how things make people as the other way around" (Daniel Miller 2009: 42). For example, in his well-cited discussion of Coca-Cola in Trinidad, while Miller makes a point of stressing both production and consumption, in the end one is left with the impression that a teenage consumer has more "real" control over what the drink "means" than a company executive who seems, for lack of better terms, misguided and ignorant (Miller 2002). Analogously, work on "situated cognition" investigates how technologies are used in practice, and demonstrates that people's spontaneous solutions to unanticipated problems are very different from the linear and logical plans assumed by engineers (Suchman 1987; see also Lave 1988). In this kind of argument, people have room for trial and error , originality and compromise as the "proper function" is modified, subverted, or ignored (Graves-Brown 2007). While these studies do correct the original bias, since they often only look at consumers or users they tend to have the opposite problem; they can be read as implying that technologies, artifacts, objects, discourses, statements, etc., come value-free and unconstrained; they under-emphasise, or even omit, the fact that artifacts have politics (Winner 1999).

In the case of social robots, it is plausible, perhaps even expected, that consumers will use the robots in all kinds of ways unanticipated by their creators, but those social robots are still designed in specific ways. Prominent psychoanalyst and science and technology studies (STS) scholar Sherry Turkle (Turkle 2006, 2011) argues that social robots are tools of projection in ways somewhat similar to dolls or toys, but are nevertheless fundamentally different. Like toys, robots allow children, or even adults, to imagine them as beings (or persons) with feelings, desires, and agency. And, in her ethnography, she shows, with the aid of psychoanalytic theory, some of the ways that actual children and adults project their own issues of intimacy onto the Sony robot dog *AIBO* (Turkle 2006: 4–5). But she also points out that social robots, like *AIBO*, have some crucial differences from dolls because they prey on our "vulnerabilities" in unprecedented ways. Social robots are designed to use our cognitive, emotional, social and cultural propensities to provoke specific reactions. In particular, Turkle argues that the "killer app" of many social robots is that they feed on our innate desire to nurture and care for something (Turkle 2006: 2). Unlike an inanimate doll, the robot may both call out to us and move its body in a way that invites us to believe it is alive. In order to understand the social effects of such a robot, it seems necessary to understand how it came to be designed in this way.

The systematic split between those who focus on production and those who focus on consumption seems to me to be, at least in part, methodologically rooted. In other words, there is a strong correspondence between analytical position and the site of fieldwork. Anthropologists and social scientists have a natural tendency to focus only on the events, actions, practices, rituals, and people that they have witnessed, studied, and documented. But this understandable tendency can be a source of bias since it does not necessarily reflect what is most important (or rather it may elide the fact that processes beyond the field site are also important).

As an illustration of this point, I want to juxtapose two fairly recent ethnographies. Kinsella (2000) represents the position of production studies and (Miller 1998) represents the position of consumption studies. After discussing each in turn, I want to suggest that production and consumption can be profitably studied together, in part by drawing on work that addresses the specificities of technology and in part through anthropological musings on both connection and friction.

In Kinsella's (2000) study of "adult *manga*", she uses both in-depth historical analysis as well as her experience of extended fieldwork within a *manga* publisher to provide a detailed account of the *manga* production industry. She explains that one of her main goals is to counteract the Western trend of analysing *manga* without recourse to how it is made. According to her, such studies tend to be sensationalist. They focus on "violence, sex, and strangeness" and therefore reinforce "pre-existing notions of Japan as a cruel, sexist, strange, and repressed society" (Kinsella 2000: 14). Rather than employ "ideas derived from Bakhtin, Freud, Jung, Lacan, Althusser, feminist literary theory, or Japanology", she sets out to describe *manga* as "a series of complicated conscious social exchanges and intelligent cultural management" (Kinsella 2000: 14). When compared to, for example, prominent sociologist John Clammer's blanket gloss of contemporary Japanese popular culture as "a world of sex, death, the bizarre and the fantastic", with a distinct fixation on the erotic and the violent (Clammer 1997: 58), her argument, which relies on detailed research with specific individuals partaking in particular historical processes, internal politics, and changing institutions (of censorship, organisation, etc.), seems very convincing. She details the micro-politics between editors, under time pressures, and artists, who often identify with an anti-establishment history within *manga*, who work within corporate production companies where assistants do much of the actual drawing (details, backgrounds), in a complex of changing economic and political realities.

Still, consumers and consumption do not figure much in her account. In fact, the words "consumption" and "consumers" do not appear in her index, startling in light of the fact that *manga* is most definitely a consumer product. Rather, much of her narrative concerns attempts by the state to use *manga* to its own ends: we find common use of words like "censorship", "[political] repression", "moral panic". In her final chapter, tellingly sub-titled *The Source of Intellectual Power in a Late Twentieth-Century Society* she argues that "an institutional apparatus established for separating *good* from *bad manga*" was "fortified [with] regulation" and "*manga* which did not fit the criterion of national culture was criticized, blacklisted, and discontinued" (Kinsella 2000: 202 emphasis in the original). As such, she argues that power has been concentrated in corporations, government agencies, and publishing editors at the expense of artists and readers (Kinsella 2000: 206).

In comparison, Miller's (1987, 1997a, 1998, 2002, 2009) expansive work has focused on consumption and consumers. Unlike those who have dismissed consumption or presumed to understand how it works *a priori*, Miller has emphasized the importance of traditional ethnographic research. In other words, he has conducted, and encouraged others to conduct, extensive ethnography with consumers in order to understand consumption "in itself". This has meant considering the role of consumption and consumer goods for identity, family, kinship, and so on. Miller seeks to overturn the so-called passive dupes trope, whereby consumers have little agency or effect.

Here I want to focus on one work in particular as it makes plain the methodological advantages and disadvantages, at least from my own perspective, of a focus on consumption. This is his work on shopping in North London, and particularly his book *A Theory of Shopping* (Miller 1998). Miller argues that despite the dominant discourse that consumption is essentially a hedonistic and individualistic activity, most shopping is done for "love"—as in part of an ideology of love. He shows that consumption is crucial for making and maintaining social relationships, and in particular intimate social relations between family and between potential partners. Further, while the discourse of shopping often emphasizes uncontrolled spending and materialism, Miller shows that the practice of shopping centres around thrift. According to his research, it is the obsession with, and the experience of, saving that is the hallmark of everyday shopping. Miller therefore contrasts his ethnographic analysis with the portrayal of shopping in popular discourse, including his informants' own explicit accounts of shopping in the abstract, which centre around the exuberant “shopaholic” image. Miller uses the contrast between his ethnographic findings and popular discourse to derive his own theory of shopping as sacrifice, but, for my present purposes, it is enough to show that, methodologically, Miller showcases the value of ethnography. While surveys, focus groups, and even some interviews evidence the discursive individualistic model of shopping, Miller's ethnography uncovers something quite different.

Nevertheless, I feel that only focusing on consumers during, for example, shopping has some methodological problems that arise in certain ways within his ethnography. One example is in Miller's discussions of advertising, which I believe has a style of argument that would be misleading if analogously employed to my own ethnographic concerns. In one of the few, if only, references to advertising in the book, Miller basically dismisses it. He suggests that advertising is relatively unimportant, especially when compared to the importance of sales and coupons. Miller argues that “the entire weight of advertising seemed virtually inconsequential by comparison [to the focus on saving]. There were few instances of a clear desire to buy a product as a result of advertising” (Miller 1998: 52). Miller's evidence seems to be that people did not talk much about advertising when they were in the supermarket. For example, they did not say they bought a certain product because they saw an advertisement for it. But I do not think this is strong evidence that advertising has little effect. It is plausible that advertising could produce a meaningful effect that is nevertheless not made apparent to consumers, especially since it is reasonable to assume that advertisers have an incentive to deliberately hide the effects produced through advertising from those very consumers. Having said that, I make this point not to dwell on the specifics of advertising. Rather, my concern is with technology and design. I believe that Miller's style of argument would be problematic if applied to my own ethnography because roboticists spend a lot of time thinking about aspects of design and usability with the express purpose that these design details should be completely transparent to a user. In this way, the consumer *not* talking about some feature of a robot can conceivably indicate a very *successful* design; it can showcase its *importance*. I believe this perspective becomes more clear if we take production—and the design of technology—into account.

Of course, Miller is well aware of such issues and he has also done work with advertisers (recently summarized in Miller 2013a: 108–137). Further, his recent essay entitled “Machines that Script People” indicates his interest in how production interacts with consumption (Miller 2013b). In particular, his review of Natasha Schüll's (2012) ethnography *Addiction by design: Machine gambling in Las Vegas*, concludes by noting: “One of the reasons I value this work is that the message is pretty much the exact opposite of my own writing on the power and relative autonomy of consumption” (Miller 2013b). Schüll documents both the lived realities of gambling addicts, who feel trapped in cycles they cannot control, and the activities of machine design and casino management employed by gambling firms. She argues that gambling addiction is a hybrid production generated in the interaction between these diverse people and technology. While some individuals may be prone to gambling, she shows how casinos and video poker designers work to control every aspect of environment, ambience, machine technology, facility, and so on to maximize the length of time people gamble and therefore to maximize profits, while also hiding these efforts from the gamblers playing the machines. Indeed, in her description, the designers of gambling machines and casinos seem to hold a great deal of power over their “consumers”. While Miller accepts that, in the specific case of machine gambling, production does seem to be very important because of the insidious ways that consumers are encouraged to become addicted through machine design, his main reservation is that this dynamic could be very specific to this instance and this industry. Nevertheless, I suggest that there is some reason to think that a similar analysis could be useful, beyond machine gambling, for other kinds of technology and design.

Pfaffenberger (1992a: 283) argues (drawing on a wide range of studies in the anthropology of technology, STS and the history of science and technology) that “one may speak legitimately of the *political* dimension of technological design: the technology is designed not only to perform a material function but also to express and coercively reinforce beliefs about the differential allocation of power, prestige, and wealth in society” (emphasis in the original). By way of example, Pfaffenberger notes that managers of telecommunication companies developed surveillance in their call centres in order to monitor and coerce telephone operators into conforming to designers' social and technical “fantasies”. This example is particularly fitting for my own discussion, because, as I will describe later in this thesis, roboticists imagined that their teleoperation system (a system to remotely control robots) could be used as a way to more “efficiently” organize nursing. In such a “fantasy”, a room of remote robot operators would switch between a range of robots located in a range of hospitals and elderly homes in order to provide care. This is a set-up that, when pushed, some roboticists admitted sounded quite a bit like a “nursing sweatshop,” an apt if shocking term which suggests that power relations pervade ostensibly “neutral” technologies. Given how politics are built into technical systems, and drawing on Pfaffenberger's own arguments, we may wish to even question the distinction between the “material function” and these other (social, political, etc.) “functions”—if we take the system to be a *sociotechnical system* (Pfaffenberger 1992b), they may end up being much the same kind of thing.

Pfaffenberger's writings are also useful insofar as he develops a framework for analysing “producers” and “consumers” together. According to him, a new technology often enters into what he calls a “technological drama” (Pfaffenberger 1992a). The design and implementation of technical systems that act to reinforce a hierarchical *status quo* is what he calls “technological regularization”. In such cases, “a design constituency creates artifacts whose features reveal an intention to shape the distribution of wealth, power, or status in society” (Pfaffenberger 1992a: 282). This design constituency “creates myths, social contexts, and rituals to legitimate its intention and constitute the artifact's political impact”. In resistance to this regularization others (i.e., consumers) “engage in myth-, context-, or artifact-altering strategies that represent an accommodation to the system (technological adjustment) or a conscious attempt to change it (technological reconstitution)”. By assigning these actors different roles, Pfaffenberger uses the trope of “the drama” to interpret the interplay between them.

In crafting such a “drama” here, my aim is not just to show that both studies of production and studies of consumption have useful things to tell us, but also that what they tell us is greatly enhanced when they are considered together rather than apart. In my study, I combine aspects of both production studies and consumption studies into one account. On the one hand, the laboratory, as a field site of production, gives the opportunity to study how researchers make sense of their own work, a chance to understand their motivations, a chance to understand how these motivations translate into actual robot systems and a chance to understand how roboticists see themselves with respect to state requirements of funding and policy. We have relatively little sense of what roboticists do on a day-to-day basis and how this informs the robots they design if we base our analysis only on what I have described above as the various social, cultural, technological, and political contexts of Japanese robot development. And, while we have noted some interesting possible explanations (cultural reasons, policy reasons, technical reasons) for why robots are made, we also do not get to see the many ways that individual researchers differ, which leaves us with a rather essentialist account of “Japanese social robots”. On the other hand, the independent living centre, as a field site of consumption (not of robots as such but rather assistance in various guises), gives the opportunity to examine what it is disabled people need and want in care, what their daily life is like and what kind of aid they receive. Usually these perspectives are at most superficially addressed by those writing about social robots (in Japan or elsewhere). While it may make sense both for government policy and to the developers of robots that care is a promising application, noticeably absent are the needs and desires of the elderly and/or disabled people for whom the robots will actually be helping. Further, addressing our study to such people can potentially highlight such consumers own politics in reaction to the state or other powerful forces, instead of assuming that these consumers are passive dupes (Miller 2013a).

By combining these two field sites, production and consumption, the goal is to privilege neither, at least *a priori*. Rather this thesis attempts to confront aspects of both, following material culture in different contexts. As such, my approach is indebted to the arguments set out in *The Social Life of Things* (Appadurai 1986). But, rather than analytically prioritise the processes of circulation and exchange (i.e. "flow": for a critique of this word see Rockefeller 2011) in "regimes of value" (Appadurai 1986: 15), I prioritise the fact that the "use or appropriation of an object is more often than not both a moment of consumption *and* production, of undoing *and* doing, of destruction *and* construction" (Lury 1996: 1 emphasis in the original). In other words, I explore how technology (as material culture) depends on "cycles of production and consumption", where the purchase of, for example, household items is "consumption" but also part of the "production" of housework—food is bought but usually also cooked and prepared for the family (Lury 1996: 2). Likewise, I prioritise analytical attention to the "friction" inherent in such connections (Tsing 2005). In this thesis, I build on Tsing's argument that "universals"—like science and technology or a global movement for human rights—have to be practised, have to be built through messy engagement and drama, within gaps and slippages, and this in turn challenges their claims of unity by their very contingency. My analytic perspective therefore entails, in part, an attention to heterogeneity.

Japan and Diversity

The second analytical issue I wish to discuss is Japan's diversity, in light of the "myth" of Japanese homogeneity. The notion that Japanese both "need" and "want" robots relies implicitly on the notion that Japan, and the Japanese, are both all the same and completely different from others, a historically dominant but misleading image of Japan that anthropologist of Japan, Harumi Befu, has described as the "hegemony of homogeneity" (Befu 2001). In this thesis, rather than assuming a homogeneous Japanese population that is "in favour of robots", my aim is to examine social robot development, and potential use, against a background of diversity. By this I do not mean I will systematically address all possible points of Japanese diversity as they relate to social robots, but rather I aim to contribute to an existing (and expanding) literature on the theme of diversity. To be more specific, the theme of diversity manifests itself in two ways in what follows. First, I focus on disability and disabled people, an often under-recognised aspect of Japan's internal diversity. Second, I emphasise the global and international aspects of *both* social robot research and the disability movement.

Analytically it is useful to tie these two points to what I identify as two distinct (but related) parts of Befu's analysis. Befu uses the term "hegemony of homogeneity" to critique the essentialized stereotypes of Japan that have developed in the (culturally nationalist) literature known as *nihonjinron* ("theory" or "discourse" on "Japanese-ness").The *nihonjinron* literature is vast and includes work in geography, history, psychology, sociology, linguistics and philosophy, but the core theme of these writings is the uniqueness, coherence, importance, and potential causes of Japanese cultural identity, a cultural identity that is fundamental to all Japanese and distinguishes them from others (ostensibly *all* others, though the *de facto* comparison is usually with Western people). In other words the two analytically separate points are: first, Japan is homogeneous and therefore has little or no diversity; second, Japan is “uniquely unique” and unlike all others. These notions are challenged by my focus on disability and on global/international issues respectively.

The Recent Interest in Japan's Diversity

Before moving onto my own distinct concerns with diversity, I will give a brief description of the main ways that diversity has been addressed by anthropologists, sociologists and others in Japanese studies. In the face of the dominant trope that Japan is ethnically homogeneous, Japan's ethnic minorities, in particular, have received a great deal of attention in the literature (such as Denoon et al. 2001; Graburn et al. 2008; Lee et al. 2006; Lie 2004; Robertson 2005; Ryang & Lie 2009; Sugimoto 2010; Weiner 1996; Willis & Murphy-Shigematsu 2008). Specifically, the following minorities are frequently written about: *burakumin* (former outcasts under the feudal system), Koreans and, to a lesser extent, Chinese (who, while nominally “foreign”, have often been in Japan for generations, dating back to Japan's colonial period), indigenous Ainu in the north island of Hokkaido (which was annexed and colonised in the modern period, i.e. after the Meiji restoration), Ryukyuan people in the south island of Okinawa (where, until as recently as 1972, Japanese people needed a passport to visit), and recent immigrants (primarily returnees of the Japanese diaspora, *nikkeijin,* from Brazil and other Latin American countries, as well as immigrants from a variety of developing Asian countries such as the Philippines and Thailand). Sugimoto, in his sociological introduction to Japan, highlights these ethnic minorities (Sugimoto 2010: 189–207), as does Hendry in her anthropological addition to the same genre (Hendry 2003: 107–114). While these groups have been the subject of many recent studies and ethnographies, exemplified by two recent edited volumes (Graburn et al. 2008; Willis & Murphy-

Shigematsu 2008) these two collections also highlight other minority ethnic issues such as blackness (Carter & Hunter 2008), Muslims (Onishi 2008), and “foreigners” as executives (Hamada 2008) and sumo wrestlers (Tierney 2008).

Apart from the literature on ethnic diversity, there has long been interest within the anthropology of Japan in hierarchy and ranking, perhaps most notably analysed by Chie Nakane (1970). According to her, “vertical organization” represents (or represented) a fundamental way to understand all of Japanese social structure (Nakane 1970: 59–84). And the consideration of hierarchy and ranking continues to be an important part of the study of Japan (Hendry 2003: 102–107). Wages in Japan's largest firms, for example, have predominantly been determined by age and length of service, although this practice is potentially changing with the restructuring of Japanese business and the partial collapse of the lifetime employment system (Sugimoto 2010: 110). Indeed, the importance of hierarchy has also changed in other ways. As we have already explored, the hierarchy of the older kinship ideology has to some extent broken down. This can be a source of inter-generational conflict between older family members who want to maintain the “traditional” system (not least because they had expected to be cared for in old age, as they had cared for the previous generation) and younger members who demand more individual autonomy and freedom (Hendry 2003: 37–39). Nevertheless, whether undergoing substantial changes or not, hierarchy, and its links to age, is one of the pressing issues of contemporary diversity in Japan.

Japan also has a high degree of female-male social stratification, and gender is a major feature of Japanese diversity. A great deal of research has looked at not only the marginalisation of women within the workforce, but also at gender as it relates to pop culture and leisure, and (female-dominated) cosmopolitanism and consumption (Allison 1994, 2000; Kelsky 2001; Kondo 1990; Lebra 1981;

Ogasawara 1998; Roberts 1994; Robertson 1998, 2010a; Skov & Moeran 1995).

There is also a sociological and anthropological literature that describes (and often critiques) the commonly held perception, within Japan, that it is a classless (or "middle class") society and/or has little class consciousness (Sugimoto 2010: 35–40). Some suggest that the case of contemporary Japan requires a redefinition of class in terms of consumption and status along the lines suggested by Pierre Bourdieu (Clammer 1997: 103–104), while others suggest that class, in the Marxist sense, is a reality in Japan which is only hidden by the "*tatemae* [surface appearance] of Japanese society" (Sugimoto 2010: 35). Whatever the interpretation, economic disparity between contemporary Japanese does present another point of diversity.

Japan also has considerable regional variation, including both the contrast between urban and rural centres, and between geographic regions such as the urban rivalry between Tokyo/Kanto and Osaka/Kansai (Sugimoto 2010: 60–85). Japan is increasingly an urbanised society based around urban consumption, and with the migration of many young Japanese to the cities, the rural countryside is increasingly populated by primarily elderly people (Clammer 1997: 149). In the face of such depopulation, especially the depopulation of working young adults, it is in the rural areas that the aforementioned immigration from developing Asian countries has been sought (Sugimoto 2010: 68). Further, since Japanese women especially are moving to the cities, rural Japanese men have turned to the Philippines and other Asian countries to find marriage partners, although a majority of such international marriages between Japanese men and (non-Japanese) Asian women still do happen in the cities (N. Suzuki 2008). The specific Osakan rivalry with Tokyo (which I think is not reciprocated to the same extent) was a reoccurring theme during my own fieldwork (though not a core topic for this thesis), while the urban anthropology of Japan has arguably suffered from a Tokyo-centric bias

(Daniels 2010: 8).

A Few Notes on Nihonjinron

In this thesis I make tentative use of some Japanese concepts and terms, such as *ma* (“space” or “interval”) and *kokoro* (“heart” or “mind”). There are some particular pitfalls in this approach. The anthropology of Japan, and much of recent Japanese studies in general, holds a grave suspicion of such terms especially when they could be meant to imply that Japan is somehow “uniquely unique”. In particular, anthropologists and other similar academics often contrast their positions with the politically reactionary discourse known as *nihonjinron* which tends to essentialize Japan and Japanese people (Befu 2001; Dale 1986; Goodman & Refsing 1992; Ivy 1995; Ryang 2004; Sugimoto 2010; Yoshino 1992).

In using terms such as *ma* or *kokoro*, I could be seen as implying the validity of such “uniqueness” discourse. But this is not my aim. Rather, I employ these terms because, while they may be familiar to those with a speciality in Japan, they will not be familiar to anthropologists who work in other geographic regions. In providing these terms, my intention is to give the conceptual basis on which to understand other parts of the analysis, without which any further critique cannot be understood. In other words, while I agree completely with the critique of a special Japanese psychology or mindset, in order to understand my informants' own rationales and explanations it is necessary to understand in what sense they are using their terms. While *kokoro*, for example, could be translated as either heart (which implies emotions) or mind (which implies rational intellect), if I use one of these terms without explaining the Japanese term, some English readers may feel that “distinct” terms are being conflated. Such readers may interpret this ambiguity as a conceptual “slippage”, even though this “slippage” is an artifact of the translation into the English language rather than my informant's reasoning. In foregrounding this fact, I do not mean to imply that Japanese “have” a *kokoro* that makes them unique from, for example, “Western” people who “have” a heart or a mind. Rather, in explaining the projects and approaches that Japanese roboticists use, I point to the fact that the tropes they draw on both overlap and diverge from those we might find in other settings, such as the American artificial life lab discussed by Helmreich (2000).

Likewise, in the final chapter I discuss at length the concept of *ma* as it was introduced to me by my informants. Again, in dwelling on this particular word and its “importance”, there is a danger of essentializing Japanese people, Japanese culture, Japanese communication patterns, and so on. The danger is especially great when people have rehearsed discourses about such a “loaded” concept as *ma*—discourses that have been learned from the media, the education system, and other institutions. Indeed, such essentialism was a salient aspect of informants' explanations of *ma*. Nevertheless, I include a discussion of the term because it helps to explain informants' own positions. As Goodman argues (Goodman & Refsing 1992: 18), while we may question the validity of the *nihonjinron* ideology, it can still have meaningful effects. In other words, while it may or may not be true that *ma* is particularly important for Japanese elderly people (as my informants asserted), in order to understand the practices and rationales of those informants we need to consider quite clearly what it is that they are talking about. First of all this requires a discussion of some of the meanings that can be assigned to *ma*. Such a discussion of the “meaning” of *ma* should not therefore be read as my own attempt to “explain” Japanese people by way of *ma*, but rather the discussion is meant to point to this term and to give a gloss so that it is clearer to the reader what my informants thought they were talking about at the time.

In providing these terms, I have found it difficult to decide the correct place of critique. It is certainly true that these terms are worthy of critical analysis. But it is also true that they are the terms my informants used to explain their own positions. I have tried to strike a balance in presentation by mostly withholding judgement on whether these terms accurately reflect any “real” difference (since it is not the question I find most interesting in this thesis), but instead focus on their discursive importance in constructing roboticists' (and disabled people's) own rational worlds. My aim, therefore, is not to offer an historical critique of such terms and their place within modern nation-building and ideology in Japan (such as Ivy 1995), but rather to provide the conceptual context of technical practices. This is not a critique of the former kind of analysis, but rather my primary interest is elsewhere in this thesis (which is not an “archaeology” in the Foucauldian sense). In other words, while there is a danger of essentialism when these terms are employed, I felt that, for many readers, the ethnography would not make much sense without them. Of course, the relative advantages and disadvantages of each possible choice depend heavily on the intended audience, and in this way the thesis may reflect the fact that it was developed in an anthropology department without others working on Japan, rather than, for example, a Japanese studies department, in which colleagues would all be very familiar with the nuances of such issues of language and culture with respect to *nihonjinron*.

Disability and Identity

Turning to my own concerns with diversity, disabled people are another important part of Japan's internal diversity, but one that has arguably received less attention than it deserves, including in the anthropology of Japan (though with exceptions such as Nakamura 2005, 2006; Ohnuki-Tierney 1984; Stevens forthcoming, 1997, 2007, 2011). My approach takes these disabled people as consumers and focuses on their own needs for care, assistance, or help. But it also investigates the way these needs are related to their understandings of their political and social activism. This social activism is based in a centre for independent living, an organisation run by disabled people to help other disabled people in the community seek the services they need in order to live by themselves (as opposed to permanent institutionalisation or dependence on family). I examine the themes of politics and identity by drawing on both what people at the centre for independent living told me, and also the growing literature in disability studies (Albrecht et al. 2001; Davis 2010a; Linton 1998; Titchkosky & Michalko 2009; Wendell 1996).

While disability and disabled people are clearly part of the story of social robot development, they do not quite fit into the narrative as it is has been presented so far. While the demographic, economic, and social issues seem to justify a focus on developing social robots to assist the elderly, disability, while clearly an important issue for disabled people and their families, is not a priority for most Japanese (including the Japanese state). Of course, with an ageing population, there is concern over a potential "pension crisis" and therefore a concern over disability benefits (Honeycutt et al. 2005). And the state has been under both domestic and international pressure to address disability issues such as "normalization" (desegregating disabled people from mainstream institutions) and human rights (Heyer 2000b, 2000b). Still, it is fair to say that disabled people, like the ethnic minorities described above, tend to be rather invisible to the mainstream (M. Suzuki 2008). And, yet, many social and/or assistive robots are developed not just for elderly people but also disabled people.

To address this issue it is useful to identify what elderly people are thought to need as consumers of social robots: ongoing personal assistance in the course of routine daily life. And the reason that elderly people need personal assistance is not because they are old as such, but rather because their bodies presumably "break down". They can no longer lift things they used to be able to lift. They are unable to move their bodies around as they used to. They struggle to remember things or they have trouble focusing on tasks that used to be easy to perform. As such, the robot needs to be able to help not elderly people as such but predominantly elderly people *with disabilities*. And if a robot can help elderly people with disabilities, it can help other people with disabilities too. Therefore making a robot that helps the elderly often means making a robot that helps people with disabilities *in general*. But what does it mean to be disabled exactly?

Japanese law defines “disabled persons” as “persons whose daily life or life in society is substantially limited over the long term due to a physical disability, mental retardation or mental disability” (Basic Law for Disabled Persons, Article 2). The wording here is important: disability is “due to” physical or mental conditions. In other words, the “reason for” or “cause of” disability is some aspect of the individual person and her body. But definitions such as these have been increasingly challenged by both disability activists and scholars in disability studies.

Disability studies is an interdisciplinary field that has come to the fore only recently. It is the academic study of disability, focusing on the political, historical, social, and cultural practices and meanings attached to disability, rather than on psychological or biological “determinants” (Fleischer & Zames 2001: 206). While the literature is diverse, one of the touchstones for the field is the distinction between the (dominant/mainstream) medical model of disability, where disability is caused by an intrinsic individual physical condition and therefore a matter of medical intervention, and the (disability studies) social model of disability, where disability is caused by an unjust society via physical and social barriers and therefore a social and political issue. The rationale behind this contrast is that it centres attention on the fact that society, including its architecture and general material construction, is built with a hegemonic vision of the “normal” person in mind, a vision that excludes disabled people. Rather than make disabled people fit this already constructed world, many in disability studies call for changes in society—including a rethinking of dominant ideas of “normalcy” or “normality”. For example, prominent disability studies theorist Lennard J. Davis writes, of disability, that “the 'problem' is not the person with disabilities: the problem is the way that normalcy is constructed to create the 'problem' of the disabled person” (Davis 2010b: 3).

Further, the disability movement, in concert with disability studies, has tried to “reclaim” and “reassign the meaning” of disability (Linton 1998). Rather than describing some material aspect of the body, the terms “disability” and “disabled people” have been adopted as identity markers (Linton 1998: 12). Disability and disabled people come to be presented “in terms of human variation, as a political category, as oppressed minority, as cultural group” (Linton 2006: 86). Disability can therefore be reconceptualised in terms of minority politics and, for example, Nakamura describes how some elements of the Deaf social movement in Japan (following Deaf[4] movements elsewhere) model “Deaf” as an ethnic minority (Nakamura 2006).[5] While there may be subtle distinctions between the social model of disability and a minority model of disability, in practical terms they are often entwined to mean much the same thing (Shakespeare & Watson 2001: 556).

It is on the basis of this identity logic that I use the term “disabled people” throughout this thesis. Clearly, there are a wide range of possible human impairments and its not obvious that they should all be considered together as one “kind” of person. Nevertheless, with the organisation of disability activism under the identity logic explained in the previous paragraph, I find it useful to use the category of “disabled people”. While there is some danger of essentialism, analytically I find it a necessary term to employ with respect to disability studies.

Still, I should again stress the fact that disability studies is diverse and the status of both identity (Davis 2010c) and the social model (Shakespeare 2010) are subject to critique, points that I will return to in the conclusion of the thesis in particular. At this point, however, one pertinent issue is the categorisation of elderly people. As we have seen, there are some good reasons to understand elderly people as people with disabilities. Likewise, some disability theorists argue that it is politically and

4 “Deaf” has been capitalised by those claiming deafness as a cultural identity.
5 Rather unsuccessfully, outside of the Deaf movement itself, because, as I have discussed, ethnic minorities are not really recognised in mainstream Japan.

philosophical useful to analyse elderly people as disabled people. Frequently, social and material changes that help one group (improved access in the form of ramps, better social welfare services) also help the other group (Wendell 1996: 18). Further, an emphasis on disability in old age also makes it clear to mainstream able-bodied people that disability is an issue that affects them directly, as they can conceive of themselves as becoming old and therefore disabled (Wendell 1996: 19). Still, others believe that the inclusion of elderly people as disabled people introduces political and philosophical problems. Some argue that the association of "frail elderly" with disabled people can naturalise disability by associating it with the biological inevitability of ageing (Amundson 1992), while others point out that the inclusion of a massive number of elderly people with disabilities creates an unstable situation for disabled identity by creating definitional issues and perhaps eroding the political efficacy of the identity concept (Davis 2010c). As one of my own informants put it to me, a crucial difference exists between those who have lived their entire lives as "normal" people into old age and those who have faced the hardship, prejudice and discrimination associated with disability since they were children. In highlighting these, my intention is not to take a personal stance on this debate but rather to emphasise that there is an ambiguous relationship between elderly and disabled status, an ambiguity that both simultaneously connects and distinguishes elderly and disabled people.

Global Movements

Since Appadurai's influential work (Appadurai 1996), globalisation has arguably become an overused buzzword not just within anthropology but across the intellectual and political landscape (Lewellen 2002: 7). Nevertheless it is also "something" that anthropologists increasingly have to come to terms with. Allison's study of toys and popular culture is a study of globalisation (Allison 2006). She traces consumption of Japanese popular culture not just across Japan, but across the world. Similarly (though with the "flows" in the opposite direction), Bestor's ethnography of the Tsukiji Fish Market in Tokyo is a study of that institution's globalisation, and he traces the global movement of fish from the world's oceans into Tsukiji Fish Market (Bestor 2004).

However, in emphasising the global aspects of Japan, my intention is not to invest heavily in theorising "the global" or "globalisation", nor to follow flows of commodities/objects across the world as such (although the movement of images, information, and people through academia, global media, and activist networks plays a fairly strong role in my account). As I explained, my interest in "the global" is from the position of diversity within Japan, in contradiction with perceived and preconceived notions of homogeneous and "unique" Japanese. In my laboratory fieldwork, first of all, many of the people I worked with are non-Japanese. This was a reality of my daily work, perhaps somewhat similar to the experience that Traweek had in working with both Japanese and American scientists in a Japanese high physics laboratory (Traweek 1992). It would be a major distortion of my fieldwork to elide these people because they are not "real" "Japanese" roboticists. Further, research, as I have explained above, is part of a global research network. Not only do young international researchers or interns come to Japan to work in the laboratories, but, as we will see when I discuss a team of Italian researchers, the Japanese laboratory frequently collaborates with other laboratories from across the world. They also write papers in English and attend conferences in the United States and Europe. Turning to the disability side of my research, likewise they are part a global social movement. As I will explain, they often talked about how they had learned from "foreign countries" (usually meaning the United States, in particular), while they also had an exchange program set up to encourage young disabled people from other countries in Asia to come to Japan, for a short time. Disabled people, particularly those of a more activist bent, used terms to describe their political positions that likewise need to be understand as global, and such people draw on the language of the disability studies literature introduced above. All of these factors mean that this ethnography cannot be limited by hegemonic and restrictive ideas of “legitimate” Japan and/or “legitimate” Japanese people.

The Field and Methodology

Having laid out the main contextual and analytical issues, this section will turn to the practicalities of fieldwork undertaken for this thesis. The thesis is based on long-term ethnographic research in the Kansai region of Japan. The Kansai region is the second most populated region in Japan (after Greater Tokyo), and includes the cities of Osaka, Kyoto, Kobe, and Nara. While I was conducting most of my fieldwork with roboticists at the laboratory during the day, I lived in Nara City with a homestay family. My homestay was with a “middle-class family,” a couple in their late 30s/early 40s along with their eight-year-old son. While I rarely draw on this experience explicitly, it was fundamental to my general “fieldwork experience” of Japan and also crucial for developing my language abilities. After this period, I moved with my wife into our own apartment in Osaka City (about two hours away by train). This move also reflects the split between laboratory research (in two different laboratories) and disability research (in a centre for independent living). I will describe these two fieldwork contexts in turn.

This thesis is based on a total of approximately twenty-one months of fieldwork. Fieldwork at the PC laboratory took place from January 2009 until November 2009, a span of eleven months. Fieldwork at Murakami laboratory took place from November 2009 until February 2010, a span of three months. Total laboratory fieldwork was therefore fourteen months. Fieldwork with disabled people at ILC took place from March 2010 until October 2010, approximately seven months.

Personal Trajectory and Background

The history of this project goes back to my undergraduate studies, which I started as a computer science major. I was enrolled in a work experience program called "co-op", and had the idea of doing one of my work terms overseas, preferably in a non-English speaking country. My university had a program for Japan. I applied into the program and was accepted to work at NTT (Nippon Telegraph and Telephone—the major Japanese telecommunications company) in a research and development position for six months. My work involved computational linguistics, programming a computer system to analyse a large corpus of Japanese-English translated text and automatically generate patterns that could be used for machine translation.

While I was in Japan, I also decided that I did not want to continue working in computer science and information technology. Since I was already mostly through my degree, I finished my last few courses, but I also decided to double major in anthropology.

While I found Japan interesting, I did not have a specific plan to return to Japan and I did not enrol in anthropology in order to get into the anthropology of Japan as such. Rather, I was interested in the intersection of psychology and anthropology and I enrolled in the Master's in Anthropology of Learning and Cognition the next year at LSE. During the year, I began formulating a research topic for the PhD. Because of my background, I was interested in the anthropology of science and technology. And since I already had some background in Japan, both from my work experience and from a few courses on culture and society that I took before I went, Japan seemed like a promising place to study technology. I discovered the developing discourse about social robots and the plan to use them for elderly care, and settled on that topic because I found it interesting.

Language

In preparation for my first co-op program in Japan, I took one or two undergraduate courses in the language. My language skills improved somewhat during my original six-month work exchange. After I returned I did not actively work on my language abilities. When I decided on my topic, I took a one-year course in Japanese offered through the Language Centre at LSE. Still, the language was a major difficulty for me during my fieldwork, especially at the beginning. In some ways, I was lucky that many at the laboratory spoke English, although the use of English also made me feel anxious and guilty about the progress of my Japanese language skills early in my fieldwork. The laboratory also hosted a language teacher who offered paid lessons to the non-Japanese researchers. I studied with her once or twice a week for most of my time at the laboratory. I also studied regularly and intensively on my own, especially vocabulary/*kanji* by aid of software flash cards. By the time I moved towards my fieldwork with disabled people, I was comfortable conducting all my fieldwork in Japanese and by the end of my fieldwork I could have regular conversations in Japanese.

Laboratory Fieldwork

The chapters focusing primarily on roboticists are based on fieldwork at a research institute and private corporation (which I will refer to as “PC”) in Kyoto prefecture, about one hour's commute from my original home stay, and fieldwork at a prestigious University's laboratory (“the University” or “Murakami” laboratory), about one hour commute from my residence in Osaka. While separate, these institutions have a strong and intimate relationship. In fact, many of the researchers I worked with hold positions at both locations.

These institutions are funded in a variety of ways. Grants for scientific research in Japan, if government funded, can come from either the Japanese Society for the Promotion of Science (JSPS)—

a funding body similar to the Research Councils of the UK or the NSF of the United States—or directly from an individual government Ministry (each of which has its own, inward-facing bureaucracy that is autonomous from the other Ministries). JSPS usually funds only individual scholars and, while it also sometimes makes contributions to smaller scientific laboratories, in the case of expensive and long-term projects, such as the full robot laboratory projects that I discuss in this thesis, it is generally from a Ministry that a laboratory directly receives its funding. When I was in the field, both laboratories held funding for (separate) fixed-term projects of five to six years' duration. Since these projects have since finished, the same laboratories may or may not be financed, organized, or even exist in the same way now.

In the first laboratory, the government-funded private corporation (PC), most of the funding for the projects I investigated came from the Ministry of Internal Affairs and Communication (MIC—*Sōmushō* in Japanese). The contemporary MIC is the result of the merger in 2001 of the Ministry of Home Affairs, the Ministry of Posts and Telecommunications, and the Management and Coordination Agency. According to its own website, MIC "has jurisdiction over various systems involved in the fundamental framework of the nation, including administrative organizations, the public service personnel system, local administration and finance, electoral systems, fire fighting and disaster prevention, information and communications, postal services, and other systems fundamental to economic and social activities" (MIC 2008). From the perspective of robotics, it is particularly MIC's focus on information and communication technology (ICT) that provides the impetus for their funding and involvement.

The second laboratory, the University laboratory, was funded through a program called Exploratory Research for Advanced Technology (ERATO), which was first set up in 1981 and substantially reworked in 2002. The prestigious ERATO supports a range of projects across many scientific fields as long as they are “substantial” and “innovative”. It operates under the umbrella of the Japan Science and Technology Agency (JST), established in 2003 after the merger of the Japan Science and Technology Corporation with the Ministry of Education, forming the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The purpose of JST is to support the development of basic science and technology in academia and business, and to facilitate technology and innovation transfer.

Access to the laboratory

I originally gained access to the PC laboratory through a friend from my co-op Japan program who put me in touch with a senior researcher and, after some negotiation between myself, my university, and the research institute, I was cleared to conduct fieldwork with an official categorization of “unpaid intern student”. My access to the Murakami laboratory came through my academic affiliation at a Japanese university.

My background in computer science clearly makes a difference for my fieldwork in certain ways. At the time I was organizing my fieldwork access, I felt that helping the laboratory with programming would be a way of “paying back” for the inconvenience caused by my presence. In this thinking, I was influenced, perhaps indirectly, by the discourse over the last few years within anthropology that has stressed the importance of such collaboration between anthropologist and informant. Still, the choice led to some uncomfortable situations because there was a tension between my own aims to continue with ethnographic research inside and outside the laboratory, especially after my intended stay had expired, while some researchers felt that I should be focusing less on such research and more on “real work”. Anna Tsing (2005: 246) has pointed out that the word “collaboration” has two meanings: the congenial and friendly working-together that scholars often value, but also the meaning of collaborating with an enemy in the time of war. In my experience, collaboration was not always neat and while there are certainly overlapping understandings—both roboticists and anthropologists are concerned with producing academic publications, for example—there were also differences in understanding—roboticists have a much shorter time-scale and most researchers at the laboratory seemed to not really understand how I could be doing research that I was not planning to publish for a number of years.

Still, I had relatively little restriction, officially, in the laboratory. In other words, there was little or no explicit instruction about what I could study.

But there were restrictions in more indirect ways that have a crucial bearing on my ethnography. As a young scholar, I was about the same age as many people in the laboratory who were similarly either students or recent graduates. I had the ability to do ethnography, to "hang out", with these people. In many ways, I am very similar to them. Many, predictably, have undergraduate degrees in computer science or other areas of engineering. They were, like me, in their twenties. And, also, they were predominately male. Being non-Japanese created some restrictions and some possibilities. On the one hand, access to unofficial "Japanese-only" meetings or discussions was more difficult: especially meetings of more senior Japanese managers. On the other hand, my "foreignness" made me more approachable to the many foreigners in the laboratory while also making me more unique, exotic, or interesting for some Japanese.

Overview of the Laboratory

During my time at each laboratory, I would attend every day during normal working hours. Originally, at the first laboratory (PC), I was also working (unpaid—officially categorised as an intern exchange student) as a computer programmer, based on my previous experience with an undergraduate degree in computer science. Shamefully, my coding skills had degenerated because of disuse and I was ineffective at the task. Part way through, my (laboratory) supervisor quietly stopped asking about my progress. From that time on, I mostly conducted fieldwork at my own discretion until my involvement with the project described in Chapter 6. Next, I conducted fieldwork at the University laboratory, where I was free to organise my own time.

The daily environment of these laboratories is much like any other office—researchers sit in front of their computers working on their own individual tasks (programming, writing papers, etc.). But, while the setting is a Japanese office, it is, in some ways, an unusual one. Most researchers, at both laboratories, are either students or recent graduates. They do not wear suits as one might expect of Japanese *salarymen*[6] but rather jeans and t-shirts. They are often appointed only for a short time, until they finish fixed contracts or graduate with their degree. These people do the low-level programming, designing, and testing. Even their supervisors, those who run the projects on a day-to-day basis, were often not older than 35, in part because of a high staff turnover.

While most are men, some of these researchers are women (perhaps one in eight, as a rough estimate). One woman researcher, Ishida-san, told me that women are more involved in social robots than in other areas of technology because women inherently have a better understanding of social situations than men and are therefore well suited to this kind of work. Still, in my experience, female researchers work on the same kinds of robots in the same kinds of ways as male researchers. While it is

6 The salaryman, although not necessarily reflecting an accurate image of the Japanese workforce, is a common trope for the "average" Japanese worker (Sugimoto 2010). The salaryman is a middle-aged male, employed in white-collar work and dressed in a generic dark navy suit each day. He was hired directly out of University and has since worked long hours at the same company for all his working career until retirement.

clear that the field is male-dominated, gender was not one of my primary research interests, though, as I have noted in an earlier section, it has been discussed by others (Robertson 2010a)

As I pointed out above, the laboratories are also very international. Many non-Japanese, from across Europe, the Americas, and Asia, work at the laboratories. PC has an extensive exchange program that brings new international students to the laboratory for internships every few months. After these students leave, following stays of between three and twelve months, a new batch replaces them. The university laboratory also has a large cohort of "foreigners". While a large portion of the foreigners were students, there were also more senior, long-time employees of the laboratory as well as temporary post-doctoral researchers from abroad. In my experience, robotics research (at least the academic and semi-academic kind) is heavily reliant on this collaboration with non-Japanese.

Still, most senior positions are occupied by older Japanese men. These men have final authority though not necessarily direct control over everything in the laboratory. They define a broad, non-specific, strategic vision, and periodically meet with their subordinates to survey their progress. This agenda is then implemented in various ways.

Because of the variance in nationality, ethnicity, experience, education, age and gender, the staff of a laboratory cannot be said to carry any one homogeneous vision. While most are Japanese, a substantial number are not. As I explained in the section on diversity above, "immigrants" are an important part of Japanese society. And I think this holds true for my own work, even if the "immigrants" I worked with do not fit the stereotype from the Japanese studies literature (i.e. poorly paid Asians in the so-called 3K work: *kiken*[dangerous], *kitanai*[dirty], *kitsui*[hard]) and are often (though not always) in the country for less than a year. The thesis should be read less as an ethnography of (ethnically) Japanese researchers and more an ethnography of researchers in Japan. Likewise, while Japanese is the predominant language, many of the Japanese researchers could also communicate well in English.

During the first eleven months of laboratory fieldwork, at the PC laboratory, my focus was on doing ethnography through participant observation, examining the daily work that researchers did on their projects. I would talk informally and serendipitously with the researchers, as a regular (if unusual) member of the laboratory, over coffee breaks, lunch time, and so on. I also, where possible, observed roboticists working with the robots, debugging, testing, running experiments, attending meetings, running project field trials, and demonstrating prototype systems to the public. As this fieldwork was coming to a close, I felt there was a selection bias, since such a method tends to favour those with both the will and the ability to start up a conversation with a colleague like me. Senior researchers, who are busy and have their own offices, are not usually present during such informal conversations. I therefore explicitly set times to interview them, and the scheduling of these interviews was handled in a formal manner through their secretaries, with fixed lengths (usually about one hour). I also interviewed more junior academic researchers and post-doctorate fellows, who may also be busy though more flexible in their scheduling and less formal in an interview. I recorded the contents of these interviews in handwritten notes during the interview. Still, I tried to minimise the amount of interviewing I did, especially at the beginning, because many of my friends and informants told me explicitly that when other anthropologists and social scientists (who sometimes came to the laboratory for short-term projects) interviewed them, they felt uncomfortable and self-conscious in their answers, especially when video or audio recordings were made. In fact, they sometimes asked me to give them the answers that they should in turn give to the other anthropologist, a request that both concerned and amused me.

While it was relatively easy to develop a rapport with younger researchers, because they were similar to myself, older researchers, such as university professors, were much more difficult for me to approach. For them, I was a student much like any other. Here my experience contrasts especially with senior anthropologists and social scientists who have studied other groups of people who are similar to those at the laboratory. Hannerz (2004), for example, discusses his interviews with senior foreign correspondents and notes that he was able to develop a rapport with them because of his similar experiences in the world and his ability to remember important events and people. My impression, therefore, is that Hannerz shares a status group with these older (and sometimes retired) foreign correspondents. I believe, therefore, that Hannerz would have a much different experience in my field site. On the one hand, he would likely have much better access to the more senior members of the laboratory. On the other hand, he would likely intimidate the more junior members. Sedgwick's (2007) ethnography of a Japanese organization in France likewise seems to reflect this trend, as his primary informants seem to be those mid-to-senior managers who were of comparable status and age to himself.

Of course, this does not mean that senior researchers were off-limits to me. Rather, increasingly it became clear that I would need to supplement my participant-observation data with interviews, and some of these interviews occurred after my original participant observation at the laboratory was concluded. Such interviews made up a fairly small portion of my overall time yet nevertheless have become an important part of my account. I will discuss this issue further below.

Even if someone was not busy, in my experience, many Japanese students and researchers were shy or reticent, likely in part because I was “foreign” (i.e. white) and they felt compelled to try to speak English. For this reason, at the second University laboratory, my (Japanese) wife suggested to me that I might receive more elaborate answers to my questions if I distributed an open-ended survey (in Japanese), because she said that these Japanese might feel more comfortable replying in writing. I followed this advice, giving the survey to ten people in the University laboratory. I received responses from six, and the results were informative. My aim was not to codify these surveys but instead use them in the same way as verbal questioning, as open-ended answers that expressed the person's thoughts and feelings.

One final point relates to academic papers. Most roboticists I worked with were involved in academia in some way, and frequently wrote papers for journals and conferences. During fieldwork, I would sometimes read such papers either because I was asked to check and edit the English or because someone thought that a question I had asked would be most thoroughly (and easily) answered if I just read their paper. In writing this thesis, I was somewhat torn on whether I should explicitly draw on and cite papers from the laboratories where I worked. On the one hand, I felt such citation had the advantage of more fully representing the views of roboticists in their own words while also giving them due citation for their published work. On the other hand, citing their papers would mean that I could not use pseudonyms, for obvious reasons. In the end, I chose not to cite their papers, and to make everyone anonymous through the use of pseudonyms. Still, the reading of these papers should be understood as informing the fieldwork experience. At this point, I will also mention that I have given pseudonyms to some of the main robots I discuss because the names of those robots are readily identifiable with the people who made them.

Technology and Care in the Wild: Fieldwork with Disabled People

While identifying the laboratory as the first concrete location for fieldwork was (relatively) straightforward, identifying a suitable context to study consumption was more contentious. At the outset of the project, my aim and hope was to work with social robots in the use of care. After my work in the laboratory, it became clear that such fieldwork was not an option because the technology is not advanced enough to see widespread use and there was no context I could investigate over a sufficiently long period to constitute proper ethnographic fieldwork.

Although the definition of social robot developed earlier reinforces the idea that all robots are humanoid agents that act on their own, much like a person or an animal, the meaning of “robot” is a matter of contention. While, for example, *Webster's Dictionary* defines a robot as “an automatic device that performs functions normally ascribed to humans or a machine in the form of a human”, the Robotics Institute of America defines a robot much more broadly as “a reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks” (Hunt 1983: 7). But both these definitions show the importance of “functions” and “devices”. In other words, these definitions highlight that robots are essentially machines. As such, I looked to continue developing the same research themes in a different context by expanding the range of human-machine relations that I would consider. This meant exploring people's relationships to care, assistance, aid, independence, and technology in other kinds of ways.

Following this reasoning, in combination with the unpredictable serendipity of actual life in the field, I came to do fieldwork with disabled people (primarily those with mobility impairments who made use of wheelchairs) at a centre for independent living (CIL) in South Osaka (which, to reiterate, I call ILC). These disabled people were either staff or frequent visitors at ILC. I will describe the concept of a centre for independent living in more depth in Chapter 3 and especially in Chapter 4, but briefly an independent living centre is an organisation run by disabled people in order to help other disabled people in the community live independently. Living independently is an alternative to the two other options generally available for (severely) disabled people: living in an institution or living with parents. The director of ILC is a man I call Uchiyama-san, and, as we will see, the fact that it is run by disabled people is an important part of its political and organisational logic. Many disabled people would attend ILC daily. The main “service” they received as “consumers” was the use of personal attendants, helpers, who would be scheduled each evening (and in the day, if needed, though frequently they were at the centre and did not need a full-time personal attendant during that time) to assist them in their home with such day-to-day tasks as washing, cleaning, moving in and out of their wheelchair, and so on.

Access to the Centre for Independent Living

Because of the genealogy of this project, I had no specific plans to study disabled people at the beginning of my fieldwork. Rather, my fieldwork in the independent living centre was serendipitous. I was searching for a place to do ethnography and my Japanese wife suggested that she could put me in contact with her best friend from childhood, a disabled woman who worked at the centre. After my wife contacted her friend, the three of us met and I discussed my interests in technology and care. She introduced me to the director and the others at the centre, and the director granted me permission to conduct research. He did not make any specific restrictions on my fieldwork.

As I have indicated above, people with disabilities are often the intended users of new robots, including social robots. Still no social robots are used by the people at ILC (although, on a return visit about 10 months after my main fieldwork, I noticed that they had acquired a robot vacuum cleaner). But they do make use of many kinds of “barrier-free” (*bariafurii*) objects, tools and machines, most noticeably wheelchairs. Wheelchairs are unlike social robots insofar as people do not talk to their wheelchairs (at least that I saw) nor keep them as “friends”. But disabled people, like my informants, rely on wheelchairs and spend all their time in them. Compared to computers or cellphones, which some may argue have become necessary to the modern urbanite in a metaphorical sense and have even become sources of intimacy (Bray 2008), wheelchairs are more pressingly needed by their users and in this sense more fully integrated into their users' lives—they are more intimate.

Further, the employment of helpers—personal attendants that assist disabled people with daily tasks—was also a focus of my attention in fieldwork because the role of helpers is close to the intended role of advanced social robots. A great deal of the interest in social robots is focused on designing devices that are flexible and can facilitate independent living for those requiring care, abilities that helpers already possess and employ. Further, in keeping with the theme of a *social* robot, helpers are very socially involved, in a way that is unremarkable for a human, of course, but would be a major feat for a robot. For instance, they talk, joke, laugh, argue, "hang out", etc. If robots are going to be used in such a role, then it is worthwhile to examine how this role is currently filled by people. This is not the kind of research that is done by roboticists, who, I found, usually see their work strictly confined to developing and testing robots in limited contexts.

During this phase of my fieldwork, I attended the centre four or five times a week during day-time hours over a period of approximately six months. My main field site was at a place I call "TOP" (*take-off point*). ILC itself is set up as an office. As mentioned, the centre is staffed by both disabled and able-bodied staff. On the one hand, the office is very informal and people often sit around a large central table chatting and joking while they work. On the other hand, it is still a place of business and people can often be quite busy. For this reason, the staff at ILC suggested that it would probably be better to have my main site at TOP, a service provided to local disabled people that acts something like a small community centre. Severely disabled people who cannot work regular jobs, but nevertheless live independently, come to this centre during the day in order to engage in a variety of leisure activities and community projects with other members (hence they do not need individual helpers at this time, and instead a few helpers are assigned to TOP each day to assist everyone there). I would usually visit the main ILC office a few times a week to check in, but the bulk of my ethnographic fieldwork was spent during the day at TOP. As a rough estimate, ILC would usually have about ten to fifteen staff at the office on any particular day, while TOP would have ten or so disabled people (who were all in wheelchairs). But people often came and went freely, so these numbers fluctuate not just day to day, but minute to minute. At TOP especially, I was relatively free to interact with people, talk with them informally and ask questions, as well as both observe and participate in daily activities. I also participated in various “field trips”, such as a visit to the Osaka Aquarium, a visit to a large swimming pool and water park, a visit to a local bowling alley and video game arcade, and a visit to a shopping mall. I also participated in a variety of social events organized by ILC and/or TOP, such as summer *matsuri* (festival), evening *takoyaki* (fried octopus dumpling—a food associated with Osaka and Kansai) parties, weekend picnics/barbeques as the local park, educational seminars, an “encouragement meeting” to honour the hard-work of employees, etc. Individual members would also sometimes invite me to do things such as go drinking, go to a baseball game, and so on. Further, some individuals invited me to visit their homes, an experience I draw on extensively in Chapter 4. Finally, some time after my original fieldwork and during the process of writing up the thesis, I conducted a few final interviews with my main informants to fill out any missing portions of my ethnography.

Methods and Problems of (Re)Presentation

Since this thesis has two separate fieldwork sites, and these sites are quite different, there are a number of issues of presentation and representation. In particular, the robotics laboratory was an environment familiar to me, from my past studies, while my engagement with disability was completely fresh and new. Further, the kinds of people in each site were quite different: busy researchers for whom I was much like themselves, and relatively idle disabled people for whom I held novelty interest.

Ethnography of the Known

With my own “technical background”, there is the question of how to represent familiar technical practices. Riles (2001), Strathern (2004), and Marcus (2009) have discussed the difficulties posed to ethnographers when they try to describe familiar bureaucratic, technical, and “boring” practices. This is what Riles calls the ethnography of the “already known” (Riles 2001). While for some readers the laboratory may seem quite exotic and unusual, my own experience of it was much more mundane; these are much like many people I have known throughout my own academic and professional life.

In Latour and Woolgar's seminal ethnography *Laboratory Life*, they describe their strategy of separating “etic” and the “emic” accounts so as not to submit to the account given by scientists themselves (Latour & Woolgar 1986: 38–39). The rhetorical backbone of this strategy is the trope of the “tribe”: as such they write “Our anthropological observer is thus confronted with a strange tribe who spend the greatest part of their day coding, marking, altering, correcting, reading, and writing” (Latour & Woolgar 1986: 49). In other words, they cast scientists as a “tribe” in order to analyse scientific practice as they see it and not as they know it. Still, in my experience, using this “exotic” and “tribal” metaphor was difficult to employ in practice. Partly this is because I am uncomfortable with the “tribe” trope as somehow quintessentially anthropological, and partly because there is an inherent contradiction between casting scientists' work as “strange” while also trying to give an ethnographic account that makes sense of their world.

Compounding this issue is one of presentation and data. This ethnography arises, in the first instance, from long-term participant observation. As such, my main findings and observations arose gradually over time through the reiterative process of participant-observation fieldwork. And, yet, a question of evidence becomes pressing in such processes. Bloch (1991) has noted that often anthropologists develop their main findings in exactly this way but then seek, nearing the ending of their fieldwork, to elicit the linguistic evidence to support their positions. A similar process occurred in my own fieldwork, where I found myself, at the end of my fieldwork (or even after my fieldwork was officially completed) returning to interview key persons in order to elicit the vivid linguistic accounts that fit easier into the textual, narrative form of an ethnography. Since many of the more high-profile robotics researchers are media figures and quite accustomed to being interviewed, their answers often gave the impression that they had developed nuanced and "interesting" answers to a variety of standard interview questions—often answers of a more "exotic" bent. Since this distinction between discourse and everyday, non-linguistic knowledge is quite common, Bloch cautions us from making too much of what people say. But a further point which I want to make is that when the ethnography uses such discourses (from interviews) to further its argument, the illusion is that the analysis proceeds from the interviews in the first instance. As Law argues (2004), these are some of the limits of our own metaphysical preoccupations within the social sciences; our discussions of scientific methods are often incongruent with the practice of scientific methods. I want to stress, therefore, that when I present the more "exotic" words of roboticists, such as their musings on the relationship between animism and robots, I do not necessarily take what they say at face value. Still, it also means that I give them the benefit of the doubt to explain their own perspective. My position, therefore, could be described as agnostic.

Ethnography of the Unknown

While my view of technical practice and laboratory life may have been overdetermined from the beginning, I had little knowledge of disability (in Japan and more generally) and therefore, subjectively, I found the disability portion of my research quite different. Early in my fieldwork at the centre, I recorded in my notes that I finally felt like I was doing “real ethnography”. Although not intentional or planned, this has influenced the way I have described this portion of my ethnography because everything was so new. This may have resulted in a more traditional “thick” ethnography. In many ways, I also think that disabled people are more similar to the usual people studied by anthropologists—relatively marginalized subalterns—meaning that they fit more closely with accepted standards of what ethnographic subjects “should be” and therefore what ethnographic writing “should be”. Further, they are also very open and willing to tell their stories. In fact, I believe they often wanted to tell me their stories. Of course, this makes collecting ethnography with them much easier.

Another practical difference was that my language skills had improved. Especially near the beginning of my laboratory fieldwork, I spoke mostly English. Even later into my research, as I improved my Japanese, many roboticists still *wanted* to speak English. Nevertheless, the ability to communicate in Japanese obviously makes it easier to develop in-depth relationships with Japanese people. Another difference is that the disabled people, for the most part, were not working, unlike the people in the labs where I studied. This meant that they were more available to talk. I was also less reticent to approach them because there was little chance that I would be disturbing them.

Further, not only was the laboratory more “known” to me than the disabled centre, but the researchers at the laboratory were more familiar with people like me than those at the disabled centre. As such, I was more interesting for the people at the disabled centre than for those at the laboratory. At the laboratory, I was, perhaps, another “boring” cosmopolitan western researcher (albeit in a slightly unusual field). Conversely, I was the only non-Asian person at the disabled centre and therefore something of an “attraction”. As it will be clear in later chapters, many were quite enthusiastic to interact with me.

Multi-sited, Fragmentary, and Un-Sited Ethnography

These issues of presentation reflect more general issues of multi-sited ethnography. The multi-sited approach simultaneously opens up some methodological practices while foreclosing others. Meanwhile, the multi-variegated nature of the fieldwork makes the idiosyncrasies of any single site highly visible. Further, these issues may be exacerbated in my own case because the connections between the field-sites are in some ways unclear.

At the outset, this project is stylized as *de facto* multi-sited. In combining an analysis of production and consumption, this project posits two different field-sites. It corresponds to Marcus' (1995) concept of multi-sited ethnography insofar as he argues that anthropologists have increasingly had to deal with global flows that cannot be contained in any single site. He argues that extending ethnography beyond a single locality allows us to draw new connections, in particular by relating local sites to global systems. While this thesis was not developed to fit with Marcus' concept of multi-sited ethnography as such, it clearly bears discussing.

In implementing such a multi-sited approach, my ethnography has struggled with its own omissions and limits. Indeed, recent critiques of Marcus' concept of multi-sited ethnography have attended to these issues in particular. At least from the perspective of the initial project, my time spent with disabled people meant that I could not spend more time in the laboratory. Since it takes a long time to develop the intimate human relationships that often lead to "thick" ethnography, this is a practical problem for any multi-sited ethnography (Hage 2005). Although I spent fourteen months in the laboratory, it is possible that, if I had remained there for the last few months of my fieldwork, my laboratory ethnography would have been improved greatly. This general problem of multi-sited fieldwork is what Candea terms the "tyranny of choice" (Candea 2010). As Candea describes it, the very possibilities opened up by multi-sited ethnography made him feel uneasy about what should be included within the ethnography. Since there are practical limits (such as time) for any individual ethnographer, following one "thread" often means that a different interesting "thread" cannot be followed.

In my own work, this problem extends insofar as the "boundaries" on my fieldwork had to be redrawn in ways that I did not expect. Without any knowledge of disability studies, it was difficult to understand the significance of many small parts of disability politics as they were expressed at the centre. But, without any boundaries on fieldwork, it is difficult to maintain any measure of coherence. Candea argues that these problems are generated by a latent holism within the multi-sited ethnography concept. By incorporating multiple sites, anthropologists assume they can study a "whole". But this, he says, is impossible.

Candea (2007, 2010), therefore, proposes "arbitrary" boundaries to be imposed by the anthropologist, boundaries that the anthropologist is responsible for self-consciously creating. In retrospect, rather than assuming I could study production and consumption together and capture a "holistic" picture of social robots, or perhaps technology and care, should I not have been more "ascetic" (in Candea's terms)? Indeed, the notion that my fieldwork forms any kind of holistic account is difficult to sustain. Rather, as I develop my argument, it centres, at least in part, on messiness and contingency. Such messiness is found in the very spaces of "universals" (Tsing 2005)—science and technology, human rights.

For Tsing (2005), the universals of global connections are being produced in "friction" and the messiness of these connections challenges the model of a clear, homogeneous globalization. Her methodology is therefore to employ an ethnography of "fragments". Tsing (2005: 271) writes that she uses "ethnographic fragments to interrupt stories of a unified and successful regime of global self-management". In this thesis, I use a similar approach to examine a certain kind of "collaboration", between roboticists scientists and disabled people, to show how "such collaborations bring misunderstandings into the core of alliance [and in] the process, they make wide-ranging links possible: they are the stuff of global ties. They are also the stuff of emergent politics: they make new objects and agents possible" (Tsing 2005: 247).

Still, what boundaries should we draw when we develop such an ethnography of fragments? Candea proposes the concept of "arbitrariness" but I am uncomfortable with it. Candea seems to simultaneously suggest that the anthropologist make arbitrary choices but also take responsibility for those choices, but I fail to see how one can take meaningful responsibility for a choice they made arbitrarily. In my ethnography, I have constructed my sites not to capture a "whole" nor to be "arbitrary", but rather to *design* the field-site to fit my analytic and theoretical interests. In this, my ethnography fits arguments recently made by Cook, Laidlaw, and Mair (2009). Like them, my "field" is decoupled from one specific space/place of fieldwork. Rather, the "field" is a research construct. My boundaries are drawn to introduce interesting comparisons and contrasts (for example, between production and consumption) and to generate new kind of insights. As such, following the terms developed by Cook, Laidlaw, and Mair (2009) this project may be better understood not as a "multi-sited ethnography" but rather as an "un-sited ethnography". In such a construct, a valid anthropological "field" does not need to correspond to a specific physical location or entity as such but is, instead, a concept crafted for the purposes of a project of research.

One way of re-conceptualizing the field is perhaps Tsing's trope of a "frontier". Tsing defines a frontier as:

> a space of desire: it calls; it appears to create its own demands; once glimpsed, one cannot but explore and exploit it. Frontiers have their own technologies of space and time: Their

> emptiness is expansive, spreading across the land; they draw the quick, erratic temporality of rumor, speculation, and cycles of boom and bust, encouraging ever-intensifying forms of resourcefulness (Tsing 2005: 32).

This ethnography explores the frontiers of social robot research and the frontiers of disability politics. It is in this "un-sited field", a field in many overlapping but distinct frontiers, that this thesis ultimately must be understood. Even if all the fieldwork was at one laboratory, the movement of people, cycling of projects, and other issues of incompleteness, partiality, and fragmentation would still be important. As such, while the two sites make these issues increasingly visible, they are issues that would still need to be addressed in a single-sited ethnography. The value, in part, of multi-sited fieldwork has been to bring these methodological problems to the foreground.

Chapter Outline: Constructing an Ethnography of Social Robots and Disability

Having laid out the analytical and methodological issues, this section provides a summary of the main body of the thesis. My aim in this dissertation is to first describe the two different fieldwork contexts in two independent ethnographic accounts. The first four chapters, two for each field site, give this general ethnographic account. After the basics of these two accounts have been laid out, the remaining chapter of the thesis asks how the perspectives of roboticists, on the one hand, and disabled people at the ILC, on the other hand, can be usefully compared.

Section 1 gives an account of social robot laboratories. In addressing roboticists, my main questions are: what are roboticists trying to do? and how are they trying to do it? Chapter 1 focuses on the reasons, motivations and purposes for making social robots. In other words, this chapter discusses the *rationales* of roboticists for making social robots. Chapter 2 focuses on the practice of social robot research. In particular, this chapter examines problem-solving through the vehicle of one specific project, a network robot system designed to be used in, for example, a shopping mall. It discusses the kinds of (technical) problems that roboticist face in their research and how they conceive of these problems, which I come to term their *problematization*.

Section 2 turns to the disabled people at the centre. My questions are first, "what is the daily life of a disabled person like?" and second "what is a centre for independent living and what is it meant to do?" The first question I attempt to answer in Chapter 3 with a detailed account of one individual , Ato-san, and his barrier-free lifestyle. This chapter focuses on Ato-san's daily life, his routine, the tools and technology that he employs, and the way he interacts with the world through his own unique body. The chapter concludes by introducing the politics of barriers, and Chapter 4 continues this focus on disability politics, first giving a general overview of the ILC and its operations, before exploring its basis in disability movements both international and domestic.

In the final chapter, I examine an intersections of robots and disability that occurred in my fieldwork. I draw on the perspectives of disabled activists and scholars, informed through my ethnography at the ILC, in order to critically engage with the ways that humans and their abilities are conceived by roboticists. I describe a project designed to aid elderly people with dementia, a project that took place just before I left the PC laboratory, in order to discuss the ways that disability as a "problem" is approached in their work.

In the conclusion, I return to the analytical issues of production/consumption, disability, and the global nature of my field (*vis-à-vis* Japanese "specificity"), before finishing with some reflections about the ongoing concern with "problems" and the "problem of problems" that develops throughout this thesis.

Section 1: Production in the Laboratory

Chapter 1: Engineering, Science, and Coolness: The Rationales of Social Robot Research in Japan

Introduction

Early in my fieldwork at the PC laboratory, I was eating lunch with three researchers: Mark, an American researcher in his thirties who had been in Japan for a number of years, along with two French internship students, Benjamin and Luc, on temporary exchange for six months (later extended to a year). The restaurant served a local Osaka dish called *okonomiyaki*, a dish which many Osakan people, Osaka being the “the kitchen of Japan” *(nihon no daidokoro*), consider to be one of their city's main specialities. *Okonomiyaki* is a thick kind of “pancake”, mixed with cabbage, and often topped in either pork or squid, a sweet brown sauce, mayonnaise, *nori* (a type of edible seaweed), *katsuobushi* (dried skipjack tuna flakes), and perhaps other things. Okonomiyaki, in fact, literally means “grill what you like.” As is common at *okonomiyaki* restaurants, we were seated at a stove-top table and the *okonomiyaki* was made in front of us. The staff came with a bowl of ingredients, spread it out on the stove-top, applying the toppings and sauces as well as flipping the *okonomiyaki*. As we were waiting for our food, Mark asked if we were all thinking what he was thinking. The rest of us had no idea what he was talking about. He answered that of course he was thinking about how to make a robot that could make *okonomiyaki.* He thought that would be a really interesting project. Benjamin and Luc started laughing, and said that they were not thinking about that because “We are not GEEKS!” Mark took it in his stride, still convinced that an *okonomiyaki* robot would be a fascinating project. As it happens, I later learned from another Japanese researcher, Yamashita-san, that the company where he was previously employed had indeed made a robot that makes *okonomiyaki*. I asked him if it was being used in any actual restaurants. He replied that he thought not, but explained that they never intended it to be an actual product but rather an interesting project to showcase their technological prowess, spark new innovation, and also make a playful nod to their own Osakan heritage. As a fairly small manufacturer in East Osaka, a highly visible and unique robot is excellent advertising for their more mundane and non-glamorous products.

This short vignette captures some of the reasons and motivations, or rather what I will call *rationales*, that robot researchers in Japan use to make sense of their work to both themselves and to others. Reasons, motivations, and rationales can, of course, be quite idiosyncratic, depending heavily on the individual. But, in the case of social robot research, there are also some common patterns. The first is that social robots, as tools and machines, are often intended to be useful to people by fulfilling a pragmatic function (such as making *okonomiyaki*), and this is one reason for their development. The second is that social and/or humanoid robots can improve scientific knowledge by contributing to fields such as psychology and cognitive science. Researchers believe that by implementing psychological, cognitive, and neurological models into robots, they can test those models and ultimately develop better scientific theories through the development of their systems. Some researchers also believe that human-like robots provide a uniquely powerful platform for psychological experimentation, allowing researchers to test very precisely how people respond subconsciously to subtle variations in behaviour. The third very common reason that roboticists give for their work is simply their desire to make "cool" things, their desire to construct robots that spark wonder and delight. They are fascinated by technical problems, particularly the problem of making a human-like robot, and the prospect of a machine that has a mind, has a heart, and seems alive is so "cool" that it is reason enough for their work. These three reasons and motivations I intend to describe with roughly equal weight and I do not list them in this order to imply any ranking of degrees of importance. For the sake of both brevity and clarity, I am going to refer to these reasons and motivations as three kinds of *rationales*[7]: *the rationale of engineering*, *the rationale of science*, and *the rationale of coolness*.

After discussing the three rationales, this chapter will conclude by examining the social context of power entailed in these rationales. Despite the personal feelings of any individual researcher, they must balance all three rationales because multiple representations are necessary to sustain a project (Latour 1996; Mosse 2005). Therefore, the design and/or use of a single robot usually engages with different rationales at the same time.

The exploration of these three rationales, of engineering, of science, of coolness, will hopefully shed light on why Mark might think an *okonomiyaki* robot is a good idea and why the French interns might have laughed, why other roboticists in Japan did make such a robot and what it might mean when this robot is demonstrated at a trade show and appears in the New York Times (Daly 2010).

The "Typical" Japanese Organization

Before discussing the main issues of this chapter, it is useful to place the laboratory in relation to the "typical" Japanese organization, as it has been discursively constructed in the literature. As the most highly developed non-Western nation-state, the production economy in Japan has been of interest to Western scholars and commentators.

Seminal works on Japanese companies include Dore (1973) and Rohlen (1974). These detailed and meticulous studies focused attention on the social and cultural aspects of Japanese production.

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7 In some places, the word motivation could work just as well and perhaps even better. For example, we could say that the desire to make useful machines is many roboticist's motivation for making social robots. But I have chosen to primarily use the word rationale because, on the one hand, it can usually be used to capture this sense of the term motivation and, on the other hand, rationale does not carry the baggage of psychologism that is arguably present in the word motivation. For example, a researcher could be motivated to go into social robot research because he was accepted into a prestigious graduate school by a renowned professor and he chose this option over having to enter the workforce. The word rationale, in contrast, stresses the fact that the reasons roboticists give are interrelated, organized, and systematic. I have therefore chosen this term and tried to stay consistent.

Arising out of this work has been a focus on a number of "unique" aspects of the Japanese production system: the life-time employment system, seniority-based remuneration, worker commitment and organizational "harmony", and enterprise unionism. For example, Dore notes that "Hitachi [the name of the Japanese factory] is reasonably typical: the features which make up what we shall call the 'Japanese system' – low labour turnover, wages determined more by seniority than by function, enterprise unions, high levels of welfare payments – are generally shared by all Japanese large corporations" (Dore 1973: 103 emphasis in the original). It is worth noting the Dore refers specifically to *large* corporations, as Roberson (1998) has argued that the literature since that time has had a bias towards discussing the large firm. Likewise, the prototypical worker seems to be a white-collar male "salaryman", although blue-collar workers have also received some attention (Cole 1973; Roberson 1998). While some have pointed out that "salarayman" stereotype does not accurately reflect the average worker in Japan, it remains the dominant imagery (Roberson 1998; Sugimoto 2010).

One aspect of the production system in Japan that has received a great deal of attention, starting with Abegglen's (1958) early study, is the so-called lifetime employment system. Male workers join a (large) company directly out of university or college, with little expectations made of their current skills or experience, and the company trains them. They expect to stay with that same company for their entire career. While mobility does exist, it is inversely proportional to status. Women are expected to quit upon getting married, while young people at the beginning of their career are relatively more likely to change jobs than mid-career workers with developed skills. Further, those that are educated are more likely to stay with one company than those who are less educated (Clark 1979). As noted, the lifetime employment system has been portrayed as one key part of an integrated employment system that includes enterprise unionism, seniority-based pay, and worker commitment. These parts interlock such that they produce a tight-knit community, and the workplace becomes the primary site of identification for the working Japanese male. The Japanese company has been seen as a “family”, and even analysed on the basis of structural-functional kinship theory (Nakane 1970).

Science and technology, including research & development (R&D), has also had a particular trajectory in Japan that distinguishes it from many other industrialised countries. Japan has historically had quite low enrolment in graduate school. Under the “traditional” employment system, it was generally more advantageous for a promising young university graduate to enter the employment system quickly and directly (Low et al. 1999: 26). Delaying entrance to the work force by going to graduate school for extended periods could seriously damage a young person's work prospects, especially if they did not enter the work force before the age of 25.

Rather than academia, science and technology has been highly centred in private corporations, while the country has often been portrayed as “free-riding” off the basic science done in Western countries (Low et al. 1999). Inevitably, the comparison is with the United States and its well developed university system, which receives a great deal of public funding. In contrast, basic research has been underfunded in Japan, and Japan has been characterized by a penchant for applied and practical technology. Rather than generate innovative science and technology in the publicly funded university, Japan has been said to import the basic scientific research done elsewhere while the vast majority of R&D spending has occurred in private laboratories. This corporate R&D has mainly focused on tweaking and streamlining technology from elsewhere (Edgington 2008: 2; Low et al. 1999: 11–34).

Shifts in Japanese Production

While the sketch of the traditional organization is still important, it is useful to consider the ways that Japanese organizations could be changing in recent times. Historically, many of the influential studies of Japanese production have focused on factories and industrial production, but one change within the Japanese production system, occurring over the last 20 years, has been a movement away from manufacturing. Due to both the long recession and increased economic pressure in an “age of globalization”, a great deal of Japanese manufacturing has been moved overseas. Not only has this disrupted traditional supply chains within Japan, which have been generally portrayed as very tight, it has also opened the economy to new forms of production. In this sense, there has been a policy and production shift towards the so-called knowledge economy, of which the laboratories discussed in this thesis are clearly a part. As we will see, related to this change in economic production are potential changes in employment and organizational practice.

Japan, including the Japanese government policy makers, has been under pressure to change their “traditional” production system in a way that better fits with (supposed) current realities. For example, in the pursuit of “innovation”, there has been pressure to open up “mobility” within Japanese science and technology research (Jackson & Debroux 2008). Low mobility is one of the main sources of Japan's supposed “drawbacks in innovation” compared to Western economies (Edgington 2008: 2). The thinking is that talented Japanese researchers need the freedom to be creative and “innovative”, which means, for example, shorter fixed-length contracts. Likewise, salary based more heavily on productivity and results, instead of seniority, has been a feature of this new incentive-based production economy.

Such changes in policy are reflected in the following passage from the 2003 MEXT (Ministry of Education, Culture, Sports, Science and Technology) White Paper on Science and Technology:

> *Japan's research community is said to have less mobility than Europe or North America. A research community with low mobility makes it difficult for a creative researcher to move to better compensation and a better environment suited to the person's results and aptitude, and therefore impedes demonstration of the researcher's creativity. Moreover, improved*

> *mobility is considered to be important for securing a wide-ranging education for researchers. Furthermore, with the increasing emphasis seen in recent years on interdisciplinary science and technology, much new knowledge appears to be arising from interaction between diverse opinions and diverse specialities. Improved mobility, then, can be considered essential for improving the vitality of research organizations by bringing together human resources from diverse backgrounds.* (MEXT 2003)

Likewise, the government has also worked to facilitate cooperation between academia and business. In many ways this movement has resulted in a radical transformation of the university system in Japan (Edgington 2008; Holroyd 2008; Jackson & Debroux 2008: 256; Woolgar 2007). In fact, until fairly recently, professors were barred from working for or contracting with private corporations and also were not allowed to sit on corporate boards of directors. Recent policy and legal changes have attempted to foster the productive interaction between private corporations and Japanese academia by deregulating the university system and trying to encourage university researchers to become more entrepreneurial. For example, over the last 10 years, Japanese policy has attempted to encourage more university spin-offs (USO), in light of a perceived comparative disadvantage to the "Silicon Valley model" of innovation found in the United States (Debroux 2008).

Further, as part of the "internationalisation" (*kokusaika*) project that has been occurring in Japan over the last 30 years, the Japanese state has also sought to "internationalize" science and technology (Barker 1998). Barker (1998: 82) highlights, in particular, that the Japanese state has focused on "foreign participation in domestic R&D programs; encouraging international researcher mobility; improving access to the results of Japanese science and technology; participating in world-wide activities; and, promoting specific collaboration programs." And collaboration with international researchers and international institutions has been, for the most part, endorsed by academically minded scientists (Low et al. 1999: 30). The Japanese researchers discussed in this thesis were highly involved in international research through their collaboration with foreign researchers both in Japan and abroad. As with other changes, the extent and effectiveness of these efforts is up for debate. Nevertheless, as a policy reality and as a discourse, internationalisation has contributed to the environment of the laboratories under study. Part of the allure of "internationalisation", from the perspective of science and technology policy makers, is the chance to get young researchers (both domestic and foreign) to stay in Japan. Such researchers, in other words, are seen as a potential resource, and the laboratories have responded to both pragmatic and ideological needs to include a higher number of international researchers (especially younger international researchers such as graduate students).

Is the PC Laboratory "unique"?

In relation to the stereotype of the traditional Japanese organization, the laboratories discussed in this thesis seem quite unusual for a few interrelated reasons. Unlike the lifetime employment system, there was quite high turnover in the PC laboratory. According to PC, 74% of its researchers are contract workers, 12% are on loan from other institutions, and 14% are permanent employees. In other words, the vast majority of PC's researchers will only work there temporarily. And yet these are highly educated individuals. They do not fit neatly with the historical trend whereby it is primarily low status workers who change jobs. Further, as the opening vignette makes clear, the laboratories also had a comparatively high international make-up. According to PC, a full 20% of the researchers are international, a substantial number for a country that is often portrayed as homogeneously Japanese.

Still, when considered in the context of recent changes to Japanese organizations, especially those involved with science and technology research, some of these seemingly unique features of the PC laboratory make more sense. As we have seen, high turnover and an international make-up coincide with specific industrial policies relating to science and technology.

While the Murakami laboratory, as part of a university, is obviously academic, the PC laboratory also sits at the nexus between academia and business. Senior researchers at PC laboratory were often full university professors who were simultaneously involved in multiple spin-off projects, companies, and schemes. They pressured their subordinates to produce both academic publications and industrial patents. Still, according to my findings, many researchers explained that their primary motivation was to do fundamental scientific research, and we can interpret this not only as personal inclination but also as a choice that embraces an arguably "new", "enlightened", and/or "internationalized" Japan at the expense of a (potentially faltering) "traditional", "rigid", "conformist" Japan. The tension between these impulses forms the backdrop for the discussions of various rationales in this chapter.

The laboratories had a much difference "feel" from a traditional Japanese organization. For example, unlike the strong feeling of community that is often cultivated in the traditional Japanese organization, the laboratories had relatively weak social links and relatively low levels of community. After-work drinking sessions, which are widely considered to be important parts of the Japanese work system, were almost non-existent at the laboratory. In fact, in my experience, such drinking sessions were more common among the international researchers than the Japanese researchers.

My aim in these sections has been to show that, while seemingly unusual, the laboratories discussed in this thesis also need to be seen in light of the fact that the "traditional" Japanese corporation has been responding to new political, economic, social, ideological, and policy changes. Still, predicting whether the "traditional" practices of the Japanese company will completely give way to new forms of (possibly Western-styled) organization is not my primary concern here. As such, I want to be clear that my aim is not to cast value judgement on where Japan has been and where it is now, nor to give advice on what Japan “must” do. Rather, I describe these potential changes, and the discursive space they inhabit, as the “assemblage” (Law 2004) in which the laboratories should be understood. In other words, these laboratories have complex relationships with both the traditional and stereotyped “employment system” and the neoliberal “innovation system” being deployed in contemporary Japan. The laboratories need to be understood as neither “typical” nor as “anomalous”, but rather as particular: as specific sites informed by the ongoing corporate, state, and academic re-configurations of Japanese science and technology production. Given this context, I will now turn to the main body of this chapter: the differing rationales of social robot research. While the interests of policy makers may be quite important, here I will discuss the reasons that researchers themselves have for making their robots: engineering, science, and “coolness”.

Engineering

The rationale of engineering is to make practical and pragmatic robots that do useful work for people out in the world. Ideally, social robot research as engineering will result in actual products, rather than only knowledge (as will be the case for social robot research as science), and it will result in products that have some specific and necessary function (rather than “useless but cool” robots, which are frivolous in the rationale of engineering). For example, the next chapter will focus on a network robot system that is designed to provide customer service information in a public area such as a shopping mall or a museum. The engineering rationale is that such a system provides needed services to people in an (ideally) autonomous, non-intrusive, and useful way, in a setting where people often have questions that could easily be answered by a machine.

Many researchers expressed the opinion that developing useful robots is the most important goal in their research. One Master's student I spoke with, Kimura-san, said that she believes that robots should be made for housework (laundry, cooking, and cleaning) and to make life more convenient. She did not think it was possible for a designer to make a robot with a heart/mind (these two concepts, while distinct in English, are expressed together with one Japanese term *kokoro*; *kokoro* will be a reoccurring term throughout this thesis). She thought that robots should be valued only as another kind of machine. In another example, one day during lunch, after a morning of programming, Mark, the American researcher from the first paragraph of this chapter, said that he thought robots should not be made to replace the "human touch." He thought that instead roboticists should focus on making robots that do dirty and dangerous manual work. Kitagawa-san, a long-time researcher of PC, responded that perhaps this is true, and, if they did make such robots, it would allow people to devote their time to "higher pursuits, like art".

Talking to Kitagawa-san on a different occasion, I asked him whether he thought social robot research is engineering or science. He answered firmly that it is engineering. He said this was his primary interest and that, in his opinion, this was also true for most people in the laboratory. He told me this is not true of all laboratories, which may be more focused on the scientific side, and often the members of his laboratory collaborate with such people. He also added that it is highly dependent on the individual researcher.

When I asked Yasuda-san, Kitagawa-san's boss and the head of the network robot project described in the next chapter, the same question, he answered in a very different way. He said that social robot research is aimed at making useful things for people. But, he added, science is needed to do that and therefore social robot research is both engineering and science at the same time. I continued my probing by noting that social robot research seems very different from other sciences, such as chemistry. Yasuda-san then quickly pointed out that chemistry is a poor analogy, and that medical science is more appropriate. Like medical science, social robot research aims for practical results, technologies that can help people, but these technologies will only come to fruition through good science.

Professor Murakami, head of the laboratory at the University that was my second field-site, also told me that he believes engineering and science are not separated. But his reason was that the pursuit of scientific research may lead to practical applications. He explained that while the symbolic goal of making human-like machines, *"The Dream"* as it will be termed in the section on the rationale of coolness, was a long way off, the pursuit of that goal will lead to other useful applications. To illustrate this point, he said that, for example, Teflon is a spin-off from NASA. While this particular example actually turns out to be an urban legend[8], his basic point was that such exploratory projects (as the space program or humanoid robotics) will invariably produce useful, household technologies as by-products.

Yasuda-san and Professor Murakami are not unique in this regard, as many roboticists I asked told me that they saw no useful distinction between science and engineering. But the same researchers would then talk about the "engineering" approach or the "scientific" approach as distinct entities. This suggests that they do not actually see them as one and the same. While Yasuda-san and Professor Murakami are similar in that they claim not to draw a distinction between engineering and science, they also differ in a subtle but important way. Yasuda-san's main purpose is to make robots to help people, which includes science, as a secondary concern, because science is necessary for that main purpose. Yasuda-san is motivated to do engineering. Professor Murakami is a bit different. He implied that he is not motivated by engineering primarily. Rather, he had an argument for how pragmatically useful technology can arise, unintentionally, out of the kind of exploratory research that he is interested in. Therefore Professor Murakami draws on the rationale of engineering in order to support open-ended

8 http://www.sti.nasa.gov/tto/spinfaq.htm#spinfaq12

research, but he does not prioritise engineering in the same way as Yasuda-san.

One final point is that, during my fieldwork, it was suggested to me that there is also a cultural aspect to the rationale of engineering; that (potentially) at least some non-Japanese value the rationale of engineering comparatively more than their Japanese counterparts. This was highlighted by a group of Italian researchers who came to Japan for two weeks to collaborate on a short project with the researchers at PC. The Italian researchers' project and its associated robot, *RoboBin*, encapsulated well the rationale of engineering. While vaguely humanoid in form, the robot was designed not to communicate with people socially but rather to visit people's homes to collect their trash. The Italian researchers explained that, in their country, streets are very narrow and are quite inaccessible for the average garbage truck. RoboBin was designed as a solution to this problem. It would easily be able to navigate the small, uneven streets of European cities. It would then put the trash in a storage compartment inside its main body and return to a disposal facility. The robot was designed to act independently through GPS and its own autonomous systems.

These researchers explained that most Italian people only want robots like RoboBin. Throughout their entire stay, they commented both to myself and to others from PC that Italians, in general, do not know about, and are in fact suspicious of, robots. These researchers repeated many times their belief that most Italians have no desire for social interaction with robots, and that therefore, as researchers, they position themselves to design pragmatic robots. It is not necessary that these robots be humanoid and perhaps it is best that they are not.

The researchers attributed Italian ambivalence towards humanoid robots to the many scary movies and other negative portrayals of robots in popular culture. One Italian researcher said this was exemplified well in an Italian film he called 'Christine and Me' (apparently the 1980 film *Io e Caterina*) where a man makes a “girlfriend robot” to live with him. But, as the researcher explained, the robot eventually becomes jealous of his relationships with other women. The roboticist's explanation trailed off there, but his implication was that, for Italians, a robot making a claim over a man's fidelity is very disturbing. It is for these kinds of reasons, he said, that Italians do not like robots. The Italian researchers also explained to me that Italians like a great deal of “warm” interaction; they want to talk and laugh. This interaction cannot be reduced to pure utilitarian rationalisation. Customer service, for example, cannot be reduced to efficient task performance. If a robot cannot interact in a “warm” way, Italians would feel uncomfortable.

In contrast, according to the Italian researchers, in Japan, common people have interactions with robots while the kinds of robots that they see all around Japan are very rare in Italy. One researcher stated that Japanese have a dream of having a robot in every house, a dream which “may be nice” but is completely infeasible. It is just a dream, he said. Strikingly, and by pure coincidence (as these two researchers had no interaction to my knowledge) Professor Murakami used the exact same term, “dream”. But while Murakami was enthusiastic about “The Dream” as a useful symbolic goal and a promise for the future, this Italian researcher was quite negative about such a “dream”. He thought it impractical. He explained that they, the Italian researchers, were more concerned with making something useful now, which he implied was more justified.

These cultural differences, as expressed by the Italians, need to be qualified. Recall Kimura-san, a Japanese woman and researcher, who thought that robots should be made for cleaning, cooking and household chores, and should be valued only as convenient machines. Japanese are not all the same and many seem just as concerned with a robot's practical utility as these Italian researchers.

In summary, the rationale of engineering is to focus on making pragmatically useful technologies. Researchers that focus on the rationale of engineering want to make devices that can be useful to people (preferably sooner rather than later).

Science

Some researchers approach social robot research as a way to do a new type of science, particularly a new type of cognitive science. The "scientific approach," a common phrase in the laboratory and often the counterpoint to the "engineering approach," was to do fundamental research into the human mind. At the most general level, the rationale of science in social robot research seems similar to the logic of Aristotelian *mimesis*: imitation or mimicry of human form and human action, the human body and its associated behaviour, in order to better understand that body and its behaviour. This is realised in two associated arguments made by roboticists. First, as these researchers see it, making an intelligent robot is a way to explore how our own intelligence might work through modelling, construction, and testing of robots; psychological theories can be combined with models of neurobiological mechanisms, implemented as computational models, tested in the form of a robot, and ultimately revised in light of these experiments. Second, researchers use advanced humanoid robots in order to understand how people respond to social behaviour from a robot, especially a very human-like android, and, by extension, how people respond to social stimulus in general. They believe they can use experiments to find the small differences between humans and robots, in gesture, appearance, and so on, that, at a subconscious level, are very important to us psychologically. This will help us better understand people's behaviour as well as their interpretation of other people's behaviour.

Constructivist Cognitive Science

Some researchers believe that building robots will provide unique insight into our humanity through the act of construction itself. This is along the lines of AI, in which the goals are both "to produce useful machines" but also "to understand human intelligence" (Garnham 1987: 2). The main difference is that the Japanese researchers I spoke with did not use the term intelligence but instead (often) *kokoro*. *Kokoro* is usually translated as “heart” but can also often be translated as “mind”, and the English distinction between these two terms does not hold the same in Japanese. Rather than a purely rational AI, the attempt to make an artificial *kokoro* readily includes emotion, sociality, and embodiment. As Moeran explains, *kokoro* is often used to make sense of Western concepts (science, technology, rationality) but “it is essentially a Japanese concept which, it is claimed, understands beyond mere 'intellectualism'” (Moeran 1989: 72). Robots, as opposed to disembodied AI, accord well with this line of thinking, since robots have bodies and move through a physical environment. Nevertheless, the relationship to the scientific rationale is still pretty much the same as classical AI: implement theoretical models as actual machines, in order to better evaluate and develop those models.

The university laboratory's research agenda is based around this principle. Murakami and his team have set out to develop a new kind of robotics based on the field of developmental cognitive neuroscience, an interdisciplinary field combining neuroscience, development psychology, and cognitive science. As the name implies, the field is concerned with “the relation between mind and body, specifically between the physical substance of the brain and the mental processes it supports” and with “the origin of organized biological structures, such as the highly complex structure of the adult human brain” (Johnson 2011: 2). These are the same issues (or questions) that concern Professor Murakami.

Where he differs is that he believes these questions can best be approached through robotics. Rather than the simple application of biological knowledge to robot design, he envisions a constructive science. Such a science would be poised to build a new kind of knowledge, qualitatively different from both natural science and social science. Professor Murakami believes that natural science has tended to focus on the micro-scale only, for example, neurons in the brain's internal structure, and therefore has difficulty explaining actual human action and behaviour. Conversely, social science, as he sees it, cannot explain the mechanisms by which human beings physically operate. The version of robotics that he and his colleagues are building is supposed to be a synthesis, whereby working models can be implemented in the robot and improved through iterative testing. At the level of design, this means both constructing an artificial robot brain and also investigating the structured environment that supports learning for an embodied artificial agent.

To this end the Murakami Laboratory has developed a “baby” robot that can learn from its environment through instruction and interaction. The robot looks like a large (130cm tall and 33kg in weight) grey silicon, human infant. Rather than program a full repertoire of behaviour into the robot, the aim of the researchers is to have the robot learn much as a young child does. For example, researchers have studied the ways that parents teach their human infants to stand up, and they mimicked these techniques in order to teach the robot to do the same. They have also taught the robot to recognize visually, through its on-board video sensors, emotions such as sadness and happiness in facial expressions. Their future goal is to teach the robot more advanced techniques such as language and speech.

Humanoid Robots as the Perfect Experimental Actors

The second aspect of the rationale of science is based on the argument that robots, especially human-like androids, provide a unique and powerful testbed for psychological research. In particular, robots can be controlled more precisely than any human actor and therefore they can be used to do incredibly fine-tuned experiments. Such an android will be able to provoke all the subconscious and rarely observed reactions we have to minute social stimuli.

In the introduction, I briefly mentioned the “Uncanny Valley” theory of Masahiro Mori, a

Japanese roboticist who was writing in the 1970s. Mori (1970) predicted that as robots approach human-likeness, they approach an "uncanny valley". In this phenomenon, extremely human-like but subtly imperfect robots provoke a sense of uncanniness, eeriness, and perhaps even fear. Mori used examples such prosthetic hands (as well as corpses and zombies) to illustrate the unsettling subjective feeling we have at something that looks very human-like and yet is ever so slightly different. A prosthetic hand may look exactly like a human hand. Yet, when we touch it and it feels cold, he claims that it produces an "uncanny" feeling. Mori illustrated this theory graphically, shown in Figure 2.

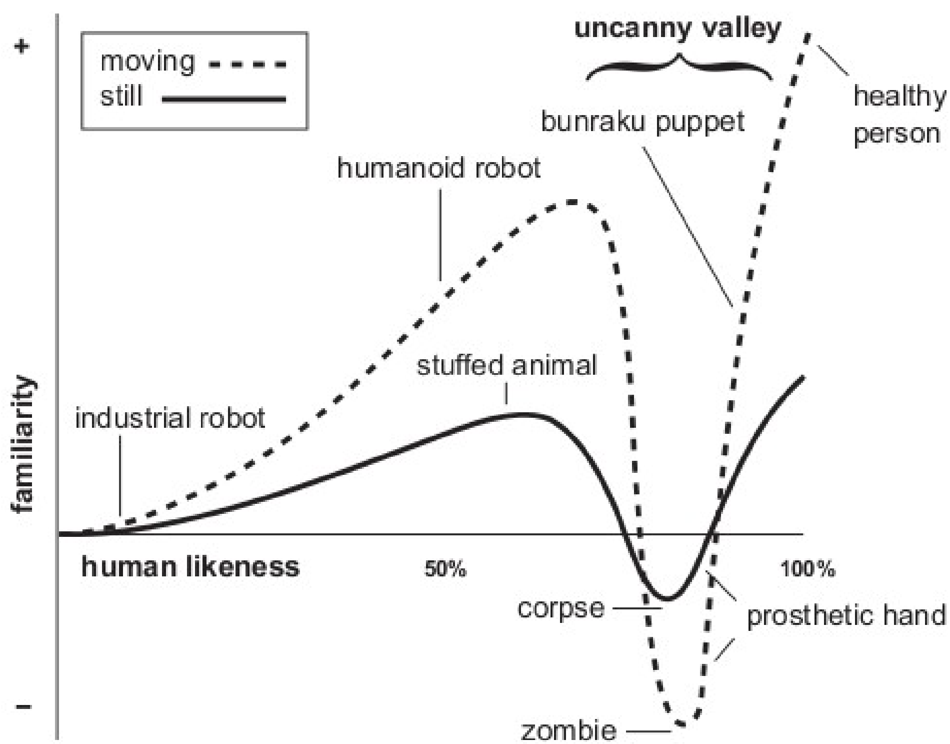

Figure 2: The Uncanny Valley

(MacDorman 2005)

Mori argued that because of the "uncanny valley," roboticists should avoid making very human-like robots. Rather, they should make robots that, while humanoid, are readily distinct from actual human-likeness. Any attempt to make a human-like robot will invariably have the small imperfections that cause uncanniness, and the android will then fall into the uncanny valley.

Some contemporary roboticists have turned Mori on his head, so to speak, and claimed that the uncanny valley can actually be an advantage from a research perspective. They suggest that this “uncanny” feeling can be a heuristic device for exploring the human interpretation of appearance and behaviour. As researchers, they can use human participants to judge the human-likeness of their androids and, because human participants are so sensitive to even the smallest subtle detail, researchers will be able to test with great precision. Insofar as people judge an android as “uncanny,” the researchers will then know that there is some problem, prompting them to revise their model of behaviour. In this way, androids are excellent ways to rigorously test models of behaviour and interaction.

Didymos, the life-size robot replica of Professor Masuda, is a prime example of such an android. It looks very much like a real person (Professor Masuda), although to a human observer it does have small imperfections, which are difficult to capture in words but readily apparent to the human eye. While visually impressive, Didymos is not an autonomous robot. Rather, all its actions are controlled by a remote operator. In the laboratory during my fieldwork, Didymos was being used for the kind of psychological experimentation described above. This research and experimentation was mostly being done by a German post-doctoral fellow Hans, working under Professor Masuda's direction, at PC. I am going to describe Hans and his experimental set-up in depth as a concrete and tangible example of the rationale of science.

Hans frequently told me that he was interested in social robot research because of the prospects it has for science. He often expressed scepticism about the utility and desirability of advanced robots for actual use in mainstream society, frequently drawing on films such as *I, Robot* and *A.I.* to imagine the problems that might arise. He was therefore drawn more to social robot research as science than as engineering. During his actual work, Hans was a thoughtful researcher, interested in hearing a variety of perspectives as they contribute to science. Very rigorous and meticulous, he was particularly enthusiastic about combining computer science and artificial intelligence with psychology and social science.

Hans's PhD research had focused on a virtual agent, which is a software program (or artificial intelligence) depicted as an animated 3D character on a computer screen. His research focused on how to make an artificial agent more believable, particularly through emotional display and other kinds of affect. While his PhD was in computer science, he had become increasingly interested in social science, and psychology in particular. He had told me that he had spent so much time during his PhD talking only with psychologists that near the end he was having little communication with his own department (though, as he stressed, he still considered himself "a technology person, *really*").

His interest in psychology was primarily in the psychology of emotions. He had worked on implementing specific psychological models of emotion into the virtual agent, using a system architecture that would relate different emotions together in a complex hierarchy of levels. He had also worked on expressing these emotions to a human user with simulated gestures and facial expressions. After developing his system, he had tested it experimentally, using a simulation of the card game Skip-Bo. Participants would play the game with the virtual agent, and he tested whether various emotional displays by that virtual agent during the game would cause emotional reactions in his participants. This experimental work had been done during a previous three month stay at a research institute in Tokyo.

Hans had come to PC (his second time in Japan) to continue his research on artificial emotions, but this time with robots. Robots seemed to him to be the logical progression from the virtual agent he had previously used. At the time I was there, his emotion research used Didymos to explore how people would respond to a robot that laughs. Hans felt it would be the ideal platform to continue his research on human and artificial emotions because of the robot's remarkable human-likeness and ability for emotional display. While he occasionally made use of other robots in his experiments, Didymos was his main focus because, as he said when he first showed it to me, “it is an amazing machine.”

Hans's research was experimental in nature, and continued his focus on people's reactions to emotional displays by artificial agents during competitive games. The experimental design was as follows: Didymos is in a small room, roughly 20 square meters in area. In the centre is a table with some chairs, and at the far end, opposite the door, sits Didymos. Cameras, microphones, and other sensors are set up around the room, which can be monitored from the nearby control room, down the hall and behind a curtain. From this control room, Hans operates Didymos much like a very elaborate puppet. As the operator, Hans sends instructions to Didymos each time it does something during the experiment. In robot research, this kind of remote operation is referred to as the Wizard of Oz method, a method that will be discussed more in the next chapter.

At the beginning of the experiment, Moriguchi-san, Hans's Japanese research associate, explains the experiment to the participant. She will be playing a game with Moriguchi-san and the game involves money. Each player has one turn per round, and there will be a number of rounds for the entire game. During the player's turn, she is given 100 yen (about 75p) and she must split that money into two piles. One pile is for herself and the other pile is for the other player. The opponent can then choose to either accept or reject this offer. If the opponent chooses to accept, both players receive their share as agreed. If the opponent decides to reject, neither player receives anything. Each player has to therefore weigh carefully the amount that she will offer, and the amount that she is willing to accept. A further restriction was that the money must be split 50:50, 80:20, or 20:80.

In the game, the two players are the research participant and Moriguchi-san. Didymos's role is to act as a mediator between the two players. Didymos looks at the split given by Player A and then says (by moving its lips while its speaker emits the sound of a voice) the offer to Player B. Didymos then waits for Player B to indicate whether she will accept the offer, listens to the answer, and then responds verbally to Player A. For example, the research participant offers to split the money 80 for herself and 20 for Moriguchi-san. Didymos looks at this split and informs Moriguchi-san that the offer is 80/20. After considering it, Moriguchi-san decides to accept. Didymos then informs the research participant that the offer has been accepted.

This experiment is a version of a what is called the ultimatum game. The ultimatum game is a common game used in experimental economics. According to game theory and neo-classical economics, both players should act rationally in order to maximise their own gain. From the perspective of Player B (the one who receives the offer) this means that she should accept any offer which is not zero. Even if she is offered 1yen, this is better than the 0 yen she would get if she refused. Hence, she takes the offer. Player A should also try to maximise her gain, and should understand Player B will accept any offer above 0. She should therefore offer the minimum amount to Player B that is not zero, keeping the maximum for herself. In this configuration of the experiment, the neo-classical assumption is that the offering player will always choose 80:20 in her favour. Many studies with the ultimatum game have indicated these *a priori* assumptions to be false. Experimental results often show that Player A will make more “fair” or more equitable offers and that Player B will not always accept non-zero offers. Much research has been done, and continues to be done, based on permutations of this essential experimental design including, for example, experimenting across cultures and even across species (with chimpanzees) (Henrich et al. 2004, 2005, 2006; Jensen et al. 2007; Oosterbeek et al. 2004; Plott 2008)

In contrast to the original impetus behind ultimatum game experiments, this particular experiment was not really concerned with economic rationality as such. Rather, Hans wanted to test how people would respond if they were laughed at by Didymos during this competitive game. When Moriguchi-san offered to split the money 80 for himself and 20 for the research participant, Didymos would laugh (displaying laughing action in the face, while a laughing sound was played on its speaker) as it informed the research participant. In the control condition, the robot did not laugh and simply informed the participant in an emotion-less manner. Hans wanted to see if participants would feel angry or annoyed with the robot for being "unfair" and "taking the researchers side" (he also collected data on whether this would affect their decision to accept the offer or not, though this was not his main concern). Hans hypothesis was that the research participant would respond emotionally to Didymos's laughter.

The sensors in the room allowed Hans to collect the data he needed for analysis. These sensors include video cameras at various angles, including cameras that were locked onto the participants face, and recorded the entire experiment. The fine-grained examination of these video recordings was used to identify any change in gesture or facial expression. Further, the entire experiment was also recorded in audio. Finally, sensors attached to the hands of research participants could detect "arousal" based on physiological fluctuations. While imperfect (people could be "aroused" just by the stress or excitement of the experiment itself) it did offer an "objective" way of obtaining data on people's inner states.

In addition to the sensor data, Hans also collected subjective qualitative data. After each experiment Hans had the participant fill out a short survey about how she felt about the robot before, during, and after the experiment. In addition to the survey, Hans also made an effort to standardise qualitative reporting of emotions. This was primarily achieved through his use of the "Geneva Emotion Wheel." The Geneva Emotion Wheel (Scherer 2005) is a circular diagram used to graph the relationships between different emotions. "Negative" emotions are placed on the left and "positive" emotions on the right, with "passive" emotions on the bottom and "active" emotions on the top. This scheme is based on idea that similar emotions will appear near each other in the diagram ("contempt/scorn" and "irritation/anger" are adjacent, as are "happiness/joy" and "enjoyment/pleasure").

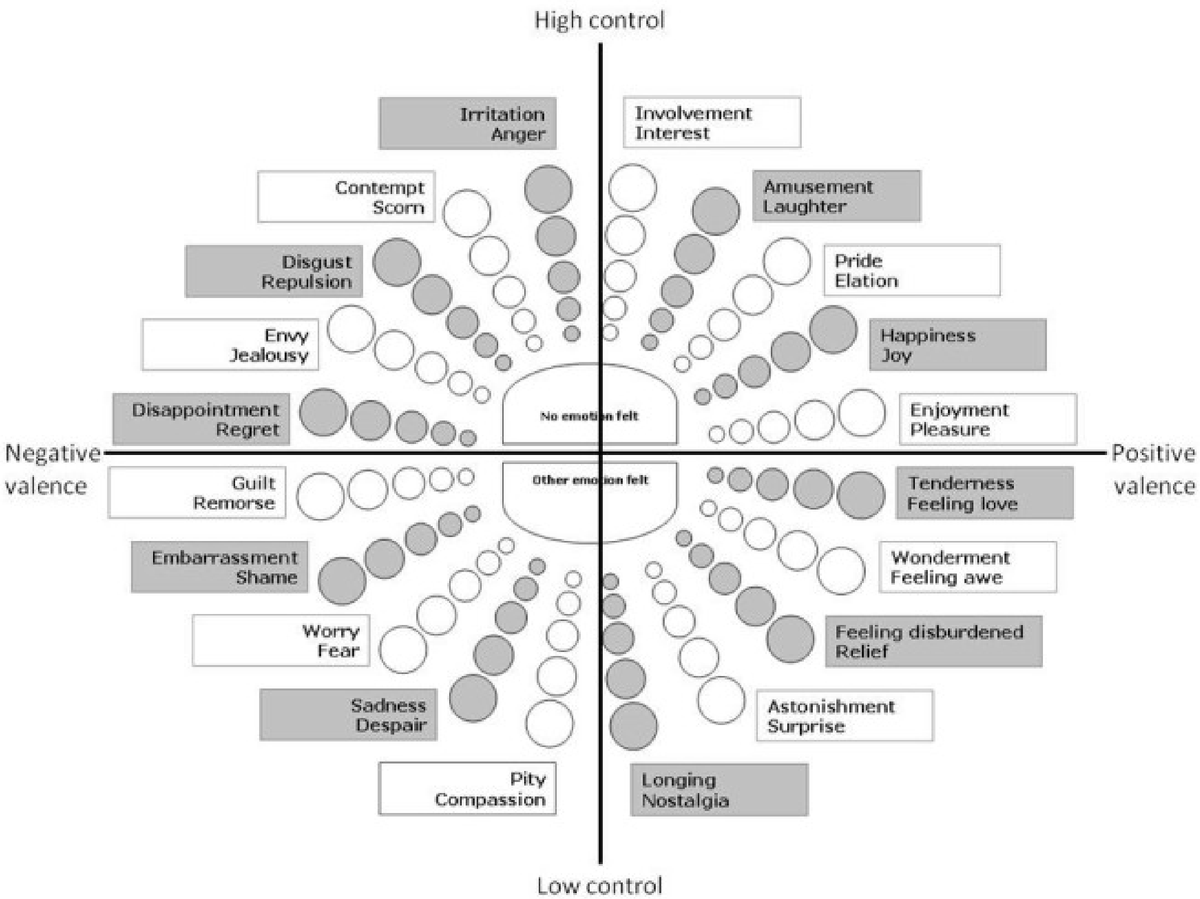

Figure 3: A recent version of the Geneva Emotion Wheel

(Sacharin et al. 2012)

Since the experiment was in Japanese, Hans had the emotions from the wheel (which had already been developed for a number of European languages such as German, English, and French) translated from English into Japanese by two independent translators, and then back-translated into English. Any discrepancies they had were then discussed and resolved. He felt that this method should help mediate against any difference in cultural and/or linguistic categories of emotion. Each participant would be given the emotion wheel during their survey, and asked to indicate her emotional reaction based on the options it listed. Hans could therefore collate the results to look statistically at how people emotionally reacted to the robot, while the graph provided a relatively intuitive way for people to express their responses. His findings were that the laughter did not significantly affect how participants make decisions during the game nor did it significantly affect their judgement of the game's fairness. But the participants did report significantly higher feelings of both “irritation/anger” and “embarrassment/shame” in the laughing condition, and Hans supported these self-reports with his own analysis of their facial expressions and gestures. He also found that a significant portion of the participants interpreted the laughter to mean that Didymos was allied with Moriguchi-san.

Hans's work exemplifies the rationale of science. He is not trying to make a usable product, a machine with some everyday, real-world utility. Rather, he hopes to contribute to scientific knowledge through his experiments on laughter. As he sees it, research like his own is critical for both understanding human emotions in general and for understanding how people perceive and represent emotions from a non-human agent (i.e. Didymos). Hans borrows from psychology, cognitive science, and social science in order to use robots to do a new kind of experimental and scientific research. Researchers like Hans believe that the implementation of psychological theories as physically instantiated robots can better help to refine those other disciplines by testing their models. All of this illustrates the rationale of science in social robot research.

Coolness

A final very important aspect of social robot research is its “coolness”. Many roboticists are genuinely interested in human-like, social robots and this intrinsic interest, the robot's intrinsic coolness, is reason enough for many researchers. Robots are not just machines for work, but objects for play. The French intern Benjamin told me that many students come to the laboratory thinking they are going to be “playing with robots” all the time but are consequently disappointed when they realise that their actual job is to sit in front of a computer programming all day. Benjamin's comment highlights the fascination with robots as such: robots are cool and fun, and are what draws many students into the laboratory.

The desire to make cool things is a personal motivation for many roboticists. One example is Mark. Mark told me that he is rather hesitant about the prospect of social robots “replacing” humans. He also seemed sceptical about whether social robots could really be used to do better science in fields like psychology and cognitive science. Rather, he said that he just likes to make “cool” things. He said that if he did not have to work for a living, he would devote all his time to simply writing fun computer programs, programs that had no “real” (productive) use. For example, he would write programs that make dancing cartoon characters appear on the screen. At home, he was always making new gadgets and starting innovative projects. Each Halloween, for the few years I was there during field work, he made a new robot themed costume that included flashing lights and working, detachable parts. One year it was *Iron Man*, the next it was *Bumblebee* from *Transformers*, and finally it was *Tron*. Rather comically, his *Bumblebee* was so elaborate that, when Mark attempted to board a train, staff asked him to leave the station for no reason other than him wearing the costume: presumably it scared them.

Mark's costumes are just one example of how popular culture is intimately tied to the coolness of robots. Some Japanese roboticists stated explicitly that their interest in the field was influenced and sometimes derived directly from robot characters in *manga* (comics) or *anime* (animated film and television). As I noted in the introduction, the most widely influential character of this type is *tetsuwan* *atomu* (Astro Boy), the example almost every Japanese, roboticist or otherwise, gives when asked about fictional robots. Many researchers explained to me that that the success of social robots in Japan is directly tied to the positive and friendly example of Astro Boy. But, apart from Astro Boy, there are a number of other very influential characters and series. *Doraemon*, as I mentioned, is a ubiquitous mainstream character that appears in television, games, movies, and almost any kind of merchandise one wishes to purchase. *Doraemon* is popular across the demographic spectrum, appealing to both men and women, children and adults. Travelling more outside the mainstream, some roboticist's are involved in the *otaku* ("geek" or "obsessive fan") subculture that is heavily invested in *manga, anime,* and video games. While Astro Boy and Doraemon are analogous to Mickey Mouse, these *otaku* titles are perhaps comparable to something like Star Trek or Star Wars. Some of the titles that researchers are commonly interested in and inspired by are Neon Genesis Evangelion (*shin seiki evangerion*)*,* Ghost in the Shell *(kōkaku kidōtai),* and various incarnations of the *Gundam* series. While these *manga* and *anime* are not examples of friendly robots, but rather violent war machines, they are still examples of broadly popular robots in fiction. And they inspire researchers to make actual robots. In one example, a researcher, Ito-san, told me that the *manga* series Mobile Police Patlabor *(kidō keisatsu patoreibā*) directly influenced his decision to get into robotics. In *Patlabor*, large robots (*mecha)* are used for construction work and policing (the word *patlabor* is a portmanteau of patrol and labour). Ito-san said, as a child, he was amazed by these bipedal robots and decided he wanted to make one himself. After learning that bipedalism is actually a very difficult problem, he got into robotics in order to solve it. Since then, he explained, bipedalism had already been solved by others (he pointed to Honda's *ASIMO*), but he has stayed in robot research, focusing on robot communication and imitative learning.

Integral to robot "coolness", including its depiction in popular culture, is imagination. A collective sense of imagination (Appadurai 1996) provides the cool future vision that roboticists aim to realise in their own work. Professor Murakami gave this imaginative vision the term the “The Dream.” “The Dream” is to make a robot that is exactly like a human being. This means a fully functional robot with all the abilities of a real human: it can move like a human, it is intelligent like a human, it has emotions like a human, and it can form intimate social relationships like a human. Murakami explained that this Dream is very ambitious, “A Big Dream”, but it is useful for researchers as a “symbolic goal”. He also added that he believes most researchers at his university laboratory, at least Japanese researchers, have this Dream as the main reason for their involvement with robotics.[9] Many researchers told me that what they hope to get out of robots are things like social relationships, friendship, and even love.

Perhaps in contrast to the more universalistic ambitions explained with respect to engineering and science, “coolness” can be seen heavily cultural[10] and, in my experience, most Japanese researchers imagined achieving what Murakami calls “The Dream” through the creation of a robot *kokoro*. As I explained previously, *kokoro* can be glossed as heart/mind. The word is something of a polysemic touchstone in Japanese, and Brian Moeran notes that the term can sometimes stand in for “'Japaneseness' *vis-à-vis* Western technology” (Moeran 1989: 67). It was also the most common word used in advertising during the 1970s (Moeran 1989: 67). Its use by roboticists may reflect their own construction of a special (and ideological) kind of “Japanese robotics”, perhaps influenced by the *nihonjinron* literature discussed in the introduction.

It may seem that the desire to construct an artificial *kokoro* could fit in with the rationale of science or with the rationale of engineering, and there is a degree of truth to this as we have seen. But it is analytically useful to distinguish the different goals that these rationales entail. In the rationale of

9 It is worth pointing out that Professor Murakami's laboratory, within a university and therefore academic in nature, is less focused on the rationale of engineering than PC, a private company that would like to make products, at least hypothetically.

10 Although, as we saw in the discussion of Italians in the rationale of engineering section, this point is debatable.

science, the artificial *kokoro* was a vehicle for gaining more knowledge about the human beings; it was therefore science. In contrast, the goal in the rationale of coolness is not to understand the *kokoro* as such. Rather roboticists want to make an artificial *kokoro* as an end in itself. But unlike the rationale of engineering, such a robot is not made for any specific utilitarian purpose and the usefulness of such a robot is not of primary interest. Analytically this is what connects Mark's desire to make “frivolous” cool gadgets with Murakami's “Dream”: both take pleasure in the construction of things with “cool” qualities as objects of desire in themselves.

When I asked Tada-san, a PhD candidate at Murakami Laboratories, for his opinion on why robots were more popular in Japan, he explained that “in Japan, it is thought that [all kinds of] things have a *kokoro* dormant in them.” He also said that the perfect robot would have *kokoro* by definition. Nevertheless most roboticists, I think including Tada-san, do not view their robots as containing an already dormant *kokoro*, but rather talk about *kokoro* as something to be achieved. In contrast to Tada-san's notion of perfection, one (undergraduate) student I asked, Tokunaga-san, challenged the notion that perfection and *kokoro* were compatible. According to him, a robot with *kokoro* would by definition be imperfect because that robot would need to be able to learn. But if the robot can learn, it may learn new behaviour that the designer never wished or hoped for, and therefore would not be perfect in that designer's eyes. In a nutshell, he said, he thinks only imperfect robots, robots that could learn by themselves, could have *kokoro*.

When I asked another researcher, post-doctorate fellow Suzuki-san, if he thought robots could one day have *kokoro*, he told me that we cannot prove whether or not a robot has a *kokoro* because it is subjective. And yet, for such roboticists, robots are still possible social companions, potential friends. In fact, Tokunaga-san explained that if he has a “positive feeling” towards a robot, even if that robots does not actually have *kokoro*, he can have a “pseudo-feeling” (*gijiteki ni kanjiru*). This is possible because he is so personally enthusiastic about robots; he *wants* to have such a feeling. To the extent that a robot has *kokoro*, this relationship is legitimate and “genuine”; the relationship is like a relationship with a human being. But Tokunaga-san suggested that such authenticity is not necessary because he has such a great desire to have a relationship with robots that he will make that feeling himself. In fact, such imaginative spaces can extend even further. Another researcher, a second year Master's student named Nakamura-san, presented a startling dystopian vision as his wish for robots in the future. He described this desire in the following way. He wanted a large number of androids, indistinguishable from humans, to enter society, at which point there will be a human-robot war and the robots would destroy all the humans. He said that this would be like the worlds portrayed in the films *I, Robot* and *The Matrix*.

While many researchers are passionate about cool robots, the rationale of coolness also ignites the most animosity from those who do not subscribe to it, at least in my experience. Recall from the section on the rationale of engineering that the Italians denigrated the (pipe)dream of friendly robots in every household. And Kimura-san said that robots should be restricted to utilitarian household tasks. She stated quite bluntly to me that she neither needs nor wants robots that have *kokoro*. Hans provided perhaps the most extreme reaction when I suggested to him that some roboticists seem to be motivated by the simple desire to make cool robots. He became quite agitated by the suggestion, telling me that it was a terrible reason to do research, that it was a waste of time and resources, completely pointless. He said quite simply that “I hate this kind of thing.” Those interested in science never told me they hate the work of those interested in engineering, nor did the engineering types say that about the more science-focused work. At most, they would say they were not interested in it. In contrast, for some researchers, the rationale of coolness seemed to be simply frivolous. Nevertheless, it is interesting to note that Hans still did draw on movies such as *I, Robot* and *A.I.* to talk about his and others work. While he may have thought coolness was a poor reason and/or motivation for research, he was still influenced by popular culture and fantasy as a way to think about robot futures.

Balancing Rationales and The Economies of Social Robot Research

In very real ways, different researchers do subscribe to different rationales: perhaps Kitagawa-san to the rationale of engineering, Hans to the rationale of science, Mark to the rationale of coolness. But this needs to be tempered by the observation that researchers have to manage all of the various rationales in different parts of their work. Kitagawa-san expressed this is in a clear-cut way after explaining his own preference for engineering. He explained that when writing grant proposals, usually to government funding bodies, he and the lab emphasise the practical technologies that will arise out of their work because grant committees want to know how this research can be concretely applied. But when they are writing research papers, they stress the purely scientific importance of their work because that is what academic reviewers want to see. The applied aspects are necessary to get money; the scientific aspects are necessary to get published. Kitagawa-san said that they have to play a balancing game (his example focused on science and engineering, but as I will show, they must also balance coolness). Kitagawa-san's comments show how roboticists have to keep different rationales in mind throughout a project, and the rationale that they emphasise at any one point in time is heavily dependent on their audience. His comments also exemplify the way roboticists view themselves within a system not under their control. They cannot just merrily go on their way with whatever rationale they happen to adopt for themselves, but must engage with the other rationales, whatever their personal feelings on the legitimacy of those rationales. And they do this by representing the same projects in a myriad of different ways. These representations are crucial for evaluating the “success” of a project.

Demonstrations

One of the important ways that project “success” is measured is through public inspection, display, and audit—“rituals of verification” (Strathern 2000)—especially in the form of demonstrations. Most projects at the laboratory end in a final demonstration, which often coincides with a data collection period that will turn into publications. Demonstrations also happen intermittently throughout projects (especially long-term projects). A demonstration is where an ostensibly finished robot, though in fact more likely a prototype, is displayed to outsiders. These outsiders can be key figures from government and business, mass media such as newspaper and television reporters, as well as the general public. Typically demonstrations are scheduled months in advance and they will be highly scripted. The robot will perform some predetermined actions that make visible the progress—and success—of the project. Displaying this success is important for researchers because it translates into money. The outcome of demonstrations affect funding and affect prestige (which in turn further affects funding). Bad demonstrations will potentially lead to unimpressed funding bodies, who will not award grants for the next project. Good demonstrations will, of course, lead to the opposite. For this reason, researchers are under a lot of pressure to have their demonstrations go well.

The following is a brief ethnographic description of one demonstration. The Italian researchers, discussed in the section on the rationale of engineering, visited to collaborate with the PC laboratory team over a period of a few weeks. The final and main event of this collaboration was a joint demonstration, which was based on the laboratory's robot network system which was designed as a customer service system for shoppers and set up in the shopping arcade outside Universal Studios Japan (discussed further in Chapter 2). The Japanese robot, CRO-2 (also described in detail in the next chapter), acted as the “communication robot” while the RoboBin robot acted as the “practical robot”.

While RoboBin was first designed to carry garbage, in this demonstration it was being used to carry people's shopping bags instead. The demonstration took place in a shopping arcade near the theme park Universal Studios Japan. A large crowd gathered around a cordoned-off area and the senior Japanese and Italian researchers explained the demonstration to the audience, focusing on the purpose of each robot. Next, the demonstration began and a young Japanese researcher, in the fictitious role of a shopper, was approached by CRO-2. CRO-2 asked if the “shopper” would like help with the bag he was carrying. The “shopper” agreed and CRO-2 summoned RoboBin. RoboBin approached, opened its storage compartment, and the “shopper” placed the bag inside. RoboBin was then supposed to take the bag to the opposite side of the demonstration area. In this particular case, there was a malfunction and RoboBin started spinning like a top. After some panicked work, with a few young researchers running up to RoboBin to check on its systems, the problem was eventually resolved. The researchers, embarrassed and unhappy at having such an error during a public demonstration, nevertheless re-conducted the demonstration and this time everything went smoothly. After the main demonstration, both sets of researchers collaborated in a follow-up field trial. As random people in the shopping arcade walked by, they were asked if they would be willing to complete a survey about the robots being displayed. This survey mostly asked people to rank, on a ten point scale, how much they liked the robot, its appearance, and so on.

Demonstrations such as these are crucial milestones. In fact, at the PC laboratory, the next demonstration is often foremost on everyone's minds and the demonstration is arguably the primary outcome of a successful project (though academic publications are very important as well). Roboticists at PC are constantly working towards the next demonstration. Demonstrations are sites for both the economy of coolness, the commodity realisation of the rationale of coolness, and the economy of engineering, the commodity realisation of the rationale of engineering (while also being sites for science). Researchers have to make their robots look cool, both in exterior design (in the demonstration described above, there was a period of worry when it seemed that a new case for RoboBin would not arrive in time) and also in functionality. This means they need robots that look good and act impressive, in order to meet people's expectations and inspire new imaginary worlds. Demonstrations are also occasions for generating at least the possibility of new practical uses, new potential purposes, for the team's robot. For example, before the demonstration, RoboBin was a trash disposal robot. With a few weeks programming, and a story to re-cast the robot's role, during the demonstration, it becomes a customer service robot. In practice, demonstrations usually present elements of both coolness and pragmatic function. A demonstration in which the robot comes across as boring and useless seems almost the definition of a failed demonstration. Of course, sometimes robots seem boring but useful, or cool but useless. The success of such demonstrations therefore depends heavily on the audience. Boring robots will hold little currency for mass media or theme-park visitors; useless robots will probably fail to impress business executives or government officials.

Because these pressures are divorced from the intentions and wishes of researchers themselves, they come to see themselves as, at least partially, at the whim of outside power. In fact, both Professor Murakami and Professor Masuda expressed their frustration with the media and government. They claimed that neither journalists nor bureaucrats understand robots very well and both come to demonstrations with unrealistic expectations. They said that the media wants to see robots that are just like the movies (which they implied was unrealistic and perhaps even infantile, though I would suggest is in keeping with the rationale of coolness). Meanwhile, bureaucrats expect unreasonable progress with limited funding, and are quick to cast out those who fail to live up to their expectations. Because of widespread misunderstanding of actual robots, Professor Murakami and Professor Masuda each told me that they personally see demonstrations as ways to educate lay people. As the recipients of public funding, they felt that this was their responsibility as experts. Demonstrations, since they are often covered by mass media such television or newspaper, are an excellent way to reach a large audience. Still, both seemed to lament the fact that the mass media, on the one hand, obsesses over superficial imagery, and, on the other hand, holds remarkable power in a consumerist society that commodifies research and funding.

But, despite the fact that those in high-level researcher positions, like Professor Murakami and Professor Masuda, claim to want to educate people about the reality of robots, in the course of an actual demonstration, the bottom-level researchers who do most of the grunt work usually seem to be (understandably) less focused on accurately portraying current technology and more focused on firstly, trying to hide any weaknesses in the system, and secondly emphasising anything that might seem impressive. In an example I will discuss further in the next chapter, one problem that arose with the customer service network robot system was that the system's actual speech recognition was quite ineffective, especially when used in a noisy environment like a shopping arcade. The solution to this problem was to use human operators that would partially control the robot from behind the scenes/screens (the Wizard of Oz approach). This is at least partly for the purpose of giving a better demonstration. Without an operator, the robot will respond poorly, especially since on the day of a demonstration there is an unusually high number of people and therefore a noisy environment, which causes the speech recognition system to malfunction. But with an operator who does the language work, the robot will seem to be very advanced, easily and correctly responding to people's speech. The counterpoint to such weakness minimisation is the maximisation of anything that seems, at last superficially, extraordinary. Mark explained to me that they do not really focus on making robust, maintainable systems. Rather they put almost all of their effort into developing the newest, most blaring tech for the next demonstration; therefore, rather than stopping development well in advance of the demonstration and having an extended testing phase to fix any bugs (as per sound software engineering), they continue writing new code right up until the day of the demonstration. The aim is to have as many new features as possible, because that is what impresses people in the context of a short demonstration. As Mark would lament, this process is almost always at odds with making effective technology. Not only do they have insufficient time to do proper testing, a great deal of code is hastily written in the middle of the night just before a demonstration, leading to what Mark called, using the common computer science lingo, "unreadable spaghetti code." And my observation suggests that this sense of crisis is never-ending, a permanent state of exception (Agamben 2005), whereby as soon as one demonstration finishes, another is just around the corner, requiring the same drastic measures.

In other words, through demonstrations, roboticists enter into an economy of coolness that trades in, and commodifies, an increasing number of images, ideas, and feelings. The economy of engineering also works similarly a lot of the time. This is because engineering does not mean, in this case, making manufactured products to be sold on the market, as such, but rather making ideas for products (which may or may not become manufactured products in the future). The RoboBin demonstration is one example where the practical usage has been crafted through the demonstration. Everyone was quite clear that RoboBin was originally designed to dispose of trash. But in this demonstration it was re-cast into the role of a customer service assistant; they have created a new customer service robot, not through manufacturing but through discourse (and a few weeks of programming). Such re-casting is much more common than making a new robot just because of the cost. It costs nothing to say that RoboBin is now a customer service robot, while the cost of re-programming is a few weeks labour from a handful of graduate students. It costs hundreds of thousands of dollars (or more) to make a new robot. Kitagawa-san explained to me that for this obvious financial reason, they have to do most of their projects with the robots they already have. These robots can be programmed in many different ways and therefore fit many different roles—they can have different uses. This is what happened with the RoboBin project, and is also the same for other robots, like Didymos and CRO-2, which are used in both engineering and scientific work. This reality, roboticists claim, is usually not understood by outsiders, who expect the robots to have a clear design objective and a specific purpose. Rather, the robots are multi-purpose, but they have to be represented as purposeful in the demonstration.

Science and Publications

While demonstrations commodify coolness and engineering, publications act as the main commodities of the scientific economy. Publications measure both the validity and the impact of the researcher's scientific work. But, in my observations, the practical reality often seems to boil down to quantifying the total number of papers produced and using that number as a measuring metric of academic capital. The scientific economy turns academic capital into actual earning and social position (Bourdieu 1984: 23). Like demonstrations, publications translate directly into money in a myriad of ways. For its part, a history of successful publications is, of course, helpful for obtaining scientific research funding. But publications also affect the finances of individual researchers because of the way the academic system works, at least in Japan within the fields of science and technology. Students usually obtain their post-graduate degrees by being the lead author of a number of journal publications (though sometimes conference papers may be accepted). This is the main requirement to be awarded that degree, and the final thesis is simply a merger of these papers into one document. In the case of the PhD, this is usually three or four papers. The PhD, or other qualification, in turn has a direct bearing on individual earnings, even if the job they would be doing with the PhD is the exact same as the job they would be doing without one. According to Mark (who did not have a PhD) PC has a maximum salary that is available to researchers without a PhD, a limit which he had already reached. Any salary increase was now impossible until he had been awarded a PhD. Since PC and the University have strong links, he could be granted a PhD as soon as he completed the mandatory three or four publications. Even so, this left him with the rather cynical feeling that the PhD requirement was just one more hoop to jump through. He confided to me that he was not particularly motivated to obtain a PhD as such but he still had to hurry up and publish because of these financial reasons. Even without hitting this salary cap, the number of publications still affects salary. Each year there is a review to decide on the next year's salary, and according to at least one person I spoke with, this comes down to more or less counting the number of papers published over the year and comparing that number with the other candidates. This comparison is then used to chop up the available funding block.

While younger researchers have to work on publishing their own work, more senior researchers also have a vested interest in not only in writing themselves but also having their students and subordinates publish because they will receive co-authorship. Each student's publication therefore includes his or her name, his or her supervisor's name, perhaps that supervisor's name, often all the way to the head of the laboratory. Since the prime importance of papers often seems to be their quantity, the co-authorship of student written papers is one of the benefits that older researchers gain from accepting younger researchers. In my experience, senior researchers started projects with young researchers by stating in no uncertain terms that the primary aim of the project should be one or more publications.

Patents

Another way that research is verified and made visible is through patents. Patents seem to be the most indisputable way in which research is commodified. They are the ultimate realisation of the economy of ideas, turning those ideas into something that is literally owned as a tangible product. But people at the lab spoke less about patents and it seemed to take up comparatively less of their time. In fact, when discussions turned to patents, I was often surprised since they were mentioned so infrequently. I would hear nothing about them for weeks or months, and suddenly a researcher would tell me that they were happy that they had just been awarded X amount of new patents or that they were just given direction from their supervisor that they should try to produce some Y number of patents by the end of the year. In contrast, both demonstrations and publications were a daily topics of conversation and a constant concern for researchers. In fact, discussion of patents would sometimes surprise researchers as well. Hans, for example, came to me baffled one day and said that, out of nowhere, Professor Masuda had informed him that he should be aiming to generate patents directly out of his current research. He seemed shocked by this, having not even considered it as part of his job and also not having a clear idea of how his current research could possibly turn into patents. Therefore, while patents exemplify commodification very well, they appear infrequently and irregularly in my ethnographic data. Nevertheless, it is worth mentioning them at least because they are relevant and they do sometimes come into play.

Representation and the Success of a Project

Social robot projects are “successful” when they successfully sustain certain representations (demonstrations, academic papers, patents). In this way, my findings are reminiscent of David Mosse's ethnography of development programs (Mosse 2005). In his work on the (ultimately abandoned) ARAMIS metro project in Paris. Latour (1996) shows the history of ARAMIS as a history of changing representations. ARAMIS is constantly changing as it is made to fit the needs and visions of different actors at different times. By charting these changing representations, Latour’s aim is to challenge accounts which make either project “success” or “failure” into “obvious” facts by showing how both success and failure are contingent on whether or not actors continue the work of sustaining representations. In the case of ARAMIS, Latour argues that the project failed not because it was doomed from the beginning, but because it was not maintained as a representation in an assemblage of humans and non-humans. In drawing on Latour, Mosse makes a similar argument in order to claim that development projects are matters of interpretation, and that project failure means a "*failure of interpretation*". For Mosse "development success" is likewise a "social production". Films, posters, brochures, documents, and so on are immensely important, taking up much project focus, because, as in social robot research, they cast the project in a certain way to make it both coherent and cogent to outside actors. The production of demonstrations, papers, and patents are some of the ways that social robot researchers do the same thing. While I do not wish to suggest this is all social robot researchers do, it is difficult to get an accurate portrait of their work without taking these practices into account.

Conclusion

Perhaps unsurprisingly, social robot researchers do not all share one single motivation or reason—rationale—for their work. There is incredible diversity, with different researchers from different countries working together. And yet there are patterns in how they rationalise what they are doing, and these patterns form three distinct rationales: the rationale of engineering, the rationale of science, and the rationale of coolness. The rationale of engineering is rooted in the idea that machines should be made with some practical functional utility in mind and they should perform a useful task out in the world. The rationale of science is rooted in the idea that robots provide a scientific window into humanity through a scientific mimesis. Humanoid robots are constructed based on psychological, cognitive, neurological, and biological models, and these models can then be empirically tested, improved, and refined in new ways. Finally, the rationale of coolness is rooted in the idea that robots are interesting, fun artifacts in and of themselves, that robots are not just utilitarian machines but objects of imaginative play. All three of these rationales play important roles for different individuals at different points in time, but they all are connected through the public verification of robots in a myriad of ways. Roboticists are forced to balance these rationales as they give demonstrations, write papers, file for patents, and look to advance their careers.

I want to make a final and more radical argument about the "rationales" discussed in this chapter. Rationales, as I have tried to employ the term, are not simply different motivations but they also entail different knowledges and different practices. In fact, they represent different (but overlapping) "worlds" or "realities" of social robot production. Still, the use of the term "worlds" can be read to imply radical perspectives that do not meet: in the sense of "incommensurable world-views". Drawing on the post-ANT work of Mol (2002) and Law (2004), I want to suggest a different understanding. Mol, in her ethnography of atherosclerosis at a hospital in the Netherlands, argues that the disease has a multiplicity of realities. The atherosclerosis for a surgeon and the atherosclerosis for a physical therapist are not simply different representations of one object, but, in her analysis, different "realities" and different "objects". The objects are produced in what she calls "enactments", a term that she contrasts with "construction" as it was theorised by Latour and Woolgar (1986). While both "construction" and "enactment" emphasize a contingent period of production, in "construction", the final result is stable and static. For Mol there is no reason to assume that such "enactments" become stable and finalised. As such, her argument (which is further developed by Law 2004) is that any kind of closure is provisional. In analysing the rationales of social robot research, these notions are helpful because multiplicity is a way of understanding multiple "realities" that are nevertheless connected: "The body multiple is not fragmented. Even if it is multiple, it also hangs together" (Mol 2002: 55). The different realities of social robot research, as we have seen in this chapter, are a multiplicity insofar as they simultaneously overlap and also remain multiple: they are "more than one and less than many"

(Law 2004: 74). Returning to the contrast with incommensurable "world-views", the subtlety of the terms "multiple" and "multiplicity" is made with their contrast to "pluralism". According to Law, in pluralism, "there are no interactions between multiples and realities proliferate without restraint" (Law 2004: 160) while, in multiplicity, realities "overlap and interfere with one another. Their relations, partially co-ordinated, are complex and messy" (Law 2004: 61). These worlds cannot be held apart as incommensurable. As such, we saw how roboticists themselves sometimes expressed their ambiguity towards the very non-coherence they recognize: the surprise of a scientific researcher that he should be working towards creating patents, the cynicism another researcher felt towards the need to publish academic papers when he preferred to work on "cool" robots. These "outside" concerns are further extensions in a network or "method assemblage" (Law 2004). And yet, even the analysis of Mol assumes that most people in her study have a single goal: to help people with atherosclerosis. In the case of this chapter, even the *purpose* of research is a multiplicity. But, of course, a multiplicity of rationales that are still all messily mixed up together.

Returning the opening ethnographic vignette, the idea (and the production) of an *okonomiyaki* robot clearly brings to bear multiple rationales. Mark thought that making an *okonomiyaki* robot would be cool; he also potentially thought it could be a useful invention for hungry Osakans and therefore draws on the rationale of engineering. Further, this robot was actually made by a Japanese company, who manufactured and demonstrated it purely to advertise their technical ability, to express regional affiliation, and to demonstrate it. As it is demonstrated, and appears in news media, both Japanese and Western, it comes to stand for what the robot "really" is. People are left with the feeling that these researchers are trying to, say, replace *okonomiyaki* cooks with machines, as in a New York Times article (Daly 2010). As such, the robot is represented, or rather "enacted", in a number of different ways, all the way from conception to production to public "consumption" (in the news media). In the next chapter I want to turn to the ongoing daily practice of technical work, as production. In particular, the next chapter will focus on the kinds of technical problems roboticists face and the way they try to solve them.

Chapter 2: The Wizard of Oz: Problematization in Social Robot Research

Pay no attention to that man behind the curtain!
The Wizard of Oz (1939)

Introduction

As I explained in the introduction, a social robot is a robot designed to interact and communicate with people, often within a specific social role. For example, social robots are designed to do service jobs, to help care for elderly and disabled people, to have conversations and to provide companionship and entertainment. Such jobs, though, require robots to know how to interact and interpret people, which in practical terms also means advanced natural language functionality. As I briefly mentioned in the previous chapter, this presents a problem for social robot researchers because speech recognition systems do not work that well, especially in noisy, outdoor "real-world" environments. One of the solutions to this problem is a method called "teleoperation", in which a human operator uses their judgement, intelligence, and linguistic ability as a proxy for technological automation.

Such teleoperation is often in social robot circles called the Wizard of Oz approach. Recall that, in the story, the Wonderful Wizard of Oz turns out to be a small ordinary man, using levers and machinery to fool everyone into believing he is a powerful wizard. The Wizard of Oz approach in human-computer interaction is a method whereby a designer acts as the system. Recalling Hans's experiment, a real operator, behind the scenes, controls the robot and gives users the impression that they are interacting with a fully advanced artificial intelligence. For example, Hans will control the robot, conducting the conversation, while the user thinks that the robot itself is capable of fluent conversation.

The Wizard of Oz method is designed to allow designers to research how users will respond and interact with such artificial intelligence without the need to actually have that working artificial intelligence. Designers can test new models and hypotheses, and they can also continue testing and developing other aspects of the system without being held back by lack of technology in one specific area.

For roboticists, then, the metaphoric Wizard of Oz is not such a bad guy. Contrast this with a prominent example within anthropology. In Talal Asad's critique of the analysis of ideology within anthropology, he uses the term “Wizard of Oz theory of ideology” to deride the dominant anthropological position. In essence, he says that the approach anthropologists take towards ideology comes down to trying to unmask that ideology as a false layer over some “authentic” system of meaning, by showing the true meaning, function, or power behind something the non-anthropologist takes for granted. Asad feels this is an untenable position, and this kind of framing is misleading. In particular, he takes issue with the notion of an “authentic” system of meaning as the counterpoint to the false, mystifying ideology. When he uses the term the “Wizard of Oz theory of ideology,” Asad describes the anthropologist as Dorothy, who unmasks the seemingly omnipotent Wizard as a frail and poor old man. Asad notes, though, that first of all the Lion gets his courage, the Tin Man his heart, and the Scarecrow his brain, “so that belief, however absurd, is shown to have its social function” (Asad 1979: 622). Further, he continues that “the essential reality which is revealed is itself a phase in the narrative of Dorothy's unconscious...the uncovering of 'essential meanings' is itself a production of discourse” (Asad 1979: 622).

In contrast to the roboticists' viewpoint, here the Wizard is the antagonist to truth and I think this is actually quite an apt metaphor for what many anthropologists attempt to do. As I explained in the introduction, Jennifer Robertson has recently done research with roboticists in Japan and has written a series of articles that focus on the conservative ideology she believes underlies their development (Robertson 2007, 2010a, 2010b). She argues that the Japanese government's policy to focus heavily on social robots seeks to avoid immigration as a possible solution to perceived demographic problems and therefore "reinforces the tenacious (if mythical) ideology of Japan's ethnic homogeneity" (Robertson 2010b: 62) while she also argues that social robots fortify the lower status of Japanese women through reproduction of unequal gender roles (Robertson 2010a, 2010b). Robertson seems to be claiming that the "true meaning" of social robots is a plot to reinforce Japan's social inequalities; to use Asad's metaphor, she seeks to unveil the old man (or old men) behind the screen who are pulling the levers and speaking into the microphone.

While the discussion of the Wizard of Oz may seem a diversion, I draw on this contrast because it is at the heart of much of what follows: a contrast between roboticist and anthropologist in role, but also an insight into how both approach problems. On the one hand, the respective uses of the metaphor place the two disciplines in juxtaposition: roboticists as the Wizard, anthropologist as Dorothy. Roboticists, in their metaphor, create the Wizard's power through misdirection; in Asad's metaphor, anthropologists seek to destroy this power through demystification. On the other hand, both uses of the Wizard of Oz metaphor share something deeply in common. In their own way, both use Wizard of Oz to describe that discipline's approach to making a problem and proposing some kind of (re)solution. They describe the "problem of problems", which I think can be understood in terms of "problematization" (Foucault 1997). The Wizard of Oz method as used by roboticists is a clever solution to a vexing problem—lack of sufficient technology to produce the desired effect. While it might at first seem counter-intuitive to "replace" a person with a robot, only to have to use a human to control that robot anyway, this makes sense when we consider the problem in a certain way—given that we already have a robot system, what do we do about the fact that it cannot understand natural language in outdoor environments? The sense in which the problem is constructed in such a way as to lead to certain kinds of solutions is what I mean by problematization. As for anthropologists, consider the language we use. Asad's Wizard of Oz caricature is a way of describing what anthropologists think they are doing when they try to “problematize” something, whether it is Berber religious concepts (as Asad discusses) or the politics of social robots (as Robertson discusses). When anthropologists problematize something, they seek a unique viewpoint through the questioning of something taken-for-granted. Then they try to demystify that taken-for-granted thing, peeling away the surface layer to reveal some underlying (“authentic”) meaning or cause.

I have referred to this as problematization, and I draw on two prominent theorists in this use. The first is Michel Foucault. Foucault, in his later years, started to use the term problematization in order to talk about what he called the history of thought—as separate from what he called the history of ideas and the history of mentalities. The following passage describes Foucault's use of the term “problematization” in relation to “thought”:

> It seemed to me there was one element that was capable of describing the history of thought—this was what one could call the problems or, more exactly, problematizations. What distinguishes thought is that it is something quite different from the set of representations that underlies a certain behavior; it is also quite different from the domain of attitudes that can determine this behavior. Thought is not what inhabits a certain conduct and gives it its meaning; rather, it is what allows one to step back from this way of acting or reacting, to present it to oneself as an object of thought and to question it as to its meaning, its conditions, and its goals. Thought is freedom in relation to what one does, the motion by which one detaches from it, establishes it as an object, and reflects on it as a problem (Foucault 1997)

What interested Foucault was the way that practices, actions, behaviours, objects and so on cease to be common-sense and given and rather become objects for thought, become problems to be solved. By focusing on the way that different problems, or rather problematizations, have arisen over time, he attempts to chart “thought” through history as it engages with these problems. Problematization is therefore the way that problems are made up, both as a freedom to explore new thinking, but also as the material practices that turn questions, obstacles, or other phenomena into problems and thereby condition any possible solution.

The second theorist I draw on (though to a lesser extent) is Michel Callon. Callon uses the same term, problematization, in his influential work on the scallops of St Brieuc Bay, to describe the first stage of his "sociology of translation" (Callon 1986). He describes the way that the scientists in his study recruit both themselves and various other actors (scientists, fishermen, scallops) into a new network. They form the questions to be answered ("is this experience [of Japanese scallops] transposable to France and, more particularly, to the Bay of St. Brieuc?" (Callon 1986: 201). Problematization turns these questions into projects, into problems, by tying various actors together: "the problematization, rather than being a reduction of the investigation to a simple formulation, touches on elements, at least partially and locally, which are parts of both the social and the natural worlds" (Callon 1986: 202). According to Callon, the problematization is also formed as the actors state what they want out of this network, as well as construct themselves as necessary to the project, construct themselves as an "obligatory passage point" (OPP) (Callon 1986: 202). According to Callon, the "problematization describes a system of alliances, or associations, between entities, thereby defining the identity and what they 'want'"(Callon 1986: 203).

Foucault's and Callon's use of the term problematization share some obvious similarities and some obvious differences. Foucault's method is historical and philosophical; Callon's method is sociological and based on Actor-Network Theory (ANT). Foucault stresses thought in his conceptualisation; Callon stresses network. But they both focus on a point where a problem is posed by one or more actors; they emphasise the change from non-problematic into problematic; problematization is the establishment of something new but not necessarily wholly constructed. Both see problems as rooted and arising out of a diverse assemblage of practices, technologies, and actors who are brought in to set the conditions for that problem and its many possible solutions. This means that problems are not simple and given, but rather complex and particularistic, reflecting (but not being reducible to) their context. They share a focus on the material analysis of practices that lead to problematization.

Problem-solving is what many consider to be the essence of engineering. Laudan (1984) argues that "change and progress in technology is achieved by the selection and solution of technological problems, followed by the choice between rival solutions." In fact, Vincenti, in his seminal historical work on engineering knowledge in the aeronautical industry, states quite bluntly that "we can start with the obvious statement that engineering is a problem-solving activity"(Vincenti 1990: 200).

If engineering is "obviously" problem-solving, then "problems" seem like a rather mundane topic. We all have "problems" and it is not obvious what any of these "problems" have in common. We have bowel movement problems, problems with our taxes, "open problems" in mathematics, "hard problems" in philosophy. And we have numerous social problems. For instance, anthropologist Roger Goodman has documented (and critiqued) the notion that Japanese society has a "problem" of returnee international youth, Japanese children who have lived overseas for some extended period, children who supposedly no longer embody a pure "Japanese culture" and therefore cannot adapt to the national education system (Goodman 1990). It seems anything can be a problem. But the corollary is that not everything *is* a problem. If Japanese youth who have lived abroad are a "problem", those who have stayed in Japan are not.

Perhaps because it is a mundane topic, problems should be of interest to the anthropologist, who, after all, is a student of the everyday. Likewise, if problem-solving is the essence of engineering, then an analysis of engineering needs to essentially be an analysis of problem-solving. We can take Lucy Suchman's *Plans and Situated Actions: The Problem of Human-Machine Communication,* the highly influential ethnographic and anthropological examination (and critique) of AI research, as instructive

(Suchman 1987). Throughout this text, the word "problem" abounds, describing various kinds of problems, problems for the anthropologist, problems for the engineer, problems of theory, problems of method. This in itself points to the importance of the very notion of a "problem". And this is substantiated by what I think is her main thesis: certain ways of solving problems by engineers (particularly by way of goal-orientated machines) lead to the design of "intelligent machines" that will invariably cause more problems when novices try to interact with those machines. Suchman's study is about how problems make a difference.

My use of the term problematization is therefore intended to orient the discussion towards an analysis of such technical problems in themselves. What are the ways and hows of problems, the conditions of problems, in this laboratory context? And what does this mean for potential solutions? To make sense of the Wizard of Oz approach, it is necessary to understand what problem it is attempting to solve, and how that problem is conditioned in such a way that the Wizard of Oz approach becomes a suitable, worthwhile, and productive solution. This chapter is therefore an exploration of problematization, as a creative practice, in one particular ethnographic context. My aim in this chapter is not to develop a systematic typology of Japanese social robot problems, although some distinctions and categorisations may come to be implied. Nor is to describe Japanese social robots as somehow both coherent and uniquely unique as a field. Rather, my aim is to elucidate the form and practices of problematization. In this way, my focus follows Andrew Pickering's argument in *The Mangle of Practice* (Pickering 1995), operating not in the "representational idiom" but in the "performative idiom," focusing not on *representations* of problems but rather on *what those problems do in the world*.

The Goal of Natural Interaction

Before discussing the main content of this chapter, it is first necessary to lay out what the "goal" of social robots often is, because this goal is directly related to what is then a problem. The goal, in simple terms, is to be “natural” (*shizen*), as in a robot that “seems natural” or a robot that has “natural” behaviour. “Natural” means that a robot acts in a way that meets peoples unconscious expectations; it does not feel like an artificial or strange interaction but rather flows easily. As roboticists understand it, “natural” for a social robot includes verbal and behavioural fluency, as well as the ability to communicate seamlessly with people. All of this gives a person the impression that he or she is acting with an anthropomorphic agent.

Being “natural” is therefore deeply connected with being “social”, both terms that roboticists often use in the laboratory and in publications. “Social,” as Mark explained it to me, refers to human communication and interaction. Roboticists, when they use the term social, are not referring to sociological concepts of social on the macro-level, concepts like social structure. While Mark, after reflecting, suggested these two levels might be related, he explained that social robot researchers are mostly interested in the social at the level of face-to-face communication. Pushing him on the human inventiveness of sociality he responded that “I don't see social customs as invented; they are natural for us, emergent.” Mark also explained that “natural interaction” is like “affective interaction,” a concept from the field of human-computer interaction (HCI), that is used to describe the act of designing technology so that it takes into account people's emotions.

Mark explained that for him the opposite of “natural” is “unnatural”, “artificial”. To understand the meaning of this, however, requires a degree of caution. By “artificial” Mark does not mean the simple fact that the robot is a manufactured object. Clearly a robot is artificial in this sense. Rather, he means that it feels unnatural. As he described it, “natural” is just our human way of being. A robot acting “naturally” would be transparent for us, allowing us to interact in an intuitive and unselfconscious way, while a robot acting “unnaturally” would seem artificial because we would be conscious of the way that it is not like a human. A robot that seems “uncanny” (Mori 1970) does not seem natural. We cannot interact with it in the same way as a “normal” (person-to-person) social relationship. In this sense of the word, “natural” refers not to the essence of the thing itself but rather how that thing is perceived by human beings.

While “natural” can refer to the human feeling towards something, it can also be used by roboticists to mean something slightly different. In the same conversation, Hans explained to me that he believes that what is “natural” can be set by the designer. According to him “the natural way for a robot to be was whatever way we made it.” He went on to explain that, for example, it is natural for doors to have doorknobs. Hans's position here seems to reflect an earlier conversation he had with Yasuda-san, a head at the laboratory. In a conversation I had recorded seven months previously, Hans wondered aloud what “natural” might mean in reference to an artifact. Yasuda-san replied that, with *AIBO* (a robot toy dog), Sony (the manufacturer) made *AIBO* and therefore decided what is natural *for it*.

This implies that the meaning of “natural” can have two related, but slightly different, meanings. On the one hand, Mark describes the way that natural is our way of being and that a social robot is natural insofar as it meets our expectations. We feel it is natural. Natural, in this usage, comes from the human's interpretation of the robot. On the other hand, Hans and Yasuda-san also reflect on the fact that natural can be set by the designer. This is based on the nature of the robot itself, given by its designer. In this sense, “natural” seems to refer to the robot with reference to the essential quality of that robot.

What is “natural” may also be quite culturally specific. For example, one of the researchers, Yamashita-san, explained to me that they must be very careful about designing service robots for Japanese customers, because Japanese customers are particularly concerned with politeness. In the example he was working on at the time, he was having some trouble fully specifying the actual language that a customer service robot should use because of the complicated dictates of Japanese social etiquette (which will in turn be understood differently by different people). In this sense, politeness might be more crucial to a "natural" interaction in Japanese than it would be in English.

Further, it is worth considering whether the specific term "natural" might vary in cultural meaning. Clearly, much has been written about the Japanese concept of nature (*shizen* in Japanese) (Asquith & Kalland 1997; Tellenbach & Kimura 1989; Thomas 2001). Many argue that the Japanese concept is quite specific and different from the Western concept. In particular, these arguments tend to focus on the nature/culture dichotomy (or lack-thereof) in Japan. Typical is Kyburz's discussion where he argues that the traditional Japanese concept of nature is one in which the "world view does not conceive of man and nature as polarities, but as mutual parts of an all-comprehensive whole" (Kyburz 1997: 258). According to this view, Japanese are not dualistic, at least traditionally, they see "no fundamental discontinuity between man and the other categories of phenomena" (Kyburz 1997: 259) and "'Nature' seems to have been no different from the cosmic whole of which man and his culture are integral parts" (Kyburz 1997: 274). Based on this kind of work, some might suggest that the use of "natural" in the case of social robots, as well as the connection made between social and nature, has some special root in unique Japanese culture.

But it is important to remember that the word "natural" is not the same as the word "nature". Granted, the actual word used, in both English (*natural*) and Japanese (*shizen ni*), is simply the adverbial form of the noun nature (or *shizen*). But the usage by roboticists has little to do with natural in the sense of categories, "natural" objects like trees or animals, "natural" differences like sex, or a nature/culture dichotomy. Mark and other roboticists use the word "natural" to talk about a person's understanding of their own behaviour as well as their understanding of observable human and/or robot behaviour.

Natural is a term that packs a lot of meaning, but it is also one that is ultimately not easy to define, especially since roboticists, in my experience, have fairly little interest in defining it. In other words, to be “natural” is not really problematic for them. The notion that it is tied to human expectations is therefore my own analysis that arises out of patterns of use. Rather than give a definitive meaning, this section has tried to give a sense of the term because “natural” acts as a goal for social robots, and in this way conditions them.

The Network Robot System at Universal Studios Japan

The teleoperated social robots were part of a project to develop a network robot system, a system whereby a number of robots and other technologies are connected as part of a networked environment. This network robot system was developed as an ostensible customer service system, for use in shopping malls and other public spaces. The project was one of, if not the, largest project in the robot laboratory at PC. The number of staff on the project was approximately 30, though it is difficult to give a definitive number because the laboratory was in a constant state of turnover. Many of the research staff are Japanese university students, international students working for fixed length internships of approximately six months, and temporary visiting researchers and post-doctoral fellows from both Japan and abroad. Since the network robot system project is so large, it involved many (perhaps most) of the researchers in the laboratory. The project was five years in length, and in its final phase when I first arrived in December 2008.

The project was perhaps somewhat unique in that it focused heavily on developing and testing the system in field trials. These field trials put the system in a real world environment in order to test its functioning in uncontrolled environments. As a long term project, a number of different shopping malls had been used for field trials throughout the project cycle. At the time I was doing my fieldwork, the shopping mall was the shopping arcade, Universal City Walk (UCW), outside Universal Studios Japan (USJ) in Osaka. Staff and researchers on the project would split their time between the field trial site and the laboratory. The laboratory is located in south Kyoto prefecture, in a relatively isolated and rural technology park (though ostensibly a “Science City”), while Universal Studios Japan (USJ) is in the west of Osaka near the port. The distance between these two places is about one and a half hours by train, and so any single laboratory researcher would usually go to only one of these sites each day. Most of the time only a few researchers would be at the USJ site on any particular day, but on certain demonstration days (discussed in Chapter 1) more would attend, including the main supervising researchers as well as about ten staff and junior researchers who monitor and operate various parts of the system.

The physical environment of the system is as follows. The laboratory has rented a store front for their project. Above this store front are the English words "Robot Paradise,” written in bold red letters—the two Os also contain dots and a curved line to make a happy face. Visible on either side of the sign, forming a trim between the top of the glass store front and the ceiling, is a poster with a line of colorful, yellow, orange, red, blue, green hobbyist robots[11], along with English expressions—sound effects such as “yackety-yak” and “Ta-da” as well as speech bubbles with phrases such as “what can I do for you?”, “hey!”, and “ooh!”. Written below, on the glass in the store front window are 4 lines: “Communication Service x ROBOT,” “Communication Service x ROBOT” (*sic*), “Touch Future x ROBOT,” “Future Communication x ROBOT.” Entering into the store front (but also visible from the outside, through the glass) is a room with white walls, the far end being a white curtain. The room has a number of posters on the wall that explain, in Japanese, PC's robot system (The Network Robot

11 Small, affordable robots that an amateur can purchase, build, and program themselves for their own individual enjoyment. The hobbyist robots displayed here were developed at least in part by PC.

System) and its possible uses. Some of these posters explain in detail the sensors and the computer network that manages the robots, the technical details of the system. Other posters explain how these robot systems, could be adopted into social tasks. One poster details the use of the robot system for marketing purposes. The robot would act as a customer service representative and customers could seek out product information from it. Another poster examines a more diffuse use of robotics, designing spaces for "robot architecture" and "robot integration". This poster contains images of an urban street with people, cars, robots, and home appliances on the left-hand side with further technical details on the right. The "store" front therefore contains images and English expressions to present an image of carefree fun and play. The play, the cosmopolitanism (English captions), the surroundings of the theme park and shopping mall, all work to bring robots into the "expanding culture industries....the producers of images, who are now at the core of Japanese consumption" and, therefore, the core of contemporary urban Japan (Clammer 1997: 46–47). Still, the posters and display booths also present information in a form presentable to the busy stakeholders in government and business who will attend the field site on scheduled demonstration days, maintaining the laboratory's prominent position in officially-sanctioned Japanese science and technology.

The project primarily used the robot CRO-2 (Figure 3), though sometimes other robots were temporarily incorporated into the network robot system as part of short-term projects. These other robots include RoboBin (an Italian designed garbage-collection robot discussed in Chapter 1), ASIMO (the humanoid robot made by Honda), and Wakamaru (a humanoid robot made by Mitsubishi Heavy Industries). CRO-2 is one of a series of "communication robots" manufactured by a spin-off company associated with PC and Professor Masuda (Chapter 5). Like most of these robots, CRO-2 is primarily designed to be a platform for research in human-robot interaction.

CRO-2 is a humanoid robot. It has a body, arms, and head. Its arms move around with various degrees of freedom in its shoulders and elbows, but it has no gripping hands and the arms end in blue half-spherical stumps. Its face contains two large cameras as its “eyes”, but otherwise it lacks much in terms of facial features. It can move its head around, and does this to direct its eyes (cameras) when speaking with a person. It has no legs but moves on small yellow wheels at the base of its torso. The body is mostly black, except for metallic sensor pads on its arms and chest, which allow it to register tactile feedback. It is about the height of a small child, about 120cm tall. When used in demonstrations and experiments, a tall pole with a microphone is suspended behind it. It runs on a large battery that needs to be recharged after approximately a day of use.

Figure 4: CRO-2, a communication robot

CRO-2 was one of the primary robots used not just in this project but in others at the laboratory as well. Since robots are very expensive, the laboratory can only afford to own a few and these are used in most new projects, whether long-term projects such as the network robot system or short-term student projects lasting only a few months.

Such individual robots may have a range of sensors, but these are short-range and therefore the robot has only limited information about its environment. To solve this problem, the network robot system also incorporates a diffuse environment of sensors, such as laser, audio, video, and tactile sensors, into one system. This data is then used to construct a representation of the entire environment in real time. This will give a much more complete image than one that could be constructed with only the sensors that are physically attached to the robot itself.

The network system is structured in four layers: Level 1 is the sensor system, Level 2 the integrated human positioning system, Level 3 the primitives of behaviour system, and Level 4 the application management system. I shall explain these systems in order. Level 1includes all the sensors that gathers data from the physical environment. This includes the cameras, microphones, and tactile sensors on the robot itself but also other sensors in the environment, such as sensor towers. Sensor towers are set up in a perimeter around the area (i.e. the area outside Robot Paradise) and use lines of light to detect both the presence of objects and the movement of those objects within the area. This means that for the system to be used, these sensors and the system have to be painstakingly calibrated in any area they might be used. This provides much more information about the environment than would be available from only the sensors on the robot itself. The aim of the sensor system is to allow flexibility, so that new sensors can be added without greatly affecting other parts of the system. In this way it is extensible for other robots, locations, and tasks.

The data collected from the sensors is the raw input into the system. All of this raw input needs to be coordinated and incorporated into one model of the entire area. Much of this sensor data is used in the next level, the human position system, which is used to create a virtual map of the demonstration area. This is done dynamically, as the sensor data is tracked over time and space. The changing sensor data is then used to establish human positions within the trial area. A graphic display, used for monitoring, is available to the researchers and shows people and robots as coloured dots crossing the screen. This human positioning is one of the main advantages of the system, because (ideally) it has information on everyone inside the trial area.

This human position system is then used in the third level, a system that generates “primitives of human behaviour”. It analyses the movement suggested by the human position system and then can give data about how a person is acting. For example, it will analyse whether they are walking fast or slow, in a straight line or erratically. Such data are the primitives of behaviour.

These primitives are then used by the fourth level, the application system, which coordinates this information in order to actually dispatch the robots and run the system. As the top layer of the system, this is the space for developing models of action for the robots using the inferences generated from the lower levels of the system. For example, if a person is walking slowly and erratically, the system will infer that they will be someone that might want assistance because they seem to be confused or uncertain about where they are going. Conversely, if a person is walking quickly in a straight line, they probably do not need assistance from the robot and they may even become annoyed if the robot tries to approach them.

While the robot system is experimental, exploratory, and mainly an example of academic research, the system also has its stated commercial purpose for those visiting a demonstration: the customer service system. In particular, the robots offer guidance and information. This could be directions, such as to the toilet or the train station, but also potentially product information as well. Therefore the four or five CRO-2 robots roll around, approaching people, greeting them, and asking them if they would like some help. At present, it is not actually used to perform this function but rather works as a proof of concept. People do converse with the robots, small groups forming around them, though they are not usually seeking any specific information. Instead they shake the robots “hand”. They speak to it and see if it can understand. On days when there is no demonstration the robots are usually turned off, either for maintenance or because there is simply no reason to have them on.

The network robot system is a large, diffuse network across an area that includes both robots, sensors, and other infrastructure, located in an environment that seeks to inform people about the possible future uses of social robots while also evoking the sense that robots can be friendly and helpful to an imaginative future world of play, fun, and work. The technical side of the project aims to make robots that can act autonomously in providing customer service to shoppers through the tracking of people within the area as well as the automatic analysis of their behaviour.

The Problem of Poor Speech Recognition Software

As I explained at the start of this chapter, one of the most difficult problems for those making social robots that provide services, at least at this particular laboratory, is that of language recognition for speech. This means having a computer understand what a person says. The system has to accurately recognise the sounds, translate those sounds into words, and then interpret those words correctly for meaning. Obviously, each step is very important. Apart from understanding the meaning of speech (a very difficult problem), it is also often impossible for the language recognition system to identify the exact words that have been spoken. Within the actual space of a controllable laboratory, speech recognition is possible, at least to a small degree. But, according to the researchers, this becomes basically impossible in the real world setting of the shopping centre. The shopping centre is noisy and the environment unpredictable. Outside sounds interfere with or completely drown out the person's voice, and the system cannot automatically analyse what has been said. From what I have been told, the speech recognition system is basically useless in a field trial. Ideally, the solution should be to have better technology, such as a better speech recognition system. But a practical solution is very important as well. In this case, that practical solution is to have operators control the robots using the “Wizard of Oz” method. In this example, the operators were physically present at USJ, in a booth next to the field trial.

The Wizard of Oz approach

In the “Wizard of Oz” method, human operators can control the robots, at least to an extent, so that the robot interact more smoothly. These human operators are physically present at the field-trial site and listen to the audio generated by the robot. They sit inside a small, isolated booth just outside Robot Paradise (the door of which is visible on the left hand side of Figure 3), with headphones and a computer monitor in front of them, and listen to the audio speech that has been registered by the robot.

The operator therefore solves the problem of speech recognition because an actual human can intervene at the point when there is a problem (when someone actually speaks to the robot). In other ways, the robot can continue to work autonomously by moving around itself, identifying customers, and so on, while the operator adds the extra, missing functionality. Of course, this also means that operators may need special knowledge. For example, if the situation is a shopping centre, the operator probably needs to know enough about that shopping centre and the robot's job within that shopping centre so that that the operator can quickly intervene and provide answers to all the questions a customer might ask.

The Wizard of Oz solution has a number of advantages. As I explored in Chapter 1, research with these kind of social robots is approached not just as a development of technology but also as a kind of social science. Social robot researchers use the Wizard of Oz method so that they can research people themselves. They can conduct experiments to find out people's response to the robots, quickly changing their models of human behaviour without the need for software implementations of those models. They can also see how people will likely react psychologically to advanced robots before those advanced robots are yet developed. Since the focus is on people, not on the effort to make a specific technology as such, actually implementing the system can come second.

The Wizard of Oz approach also allows the system to be developed, tested, and used without the need to wait for better speech recognition systems. Some researchers are working hard on speech recognition development, but other researchers are working on different aspects of the system. By using the Wizard of Oz method, these other researchers can continue to move forward with development and testing without having to wait on the speech recognition people.

Further, in this specific case, the Wizard of Oz method is justified because it facilitates research in field trials. This project is rather unique in its sustained focus on field trials in open and public environments. Researchers at PC believe that such open and public environments give different kinds of data from laboratory experiments because of their unpredictable and uncontrollable nature. They feel that this data has been sorely lacking in many social robot research projects that remain in the laboratory.

Another important advantage is that it makes the system look better to the non-specialist. This may seem superficial, but for roboticists it is a real pragmatic concern (see Chapter 1). One small malfunction will overshadow everything in their system that works well. In the demonstrations, the roboticist must put on a theatrical production, much like the Wizard of Oz himself.

For these reasons, the Wizard of Oz is a good solution to the roboticist's problem, and, though a machine solution is usually preferred, a solution that works is better than no solution. In practice, a technical system such as the network robot system is going to employ both machines and humans. In the case of this problem, the inadequacy of speech recognition software, the solution is to deploy human perception and intelligence as a technical means to fill the technological gap.

Multiple Controllers and the Development of Elaborated Problems and Solutions

In a simplified solution to the problem, one controller can control one robot. But the model of one controller to one robot creates a new problem to be solved since it is potentially inefficient if the robot is partially autonomous. It may in fact be possible for one person to simultaneously operate multiple robots because robots may become increasingly (semi-)autonomous. In fact, such a system is exactly what they used in this project.

During the field trials, the operators switch back and forth between different robots. For example, if there is one operator and four robots, the operator has status information for each of the four robots. When a robot engages in a conversation, coloured indicators appear on the operator's screen. If two robots engage simultaneously in different conversations, the indicators allow the operator to determine which robot is currently waiting for instructions and then switch control to that robot. Since the conversations are simultaneous, the robot records the speech from the conversation and saves that as an audio file, which the operator can then listen to a few seconds later. Overall, the researchers at the laboratory found this method to be successful and they believed it would be a more efficient use of human operators.

But, while successful, this solution does lead to new problems, opening up new spaces for research, a phenomenon that sociologist and historian of science Andrew Pickering calls “resistance” (Pickering 1995). “Resistance”, along with “accommodation”, refers to the way that the material world and human scientists act as part of a dialectic, a “mangle of practice” between humans and non-humans in an endless “dance of agency” (Pickering 1995). For example, one specific problem is that, since the operator is listening to recorded rather than real-time audio, there is a gap between when the robot should ideally respond and when the operator can issue that response. If two robots are both having conversations, then this time-lag is likely to be increased. But this waiting period can be frustrating for those interacting with the robot. In the words of roboticists, the robot will not seem "natural". One way the roboticists attempted to solve this problem was to exploit communication practices in order to control the conversation. For example, while the robot is waiting for a response, it could speak for longer, speak more slowly, speak with some other pre-determined and generic content, intervene with a request for a hand-shake, or some other delaying actions. The hope is that this behaviour may smooth the interaction, in other words provide a *natural* interaction.

The "dance of agency" between humans and non-humans, the endless construction of problems and solutions, needs to be understood as an embodied practice in the material world. Morana Alač (2009), in another ethnographic study of a Japanese social robot laboratory, documents the ways that problem solving and design is embodied in the very movements of researchers. She describes in fine-grained detail the way that roboticists move their own bodies, for example their hands or limbs, in order to think about and design the way the robot should move. While her focus is on the body-in-interaction, equally important for my purposes is that these embodied practices are part of problem solving—in other words these are the creative and material practices of problematization. In one example, she describes how a researcher moves his body, touches his shoulder, lifts his arm, feels his neck, in order to understand how a robot could accomplish the same movement (Alač 2009: 505). Tellingly, in the process of performing these actions, he exclaims "Oh this is tough" (Alač 2009: 505). This statement does not seem to mean that the physical act of moving his own body is tough, but rather that when movement has become a problem, an object of thought in problematization, it becomes difficult. Creative, bodily, material practice turns taken-for-granted movement into a difficulty, then into problems for design, and finally into a new solution (such as an artifact function). That new artifact function may then come to have some pragmatic function, in the ways described in Chapter 1.

In the case of the teleoperation system discussed in this chapter, problems and solutions also continued to multiply, and I want to make clear the recursive properties of such multiplication. For this specific task, the researchers had implemented a system where one operator controls three or four robots. According to Mark, one of the prominent designers behind the network robot system, this was a fairly simple instance of a larger and more general problem. He and some of the other researchers began asking what would happen if they considered all the ways that operators might possibly be assigned to robots; not just one-to-one and one-to-many but also many-to-many and many-to-one. What if they had many operators operating many robots across many different spaces? What if they had multiple people taking turns controlling one robot? How could they make a technical system that would allow a flexible number of people to operate a flexible number of robots? From this technical problem, which is an extension of an existing technology, they envisaged a social use whereby an entire staff of operators could provide service, help, and companionship to a diffused group of elderly people across space, all through teleoperated social robots. From the operator perspective, this would look like a call centre, where they work in front of a computer dealing with diverse customers. From the elderly person's perspective, they would be interacting with a social robot that, despite being controlled by many different people, would give the impression of having a stable (robot) identity. Based on this new potential vision, the problem was how to do this efficiently and effectively. Roboticists at the laboratory were therefore starting to experiment with operators in order to investigate whether humans have the ability to jump into the middle of a conversation part way through, as well as designing prototype programs that would facilitate multiple people controlling one robot.

The impetus for this work lies in the creative and recursive practice of problem-solving as a technical activity unto itself, not in the “real-world” problem of elderly care. When I asked various researchers if they actually thought this call centre of teleoperated social robots was a good idea as a practical and desirable reality, some, upon reflection, said they could see some potential negative implications, such as turning the job of nursing into a "sweatshop" of robot controllers. But it would have little impact on the work of roboticists themselves, because their focus is on technical problems in the first instance. This problem, as we have seen, arose not from some first principles approach to a *use* of teleoperated robots, but rather from the *technical recursion of problems*. One of the most important products to be constructed in the practice of research is a new problem, or rather new set of problems. This making of new problems, what I refer to as problematization, leads to new problems (still rooted in the original goal) such as how to enable a natural interaction when operators, working in turns, may not know the history of a conversation with a service user. This opens a space for research on operators. Is it better for the system to automatically switch between robots to force the operator to multi-task, or to allow that operator to control this switching themselves? Mark said his results were mixed; some operators would become bogged down with a single robot, rarely switching, and for those people, automatic switching was better, while for operators who had what he called a "big picture" approach, it was more effective to let the controller choose when to switch. In another problem they encountered, Benjamin told me that they were still uncertain about the effects of this kind of work on operators because some quickly felt swamped and burned-out, while others did not. But according to Benjamin, many of those people who did not find it overly taxing were not actually doing the job properly, but simply sat staring at the screen while the robot was waiting for a response, and so perhaps did not have a firm grasp of either the system or their task within it.

Clearly, the creation of new problems does not imply anything wrong nor any "failure" in the research process. Rather, it is the direct result of an open-ended and recursive research process. In fact, the generation of problems is quite good for the roboticist, and actually necessary, because, insofar as research is a dynamic process, the researcher needs problems in order to continue working. In this sense, researchers appropriate new problems as part of what Pickering terms “opportunism in context” (Pickering 1984: 12–13), whereby scientists make use of resources in order to keep their real work going. In such a scheme, problems are one of the most important “resources” of all. One insurmountable “problem” would be to not have enough problems. A world with no problems is the “dystopia” that Ray Kurzweil, technologist and prophet for human-robot-machine fusion, lays out on the first page, with reference to an episode of *The Twilight Zone,* in his immensely popular *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* (Kurzweil 2000). He claims that “we [humans] live to solve problems, but we don't want them all solved, not too quickly anyway. We are more attached to the problems than to the solutions” (Kurzweil 2000: 1).

Student Projects: Humour and Terminology-Leading as Possible Solutions

So far I have discussed the productive act of problem-generating. But, as an artifact of the writing process, the story may seem to be completely linear. While problems and solutions recursively create new problems and solutions, the impression I have given is that there is some single direction in which these problems and solutions develop. To provide a corrective to that narrative, I want to examine some other projects, done by individual students, to show how they relate to the original problem of a social robot that is error prone in its speech recognition system in particular and its communicative abilities in general. Problems and solutions develop in multiple directions, where solutions do not proceed in a linear fashion nor are they mutually exclusive.

In one project, Benjamin was exploring the use of humour in social robots. He explained that when a robot makes an error followed by a correction, the result is rather awkward. For example, the conversation might go as follows:

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User: "Where is the toilet?"

Robot: "The train station is that way. The toilet is that way"
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The problem is that this form of error-correction does not seem like natural speech and interaction. The separation between the two sentences is choppy and abrupt; it does not flow. Benjamin suggested that people might feel more comfortable with it if the robot made some kind of joke such as:

Robot: "The train station is that way. Oh shit, where's my brain. The toilet is that way."[12]

In this example, the awkwardness created by the error is, if not fixed, smoothed over. Clearly, the best case is that the robot does not make any errors, but this is unrealistic and errors are bound to occur. Errors are statistically, if not deterministically, predictable. When these errors occur, instead of giving the impression of a faulty machine, humour can be inserted that will provide a more "natural interaction." As Mark said in one of the meetings on this project, jokes are "social *error correction*" (an example of the link between rhetoric and technical reasoning, a topic that I explore further below). This problem is similar to the insufficiency of speech recognition software, the first problem discussed in this chapter, because these errors also arise from defects in the system and it is therefore a matter of managing a less than ideal situation. But the solution is quite different, instead proposing jokes as the answer and leading to an entire project on humour. In turn, this project spawns other questions such as how to make a robot use and understand humour. Such a project includes researching, and thinking about, what it means for humour to be natural, considering how the effectiveness of this humour mechanism could be measured and whether this measurement was even important. The project was still ongoing in my fieldwork and, to my knowledge, no final solution had yet been realised.

A second example is based on the research of a Japanese Master's student named Takashi-san.

12 We were talking casually, and he quickly added that the robot would not actually be made to say "shit."

Takashi-san's project was to test experimentally whether it would be possible to lead people to use certain vocabulary that would be easier for the robot to understand. Like the previous projects, the goal was to have a robot that seems natural and the problem was that robots do not have the natural language facilities of human beings. In this case, the vocabulary of the robot may be much more restricted than the expansive and unpredictable vocabulary that people generally use. People can describe things in innumerable ways. For example, a small, red *Neon Genesis Evangelion manga* comic can be labelled as a book, a *manga*, a magazine, a red book, a small book, *Neon Genesis Evangelion*, and many other things (I use English here to demonstrate the reasoning—the experiment was conducted in Japanese). The ideal natural social robot would be able to understand a person using natural language. But, in actual fact, current speech recognition cannot achieve this because no robot has such complete functionality in natural language.

Takashi-san's proposed solution was to try to guide people to name things in certain ways. He would have participants enter the laboratory and sit in a prescribed location with a microphone attached to their clothing. The room contained an assortment of different objects, mostly books as well as the robot CRO-2, located inside a clearly indicated testing area. The participant was instructed to pick some object in that testing area, point at it, and then indicate it verbally. For example, the participant may say "*manga*" and point to the *Neon Genesis Evangelion manga*. CRO-2 would then point at the object and indicate it verbally. They would continue for a few more objects, and then there would be a short break and they would go through the same objects again, five times. Takashi-san used the Wizard of Oz method to have the robot recognise and point at the correct object.

While CRO-2 would verbally identify the object, it would do it with a different label than the one the participant had given. For example, instead of "*manga"* the robot might say "red book" (*akai hon*). Takashi-san wanted to know whether people would switch, in successive iterations of the experiment, from their own term to the one that was used by the robot. If so, roboticists could use this technique to make robots seem more naturally fluent, even if they had limited vocabularies, because presumably the user would not notice that the robot was doing this. While I do not know the exact details of his final data, when I spoke to him some months later he did not seem happy with his results and it seemed people did not act in the deterministic ways that would have made his solution workable. During the experiment itself, he was especially frustrated (but also amused) by the fact that some participants, especially engineering and computer science students, seemed to be trying to test the robots capabilities during the experiment through successive iterations of more complex linguistic structures (obviously they were unaware that the robot was being controlled by Takahashi-san).

I highlight Benjamin and Takahashi-san's projects in order to indicate the different ways that the same, or a similar, problem can lead to quite different solutions. While both of these student experiments were either partially unsuccessful or still uncertain, they indicate a similar recursive structure of problems and solutions. Their solutions are also compatible with each other. A robot could use both these techniques at different times. They could even be combined with the operator solution, in order to create slightly more autonomous robots that nevertheless require operators at some points.

What else is not a problem?

Problem-solving is open-ended and generative, but not in every way. Not all problems are legitimate problems for research. Roboticists consider their real work to be programming and other technical work; likewise they consider real problems to be those amenable to programming and technical work (at least hypothetically). Problems are therefore restricted insofar as they must be able to be described in this technical way in order for roboticists to even consider them as topics for their own research.

In one of our first conversations, Mark told me that he thought there needed to be the right balance between robot and human work. Robots can take the work that is appropriate for machines and humans can do the "soul work," the work that requires the “human touch”. But he then added that he did not know how to find such a balance because he could not quantify it (and roboticists tend to feel that quantification is the only sound way to produce objective data). He said he was “not so much into this touchy-feely stuff.” His comments suggest that while this balance issue is interesting and important, it is not amenable to technical problem solving and therefore, as far as Mark is concerned, it is unapproachable. It is not a serious prospect for his research as it cannot be turned into a problem. For many roboticists, the legitimate way to think about problems is as technical problems that can be solved by computer programs. In a much later conversation, Mark was quite explicit in this stance. Hans had just criticised the effort to implement plans and goals in social robots. He said that many people had tried in the past but had been unsuccessful. Therefore he would not want robots (implemented with such goals and plans) to be "holding my kitchen knife.” Mark then replied that Hans must not trust engineers and programming languages. He went on to say that programming languages are just ways of describing problems. From Mark's perspective, human goals, plans, and problem-solving should, in principle, be fully describable in the technical language of machine programming. For Mark, problems correspond completely with programming languages which implies that nothing unsolvable by a computer is a problem.

As such, there is little issue in extending technical metaphors to a whole range of things not immediately identifiable with the workings of computers. In fact, these are not really even thought to be metaphors at all. As the same conversation continued, Hans and Mark were discussing how to make a robot that could manipulate objects by considering the example of a young child learning to open a can of cola (which we were all drinking at the time). Hans explained it in the Piagetian fashion of a little explorer encountering the world. Mark agreed and said "*yes, they are building low-level libraries.*" In computer science, a library is a collection of computer code that acts as a resource for developing other computer applications; these other applications can include those libraries in order to gain that packaged functionality. A low-level library usually refers to a library that is a part of an operating system or a part of the programming language: for example, a low level library may provide functionality for opening, closing, and writing to files, or for interacting with external devices such as input/output devices. Low-level code, in other words, is close to the machine language of the computer, and a low-level library is a library that provides basic, simple, but fundamental functionality. In the case of the child with the can of cola, Mark envisioned the child building up low-level brain software that would then be incorporated into more complex learning and behaviour later on in life. If a child had low-level libraries, from his or her experience playing with a coke can, this would develop the machinery for some basic motor control as well as real-world knowledge that would be applied to any physical activity the child did in the future. In this sense, the child builds up its brain and nerve structures in the same way that a computer builds up its libraries. The use of such technical imagery to describe living things is not unique to my fieldwork. Anthropologist Stefan Helmreich (2000) describes researchers in the new field of artificial life who actually see their computer programs as alive. These programs are models of evolution implemented as computational processes, as models of digital organisms. But according to Helmreich, these researchers claim that their programs are much more than mere models. They make impassioned pleas for the reality of this life, not as "just" a model of life, but as actual life.

These conversations exemplify the technical inflection that problem-solving has for many roboticists such as Mark. Selma Šabanović, based on her own ethnographic research, argues that robot researchers tend to take a technologically determinist stance (Šabanović 2010a, 2010b). In other words, roboticists believe that the social implications of robotics follows directly from the technology itself, which in turn acts as a kind of autonomous force. In her mind, this technologically-driven approach does not acknowledge the socially and culturally situated nature of design nor does it do much to include potential "users" as partners in design of these robots.

Within my own argument, this is a sense in which problems are conditioned and specific. Problems are describable in computer languages, and so questions, issues, or obstacles that are outside these descriptive capabilities are not problems in the sense of this particular problematization. One possible objection is that the Wizard of Oz approach, as a non-programming solution, contradicts this claim. But this is not so. While the Wizard of Oz approach uses a human as the operator, in principle that operator can at some point be replaced by technology. In this sense, it is still a technical solution and is still conditioned as such. The human operator is being "enframed" as a "standing-reserve" in Heidegger's terminology (Heidegger 1982), a resource for (another) human to use in bringing about some efficient casual effect. According to Heidegger, this is the essence of technology, and it is precisely in the fact that not only "inert objects", but also humans, can become standing-reserves that signals the main danger of technology.

Conclusion

> ...the work of a history of thought would be to rediscover at the root of these diverse solutions the general form of problematization that has made them possible—even in their very opposition; or what has made possible the transformation of the difficulties and obstacles of a practice into a general problem for which one proposes diverse practical solutions. It is problematization that responds to these difficulties, but by doing something quite other than expressing them or manifesting them: in connection with them, it develops the conditions in which possible responses can be given; it defines the elements that will constitute what the different solutions attempt to respond to. This development of a given into a question, this transformation of a group of obstacles and difficulties into problems to which the diverse solutions will attempt to produce a response, this is what constitutes the point of problematization and the specific work of thought. (Foucault 1997)

The introduction used the metaphor of Wizard of Oz to both introduce the specific social robot project under examination, and also to spark thought about problematization and ideology. We noted that Asad critiqued the notion of ideology within anthropology as a “Wizard of Oz” theory, whereby the game is to reveal the awesome power of the Wizard as so many human machinations. For Asad, this leaves open the question of how that ideology, that discourse, becomes authoritative and he suggested anthropologists address this question in particular. I want to suggest that problematization potentially avoids Asad's critique.

In the introduction to a recent collection of Foucault's work, Paul Rabinow and Nikolas Rose provide a brief but instructive explanation of the term problematization which they explicitly contrast with Marxist notions of critique (Rabinow & Rose 2003). Within a Marxist notion of critique (i.e. a critique based in the concept of ideology), the critical analyst attempts to disturb the naturalness of everyday life. The analyst tries to show that the object of critique is not given but is rather the result of some specific (historical, political, economic, etc.) forces. Through such revealing, new paths for political action are revealed. We can see the resonance here with Asad's notion of the Wizard of Oz theory of ideology and the discussion of the term “problematize” in anthropology.

But Rabinow and Rose contrast this Marxist version of critique with Foucault's idea of problematization. They argue that, for the latter, like Nietzsche, “the most profound thought remains on the surface” (Rabinow & Rose 2003: xx) An analysis of problematization is not an attempt to reveal contradictions or some underlying truth, but instead it is an investigation into what has already become a problem. In doing so, the question is to ask about the conditions of such problems, including what kind of solutions have been made possible, because for any problem there are many possibilities.

With the goal of designing natural robots, one of the problems faced by the network robot system was the inadequacy of speech recognition software, a problem that generated solutions such as the addition and extension of human operators. These human operators presented new problems, with solutions that created further problems. While this is only one example, it demonstrates a process that occurs in many similar projects. Students also faced a similar process of generating problems and solutions recursively. This section has therefore tried to show that, to roboticists, the primary importance is making problems and solving them. Problems are approached technically and, ideally, a problem should be (able to be) described in computer programming languages and answerable by technological innovation.

Section 2: From Production to Consumption

While I have drawn on Foucault and the term problematization, most of Foucault's interests were not really in the kind of micro details of ongoing scientific practice as explored in Chapter 2, though he does occasionally examine technical problem-solving and artifact to design to illustrate his wider points, as in the famous example of the panopticon in *Discipline and Punish* (Foucault 1977). Rather, much of his concern was with the problems that direct the policy of states and governments in managing the health, productivity, and discipline of populations, so-called biopolitics. With this in mind, I want to return to the fact that, from the perspective of Japanese state policy, social robot development is being planned to solve one problem in particular: the demographic crisis of an ageing population. My concern is with the problem of this problem, a "problem of problems". As I explained in the introduction, it is not the fact that people are old as such that means they present a "problem", but rather that they need ongoing assistance because they are disabled, and, therefore, it is the existence of elderly people with disabilities that is seen as a problem to be solved. Robots are seen as a potential solution because of how this problem is conceived. By this I mean that social robots will be able to ameliorate the demographic crisis if, and only if, the problem of elderly people comes to be considered in a certain way. From the perspective of the state, the issue is that there are a lot of elderly people and not enough (human and financial) resources to care for them. Social robots can help by removing the need for these resources (in institutions, care workers, the time of young and productive kin) by allowing elderly people to continue to live independently. As such, we have a problematization of independent living. Within this problematization, the solution is found in technology.

> The [Japanese] Government recognises that it is in its interest to encourage independence in old age. However, to promote this trend, it faces the need for infrastructure and devices to assist the aged in everyday living when bodily and mental functions deteriorate. The Government is therefore interested in technology

> that provides some solutions to these needs and is playing a role in promoting aged-care technology. For instance, Government policy-makers hope to encourage elderly people to remain independent for as long as possible by offering various degrees of assistance in their own homes through Long Term Care Insurance (April 2000). (Dethlefs & Martin 2006: 56)

STS scholars Dethlefs and Martin (2006) lay out three potential policy options for technology in Japanese elderly care. First, Japan could adopt "internationally standard technology" with the implication "that major Japanese investment will not be made to develop new technologies for aged care" (although refinements to existing technology could be made, and there is still the issue of choosing appropriate and sound technology) (Dethlefs & Martin 2006: 49). They specifically highlight wheelchairs and hearing aids as two devices which have been imported, and suggest that, for example, as wheelchair technology improves and becomes standard, Japan could import innovative designs and/or fully manufactured models. Second, Japan could "take a major initiative in robotics for aged care, with significant investment, testing and promotion" (Dethlefs & Martin 2006: 49). This option should be familiar since it is exactly what has set the context for this thesis. Robots can provide assistance and care for elderly people, easing the labour requirements of actual human care givers. Third, Japan could take a "significant initiative in developing and promoting barrier-free technology, which consists of relatively simple and inexpensive innovations, such as light switches and eating implements designed for people with poor eyesight or limited dexterity" (Dethlefs & Martin 2006: 49). Barrier free (*bariafurii)* is the term in Japanese used to describe making things accessible and usable by disabled people. Dethlefs & Martin explain that these changes are typically much less expensive than option 2, and are made to fit the specific needs encountered by elderly and disabled people. In addition to the examples of light switches and eating implements, they also explain how many people with vision impairments had difficulty distinguishing between shampoo and conditioner bottles. After observing and speaking with such people, designers created new bottles that include tactile markings which can be used to tell them apart (Dethlefs & Martin 2006: 53). Another example is vibrating beepers. This design was originally for people who had hearing impairments, and they use this particular example to stress that barrier-free designs often have beneficial functions for all users (Dethlefs & Martin 2006: 54).

Dethlefs & Martin specifically describe three completely different options because they endorse a constructivist account of technology, in which the socially-embedded nature of technology is understood. In other words, they emphasise that technology always has alternatives, and therefore reject technological determinism. As I mentioned in Chapter 2, Šabanović (2010a, 2010a) has argued that technological determinism is the exact position that social robot researchers usually take, a position which she has critiqued. Dethlefs & Martin likewise point out technological determinism is often the default position of "groups with a vested interest in particular developments, such as companies marketing their products, [who] often promote the idea that there is only one desirable future" (Dethlefs & Martin 2006: 49).

Dethlefs & Martin emphasise that all three options have different advantages and disadvantages. It is, in particular, the latter two options that concern me the most in this thesis (although the fact that they highlight wheelchairs in option 1 is also telling in light of the ethnography that I will describe over the next two chapters). As Dethlefs & Martin explain, the second option, the robot option, is good for researchers who want to develop the latest cutting-edge technology, good for businesses who want high profits with expensive machines and technology, and potentially good for Japan's image in international circles of science and technology. Prospects for elderly people, they believe, are more mixed. They note that such robots may offer elderly people more independence, but these new technologies are potentially complex and may require extensive adaptation by their users. The prospects are also ambiguous for care givers. While their workload could be eased, they could also foreseeably become little more than machine keepers (recall the "nursing sweatshop" imagery from Chapter 2) or lose their jobs completely if they become redundant (Dethlefs & Martin 2006: 55). Option 3, the barrier-free option, has fewer, or more restricted, opportunities for researchers and probably smaller profits for businesses, but good benefits for care-givers and elderly because such technology is user-driven (Dethlefs & Martin 2006: 55). Dethlefs & Martin claim that the social relevance of technology often comes second in importance to academic researchers, who are more concerned about designing the most cutting-edge technology (as we can see from the first two chapters, this claim is supported by my own findings). For such researchers, restricting innovation to social relevance is a bothersome hindrance (and we can imagine that Professor Murakami would oppose it strongly). For businesses, while options are available for new markets, these markets are likely specialised and small compared with the profits from new expensive technologies such as robots. Still, Dethlefs & Martin point out that barrier-free technology presents opportunities for independent and creative inventors to design new innovative products. And, because barrier free is a user-driven and a bottom-up approach, it would clearly benefit the elderly and their care-givers quite directly (Dethlefs & Martin 2006: 56). Also, since barrier-free products are cheaper and more quickly designed and produced than expensive technology such as robots, the benefits for elderly people and their care-givers would be realised much sooner. Of course, they note, any actual policy is likely to be a combination of all three options. Still, as ideal types, their analysis brings out some main differences between the different options and also highlights the differences between producers and consumers.

In making the move from production to consumption, the next two chapters will focus on the concepts of barrier-free and independent living to see what they mean for disabled people who have adopted them for their everyday lives and for their politics. In a recent look at the relationship between anthropology and design, Lucy Suchman (who also works with computer scientists, cognitive scientists, and roboticists) has argued that the role of anthropology should be to critically reframe problems of design because such “reframings shift attention to that which overflows the frame” and that “those things that [exceed] the bounds of design comprise the conditions of possibility for its efficacy” (Suchman 2011: 16). She calls for “recognition of the specificity of location and the generative limits of method, such that a responsible practice is one characterized by humility rather than hubris, aspiring not to massive change or discontinuous innovation but to modest interventions within ongoing, continually shifting and unfolding, landscapes of transformation.” (Suchman 2011: 16). As I interpret Suchman, she seems to be calling for an approach that does not necessarily subscribe to the terms of designers/producers but instead opens up ethnography and fieldwork to explore terms like “design”, “production”, “consumption” and “use” much more broadly. From the perspective of roboticists, useful research, useful data, will be limited to direct observation of elderly people using robots with specific attention to how those encounters address the main design problems they have attempted to solve. By reframing the issue, I will focus on barrier-free and independent living within disabled people's own terms. Therefore, my exploration of independent living is not only a way to give a clearer idea of consumption, insofar as a social robot, and care more generally, is a product, but also to understand what “overflows the frame” by examining the politics of barrier-free and independent living for disabled people, including what these Japanese disabled people do and do not consider problems to be solved. I will do this through an ethnography of a centre for independent living in South Osaka that I will call simply ILC (Independent Living Center). Chapter 3 will examine the themes of technology, material culture, and the environment as they relate to barrier-free lifestyle, while Chapter 4 will examine the organisation and politics of ILC in more depth.

Chapter 3: Barriers on the ground: the world perceived through the wheelchair

Barrier free describes a wide range of material culture, but perhaps a primary exemplar is the wheelchair. Wheelchairs were used by almost every disabled person I worked with. And in Japan, as elsewhere, wheelchairs are the most common "badge" of disability (Stevens 2007: 265). A white wheelchair on a blue background is, of course, also the international sign of accessibility. If Marshall Sahlins is right, then, that, in modern society, manufactured objects have replaced natural plants and animals as the totems of human social groups, then the totem of disabled people might, therefore, be the wheelchair (Sahlins 1976). Still, the wheelchair is more than a badge, a sign, a symbol, or a totem. It is also a device made for moving around.

During my fieldwork, when I asked wheelchair users "*what is a wheelchair for you?"* I almost always received a one-word response: "*ashi*" (which, in Japanese, can mean either the leg, the foot, or both). Most people did not elaborate on this at all. Rather, simply answering "*ashi*" (feet/legs) was explanation enough as far as they were concerned. The consistency with which I received this same answer in fact astonished me. When I tried pushing Fujita-san, a woman in her mid-40s, by asking her whether this means that the wheelchair is like part of her body, she demurred. No, she clarified, it is her *ashi*. On a different occasion when I asked her the same question, received the same answer, and also tried probing her for more clarification, she said that the wheelchair takes the place of her legs. Without a wheelchair, she would be unable to move around. She concluded by telling me that if I really wanted to know what she meant, then I should just try using a wheelchair for a week. Ato-san, the man who is the main focus of this chapter, also explained his answer by saying that without a wheelchair he would be unable to go anywhere, unable to move around, and would spend his entire life in bed. Their explanations therefore make explicit a functional relationship between the work done by wheelchairs and the work done by legs. The only person who gave me a different answer was Uchiyama-san, the director of ILC. He answered that his wheelchair is part of his body and it is not his legs, reasoning that he already has legs. Perhaps these answers therefore support the claim that wheelchairs are embodied by their users (Taylor 2006). Through our conversations, those people I asked also stressed that wheelchairs are not things that they spend much time thinking about, just as most people rarely think about their legs.

This view of wheelchairs and legs or feet recalls Gregory Bateson's famous example of the blind man and his cane (Bateson 1972: 465). Bateson asks where the man stops and the outside world begins, and, analogously, where the man's mind is bounded. Is it at the surface of the skin, the handle of the cane, halfway down the shaft, at the tip? His answer is that separating the man and his cane is nonsensical. The man cannot be said to stop at some specific point. Rather, the blind man and the cane are part of a system which also includes the road the blind man walks along and indeed his whole environment.

It is with this connection that I turn towards one of Bateson's prominent contemporary exponents, Tim Ingold, whose recent essay, "Culture on the ground: the world perceived through the feet" (Ingold 2004, reprinted in 2011) provides the inspiration for the title of this chapter. Ingold argues for a "grounding" of culture, cognition, and perception in the foot. He claims that feet have been neglected in Western theorising because they are associated with "nature", while the hands have been given priority because they are associated with the human intellect. The foot represents our evolutionary past, shared with other animals; the hand is our thinking future and is unique to humans in their dexterity.

Ingold seeks to do away with this duality and thereby restore feet to their rightful place as our paramount tactile contact with the world through the ground, which in turn emphasises the fundamental relationship between the way we move and the way we think. A recognition of the foot, according to Ingold, brings immediate insight into at least three areas: (1) “the perception of the environment,” (2) “the history of technology,” and (3) “the formation of the landscape” (Ingold 2011: 44–45). For the first, he argues that perception depends on movement and therefore “locomotion, not cognition, must be the starting point for the study of perceptual activity,” that “what we perceive must, at least in part, depend on how we move” (2011: 46). For the second, he argues that “walking is a highly intelligent activity” (2011: 46). But that this intelligence is “not located exclusively in the head but is distributed throughout the entire field of relations comprised by the presence of the human being in the inhabited world” (2011: 47). For the third, he argues that “through walking... landscapes are woven into life, and lives are woven into the landscape, in a process that is continuous and never-ending” (2011: 47). This means that “human beings live in, not on, the world, and the historical transformations they bring about are...part and parcel of the world’s transformation of itself” (Ingold 2011: 47).

But what does “culture on the ground”, the “perspective of the foot”, look like for disabled people for whom their wheelchairs are their “feet”? In this chapter, I discuss Ato-san, a disabled man (a man with cerebral palsy who uses a wheelchair and cannot communicate verbally), his barrier-free lifestyle, his being-in-the-world, his dwelling with technology in an urban environment. On the one hand, Ingold's theorisations on topics such as movement, skill, and technology (2000, 2011) strike me as much more faithful to my fieldwork experience than a focus on the abilities of Ato-san's body, much better than a focus on his disability as an individual medical condition like cerebral palsy. On the other hand, a “perspective of the wheelchair” challenges both the universalism of walking and also draws attention to the importance of barriers in the environment. While Ingold sometimes makes a nod to barriers and obstacles, he does not really develop a political notion into the fundamental structure of his analytical framework (a criticism he himself has acknowledged and been troubled by: see Ingold 2005). In developing a notion of skill and dwelling in the world that takes into account the specific experiences of Ato-san (and other disabled people I worked with) and his barrier-free lifestyle, this chapter will also attempt to introduce such a politics of barriers.

Introducing Ato-san

Ato-san is 53, born in 1959, making him an *ojisan*, literally "uncle" but meaning a middle-aged man. He was born in Yamanashi prefecture (a place, he informed me, that is famous for peaches), but moved to Osaka when he was still an infant. Between the ages of 9 and 14 he was in an institution for children with disabilities. He was then at school until 21, and then again in an institution, this time for adults with disabilities, until he was 28. He said that institutions were very harsh, time was tightly controlled, and the staff were very strict. From the age of 28 until he was 47, he lived in his natal home with his parents in Ibaraki city, a northern suburb of Osaka. After both his parents passed away at around the same time (his only remaining family is his one younger sister), he took up independent living six years ago. He said it was initially very difficult, and often still is, particularly managing his money, which is a trouble for him. All his income and support come from the Japanese state. He receives the national pension, a special allowance for those with severe disabilities, and rent, as well individual care funds used to hire daily personal attendants ("helpers" who assist with many tasks throughout the day, such as eating, moving around, going to the toilet, and so on), though he finds the amount is difficult to live on. Further details of these systems are described in Chapter 4. Nevertheless, he enjoys the freedom and the fact that his time is not controlled for him, and he also values the time he can spend with his girlfriend, a disabled woman (also using a wheelchair) who works at a local hospital. He first heard about the concept of barrier free nine years ago (when he was 44), from *24 jikan terebi*, an annual 24-hour marathon television funding drive on Nippon Television (NTV) that aims to raise money for various issues in welfare, environment, and disaster relief. He explained that when he was young, there was no concept of barrier free.

While friendly to me from the start, he has a reputation for being rather austere and reserved. Indeed, others at the centre were often surprised that he was keen to help me in my research. They believed he was private, in a sense very "Japanese", and that he would not be open to outsiders. This impression, however, did not fit with my experience of speaking with Ato-san.

Like many TOP members ("take-off point"—the local community centre attached to ILC where Ato-san usually comes during the day), he spends the day in a wheelchair. Also like most TOP members, he is unable to work at a regular job and instead passes most of his time at leisure. He dresses in comfortable athletic clothing—track pants, t-shirt, and trainers. His large electric powered wheelchair is controlled with a joystick on the right hand arm rest. Although he has some manual dexterity, he cannot handle or manipulate objects in a fine-tuned way. He is also unable to speak in the way that we understand the term.

But in this description, I want to focus not on what Ato-san cannot do, but rather take an ethnographic approach. In other words, I want to examine his practices, which means looking at what he *does* do. I want to examine his skilled practices as they happen in the world. When Ato-san showed me his barrier-free lifestyle, he showed me how he does things and he showed me the things he uses to do them. This I think is significant. He did not spend his time showing me the things he could not do or use. It seems then he was not showing me his disabilities, but rather his abilities.

This strategy has the potential danger of eliding the difficulties that disabled people face. When Ato-san communicates with me, it is difficult. We both struggle. I struggle to understand and he struggles to make himself clear. With my Japanese, he often struggles to understand me too. But a focus on the achievement and expression of skill does not mean this achievement has to be easy or even always successful. Rather it allows us to foreground the ways that many different things—people, tools, techniques, spaces—are brought to bear in different situations. Still, in order to discuss the difficulties that Ato-san faces, I will later turn to a discussion of barriers, in order to show the tension that exists between disabled people and the world around them (including other people).

Ato-san's method of communication

To begin, I will discuss Ato-san's communication method. He understands (Japanese) speech but, to express himself, he uses writing. This is done by tracing the shapes of *hiragana* syllabary characters with his fingers on a flat surface, like a table, his leg, or the palm of a hand. In other words, "to write" does not mean that he communicates using a pen and paper, but rather his interlocutor watches Ato-san's finger as it forms strokes and then reads the character through imagined inscriptions. That person will say out loud each character, to lessen the chance of confusion. At first it can be difficult to correctly recognise all the characters, especially in my case because I do not have the experience reading and writing Japanese starting from a young age; while I can read, I am not as skilled as a native Japanese. But according to Ato-san, young and inexperienced helpers often have the same difficulty recognising his characters. He used to get angry and frustrated at them for not understanding but, over time, he became more patient and he no longer lets it upset him. Perhaps partly because he relies on this form of language, he is not "talkative" in the sense that he communicates with few words and often uses an elaborated "gesture system" (Kendon 1997), silences, pauses, expressions, and so on, which is, perhaps, also characteristic of the cultural importance that Japanese place on non-verbal communication, a theme that will arise again in later chapters (Hendry 1995: 165).

Still, he does frequently engage in conversation. Ato-san would often approach me as I was seated, manoeuvring next to me in his electric wheelchair. Usually he had come just to smile and pat me on the shoulder. But sometimes, after this initial greeting, he would stare intently into my face with wide eyes. This usually, though not always, meant he had a specific question or topic of conversation. Knowing when he wants to converse therefore takes a degree of interpretation. Establishing conversation is partly through speech on my part and body language on his, but also through his writing short sentences or single words (longer sentences are cumbersome and difficult for his method of communication).

This should be easier to visualise in the following example. One of his favourite topics was my wife, who was known to everyone at the centre as well. He would indicate girlfriend using a gesture for "woman" or "female," an extended pinkie with the other fingers in a closed fist. While this is a simple gesture (of just one finger) it carries with it a range of implications about gender, age, and demeanour (though none are set as a rule). In this context, it means girlfriend. But its use by Ato-san can also imply the feelings of both older people and older times. It is the kind of gesture an *ojisan* uses (which, if we recall, means "uncle" literally but is used for any middle aged man). Women, especially, can sometimes see this gesture as crude or gruff. So the gesture reflects Ato-san's persona, as an older "uncle" *ojisan* figure. Recognising that he is asking me how she is, I reply that she is fine, and inquire about his own girlfriend. Here he gives a sheepish grin and slightly tilts his head to one side. Understanding this to mean that not all is well, I ask him simply "angry?" (*okotteru?).* He responds by indicating that I should hold out my hand. After I hold out my hand, he then traces, on my palm, the character け. In my experience, it is much easier to recognise such characters on my hand because of the tactile sensation. I pronounce the sound "*ke*" and he affirms this is correct and starts the next character. This time, when he writes the character, I fail to recognise it and ask him to write again. It seems like an English “L”. He writes again and I still do not get it. Maybe *na* (な)? “No” he is shaking his head and writes again. I try to visualise it in my mind's eye, which is likely the wrong way to do it, since characters should be understood in their production and not just their finished product (see, for example, the related discussion of Chinese calligraphy in Yen 2005). Japanese focus on the order, direction, and number of strokes to understand hand-writing because the actual product may not look much at all like the standardised or idealised form (of, for example, a computer font). But I just want to get it and continue on, distressed that the conversation is being held up by my inability. After continuing and neither of us getting anywhere, with me gradually feeling more embarrassed and frustrated, and him looking more embarrassed and frustrated, we call over one of the helpers. The helper correctly reads off “ke,” “n” (the missing character “ん”), and then “ka” (“か”). The word is *kenka*, which means “fight”, “quarrel”, or “argue”. He has been fighting with his girlfriend and that is why he is a bit sheepish. We both joked about his situation, and agreed that he should best apologise (whatever the reason for their fight).

At ILC, Ato-san's method is unique to him in my experience. Others, who have a similar condition to Ato-san[13], who are also unable to speak, communicate instead by carrying around a laminated sheet of loose-leaf paper that has all the *hiragana* syllabic characters (the characters that Ato-san writes) as well as the characters for common words like hour, day, week, month, and so on printed in a grid. Instead of tracing out the characters on a flat surface, they point to each character in succession.

A conversation with Ato-san is reminiscent of an article by Charles Goodwin, an anthropological linguist, on a “competent speaker who can't speak” (Goodwin 2004). Goodwin describes a man named Chil who has aphasia, a condition often resulting from stroke (as it did in this case) that affects

13 Whether cerebral palsy or otherwise (such as one person with a spinal injury).

communication and language. In Chil's case, he has lost the ability to speak all but three words *(yes, no, and*). Yet Chil could communicate because he would enlist other people in order to deliver his messages. He does this partly through gesture and prosody (stress and intonation of speech), which causes those around him to guess what he wants to say. He can then affirm what they have said, or lead them to say the things he means to say.

> Although he can barely speak, Chil positions himself as a forceful, consequential storyteller. The resources needed to do this do not reside within his skin, mind, or self alone. Instead he requires the collaboration of others, as he mobilises their power to speak in order to say what he wants said. His ability to constitute himself as a relevant speaker requires a larger social and semiotic matrix that encompasses the bodies, talk, and actions of others, as well as the way in which they are situated together within a particular historical, social, and material environment (Goodwin 2004: 165).

In Goodwin's extended analysis of one specific conversation, Chil wanted to tell a story about an earthquake 50 years ago in which a picture frame almost fell on a baby's head. The episode starts when someone asks Chil if he has ever been in an earthquake. He affirms this, and then performs a gesture by putting his hand over his head. While gestures are often clear in human communication, in this case it presents a puzzle and people start guessing what he means (which sounds very like a conversation with Ato-san as well). His wife, who is also present, based on her own experience and memory, tries to surmise his meaning and verbally checks if she has guessed right, and she eventually comes to identify and then tell the story. Chil directs this conversation with sounds, *yes*, *no*, and more gestures, and in this way Goodwin argues that he is an active teller of the story, not a passive listener, despite the fact that others are the ones doing most of the talking (i.e. physically verbalising sounds).

Ato-san has some differences from this man. Goodwin never mentions writing and the implication would seem to be that Chil does not communicate in this way. Comparatively, Ato-san can generate a larger variety of linguistic signs. Clearly their impairments are very different.

Still Goodwin's overall argument is insightful in order to understand Ato-san's speech. Neither have much ability to produce speech vocally. Ato-san also enlists others, such as the helper that assisted me in reading the character, in order to make himself understood. He gets others to say the sounds he himself wants said. This speech does not just arise out of "abilities" inside his mind and body, but rather he enlists the social environment to communicate his message. He uses gesture (and sometimes sound, though not fluent speech) in order to communicate. Although my focus is on Ato-san, it is important to note that Goodwin's analytical point (a point with which I agree) is that while Chil (or Ato-san) may seem unique, everyone's speech arises not out of isolated competent speakers but through an entire environment. Speech arises out in the world through social, material, physical, and bodily (inter)action.

The Practice of Skill

Both Ato-san's and Chil's speech seem to be examples of what Ingold calls "the skilled practices of socially situated agents" (Ingold 2000: 294). According to Ingold, his notion of skill (which he sees as restoring the unification of art and technology) is based in five principles:

> First, intentionality and functionality are immanent in the practice itself, rather than being prior properties, respectively, of an agent and an instrument. Secondly, skill is not an attribute of the individual body in isolation but of the whole system of relations constituted by the presence of the artisan in his or her environment. Thirdly, rather than representing the mere application of mechanical force, skill involves qualities of care, judgement and dexterity. Fourthly, it is not through the transmission of formulae that skills are passed from generation to generation, but through practical, 'hands-on' experience. Finally, skilled workmanship serves not to execute a pre-existing design, but actually to generate the forms of artefacts (Ingold 2000: 291).

These principles, I believe, apply to Ato-san's method of communication. As I have already argued, Ato-san's ability to communicate is not a matter of pre-established properties, that is speech competence located completely inside his single body, as much as it arises out of his interaction with other people, things, and the environment in which he is located. Of course, this requires care, judgement, and dexterity. While both speech and writing are skills "passed from generation to generation," the way that Ato-san practices writing, tracing lines on surfaces, is based in his "practical 'hands-on' experience." He does not work by formulae as such. Characters have forms but Ato-san does not reproduce those forms mechanically each time he writes on a surface. Rather, he writes them anew in slightly different ways. It should also be rather uncontroversial to note that the product of his skilled practice in communication is not the execution of some pre-existing design but rather the generation of an evolving conversation with his interlocutor, the "form of the artifact" is the very process of conversing itself.

In order to better understand Ingold's notion of skill and how it relates to Ato-san in other ways than communication, we need to explore in more detail his first two principles. As such, it is useful to review some of Ingold's argument. Ingold starts his explication of skill and technique from the content of one of Plato's dialogues, a conversation between Socrates and Alcibiades (Ingold 2001: 352). In this conversation, the two are discussing a shoe maker and specifically the shoe maker's use of tools in order to complete his craft. Socrates suggests that a man must obviously be different from the things he uses, the shoe maker different from his tools, a proposition that Alcibiades readily accepts. But then Socrates also convinces Alcibiades that the shoe maker uses not only his tools, but also his hands, and by extension his entire body, to complete his work. Since a man is not the same as what he uses, and a man uses his body, it follows, then, that, a man must not be the same thing as his body. So he must be something else. Socrates claims that this something must be in fact the soul, and that he has therefore proved the existence of the soul.

Ingold believes there are fundamental flaws in this argument that need to be rethought in order to recover the "essence" of skill (Ingold 2000: 352). Plato's argument is an example of strong dualism between a man [*sic*] and his tools. But Ingold believes that such dualism is rooted, first, in the fact that Plato did not know much about craftsmanship and, second, in the fact that Plato's primary concern is to privilege mental life over manual work in order to provide philosophical support for slavery. In order to develop a different account, Ingold argues that we need to question the original separation between the shoe maker and his tools. We need to rethink what we mean by "use". Rather than imagining tools and agents as separate things brought together, Ingold claims that we should consider use as the "primary condition of involvement in the craftsman, with his tools and raw materials, in an environment" (Ingold 2000: 352). In this he clarifies that "the hands and eyes of the shoemaker, as well as his cutting tools, are not so much used as *brought into use*, through their incorporation into an accustomed (that is usual) pattern of dextrous activity" (Ingold 2000: 352 emphasis in the original). This establishes Ingold's first principle of skill.

Ingold's second principle is very closely related to this argument. He starts from a discussion of Marcel Mauss' *techniques of the body (Mauss 1973)*, which in turn also starts from Plato's argument. While Plato focused on tool use, Mauss argues that, in principle, techniques do not require tools at all but rather can occur completely in the body as a tool in itself: hence a discussion of techniques of the body. But Ingold claims that Mauss' approach shares the same underlying problems as Plato's. Essentially, it reduces the technical, the movement and skill of the body, to a mechanical act, the body as an object that is used apart from both a person's (disembodied) agency and the surrounding environment. But if we consider the body as something "*brought into use*," we must "move in the opposite direction, that is, to restore the human organism to the original context of its active engagement with the constituents of its surroundings" (Ingold 2000: 352). Ingold suggests we follow Gregory Bateson's (1972) notion that felling a tree is a "man–axe–tree system" (which, it is worth pointing out, is very closely related in Bateson's work to his blind man and cane example). That is, we should consider the person, her body, her tools, and the environment as part of a system. He proposes that "skill, in short, is a property not of the individual human body as a biophysical entity, a thing-in-itself, but of the total field of relations constituted by the presence of the organism-person, indissolubly body and mind, in a richly structured environment” (Ingold 2000: 353).

Legs and Wheelchairs, Walking and Mobility

At this point, I want to return to the fact that disabled people with whom I worked told me categorically that a wheelchair is their legs (and feet). I think that we can understand this equivalence, wheelchairs and legs, as expressing something much like Ingold's notion of *brought into use*. In Ingold's language, Ato-san is not *using* a wheelchair (as we might often say in English) but rather the wheelchair is *brought into use* just like most people's legs are *brought into use*. Ato-san and the others, in their answer, are emphasising the systematic nature of the wheelchair. They are making it clear that their wheelchair is not an isolated object, but rather it is something incorporated into their skill of movement. It is part of a body-wheelchair-environment system. The wheelchair is their legs and their feet.

I previously linked the discussion of wheelchairs directly to Ingold's essay on the foot (Ingold 2004, 2011) and I want to return to the arguments of that essay in more length. Ingold's argument, while offering insight into the different ways people move through the world and highlighting the fundamental importance of mobility, also assumes the universalism of walking and disparages mobility through machines (in paved urban areas) as seemingly “out of touch”. But this framework is a bit problematic as it applies to disabled people like Ato-san, since it is machines in a paved environment that are integral to the mobility he possesses.

In this essay, Ingold starts with a discussion of the evolution of humanity. Specifically, Ingold is interested in evolutionary stories that seek to separate us radically from all other animals. Within these stories, there are three unique evolutionary adaptations of humans: the enormous size of the brain, the dexterous prehensile hand, and the anatomical structure that facilitates bipedal walking.

Ingold claims that such evolutionary stories tend to be narrated as follows. In the distant evolutionary past, we were like other animals in that we walked on all fours. But through evolution, humanity has gradually stood up erect and, through this standing up, civilisation and the mind have emerged. With bipedal walking, the hands have been freed from the ground, freed from nature. Such a freeing allows human labour to be directed to the mind. Within this narrative, Ingold suggests, the hands have been privileged over the feet. For Ingold, this is a specific instance of the more general elevation of mind over body in Western thinking.

These evolutionary stories, Ingold believes, need to be understood within a specific historical and technological period, which Ingold ingeniously links to a specific kind of footwear, the boot. Ingold cites a range of 19^{th} century writers such as T.H. Huxley and Edward Tylor, who compared the atrophied foot of the “civilised” Western man to both the feet of “savages” and to the feet of non-human primates. The atrophied foot of Western man, in contrast to the strong and tough feet of both “savages” and primates, provides evidence for humanity's advancement (both in terms of civilisation and in terms of evolutionary biology). Already, at this time, writers recognised the importance of the boot for making the difference. Ingold claims, therefore, that the boot is related directly to modern ideas of mind over body, intellect over instinct, humanity over nature (Ingold 2011: 37). Within this modernist project, the stiff boot of the Western person has mechanised walking, turning feet and legs into a “stepping machine”. The boot is heavy, constricting, and encasing; it “imprisons” the foot (Ingold 2011: 36). And it therefore represents the domination of human technology over nature (i.e. the foot).

Rather strangely, this domination has then worked backwards in a process of naturalisation. It is only with such a stepping machine, as well as the artificially flat surface of the modern urban environment, that the image of a strong, upright citizen with correct body posture (an ideal dating back to the ancient Greeks) is elevated not just to cultural norm but also taken as the *de facto* “natural” way of walking. As evidence for this naturalisation, Ingold points out that the same kind of walking is used in scientific laboratory studies of locomotion. Using the term “the upright gait” to describe this mode of walking, Ingold claims that, rather than being “natural”, it is completely artificial. Ingold sees his argument supported in the way that German soldiers (according to Marcel Mauss) walk the “goose-step,” the upright gait taken to its logical extreme, and notes that such a “goose-step” is only possible on the “artificially monotonous surface of the parade ground” (Ingold 2011: 41).

Ingold also links the separation of mind and body, cognition and mobility, with changes in the notion of travel. He suggests that in Europe from the 18th century, walking and travel became separated. Walking was a mundane activity, primarily for the lower classes. Conversely travel, as a high class pursuit, was never done by walking (even when walking might have been just as fast and in fact been more comfortable). In this conception of travel, primary importance is placed on the destination; (high class) people travelled in order to reach a destination, which they could enjoy and contemplate. Thus, in accounts of travel from this period, the journey itself is rarely mentioned at all and the impression is that people travelled by instantly moving from point to point. Ingold claims that such travel writing makes it seem as if the writers did not have legs.

With time, as mass transportation became more affordable, and even poorer people no longer needed to walk everywhere, walking did eventually become an end in itself, since the upper classes could afford *choose* to walk as a form of leisure. Ingold links this resurgence of walking to the rise of another technology, the chair. According to him, those extolling the virtues of walking did so from their (arm)chairs. For Ingold, the chair is also important in the separation between cognition and mobility, part of a kind of binary pair with the boot: “the boot, in reducing the activity of walking to the activity of a stepping machine, deprives wearers of the possibility of thinking with their feet, the chair enables sitters to think without involving the feet at all” (Ingold 2011: 39). For Ingold, “the reduction of pedestrian experience, that has perhaps reached its peak in the present era of the car, is the culmination of a trend that was already established with the boot’s mechanisation of the foot, the proliferation of the chair and the advent of destination-oriented travel” (Ingold 2011: 44). Further, in urban centres, people become detached from the development of their environment because paved surfaces leave no traces when people walk over them. As such, “it appears that people, in their daily lives, merely skim the surface of a world that has been previously mapped out and constructed for them to occupy, rather than contributing through their movements to its ongoing formation” (Ingold 2011: 44). All of this has led to a separation of the Western person from the ground they walk on, which is not at all a good thing in Ingold's opinion "for it is surely through our feet, in contact with the ground (albeit mediated by footwear), that we are most fundamentally and continually ‘in touch’ with our surroundings” (Ingold 2011: 45).

Ingold, with the quotes around “in touch,” is clearly playing on a double meaning. On the one hand, he is pointing out the simple fact that our feet are the parts of our body which are usually the most immediately in contact with our physical surroundings. On the other hand, he is also suggesting that the ground is not just our literal grounding, but our metaphorical grounding as well; the opposite of “in touch” is “out of touch”. The implication, then, is that to the extent that our (humanity's) feet are directly in contact with the earth, we are wiser and more knowledgeable, and the extent to which they are not (modern, Western people), we are more “out of touch” and ignorant.

While he does claim that there is nothing more “natural” about walking barefoot (as with a hunter-gatherer) than walking with shoes in an urban environment (as with a Westerner), in my reading, his heart does not really seem to be in it. First, he qualifies this qualifier by stating that the idealised, upright gait of Western thinking is indeed unnatural (since it can never be the daily walking of anyone in its idealised, military-style, laboratory form). Second, the boot in Ingold's mind is firmly linked to the concept of the machine, a concept which Ingold, throughout his writings, almost always presents negatively, as a kind of affront to (implicitly heroic) skilled practice. And so there is a clear value judgement here.

Interestingly, Ingold contrasts these Western conceptions specifically with the Japanese. According to him, citing a number of Japanese authors, traditional Japanese culture has “a fundamental orientation towards the ground” (Ingold 2011: 45) that is illustrated by the different ways of walking (between Western Europeans and Japanese) that are “traditionally” considered desirable. In the West, the desirable way to walk is “walking at the hips”, a “gait with long measured strides and straight legs” (Ingold 2011: 40), in Japan, it is a “walking at the knees”, a “kind of shuffle, not unlike that of a man who has lost his shoelaces, which to European eyes looks most ungainly” (Ingold 2011: 41). He relates the Japanese mode of walking (following his Japanese sources) to different traditional dance styles, artisan techniques, and even supposed differences in child-rearing. And he further provokes the reader to imagine what it would be like if we were to change our thinking to be like the Japanese, if we were to follow them in having a “fundamental orientation to the ground” (Ingold 2011: 45). I want to challenge this conception briefly. Although it is a bit of a digression from the main point of this chapter, this is a dissertation about Japan and in this essay Ingold uses the Japanese as a crux to his argument and foil to the West. Therefore it is really necessary to engage on the issue of Japan.

In his discussion, he is missing what I think are some crucial details that turn out to be quite relevant for his argument. This is the fact that Japanese traditional gait, dance, and so on need to be linked directly to the footwear and dress of the traditional Japanese (which actually supports his argument in other ways, if not his interpretation of the Japanese data). The traditional footwear includes hard-soled sandals such as *seta* and *geta*, as well as the softer-soled (more often worn by common people but less related to traditionally valued aesthetic norms) *waraji.* It is true that none of these have shoe laces, and, if you ever tried walking in them, you would find they are best suited to a shuffling gait. In fact, the use of *geta* has been shown to have kinesiological effects on the foot (Hasegawa et al. 2007). Just like the European case, the technological effects of footwear are related quite closely to cultural ideals of beautiful way of walking. Indeed, not only footwear but also clothing has an important impact on traditional Japanese movement. Clothing such as the *kimono* is crucial for the way people move in dance; actually, in the case of Japanese dance, just wearing the *kimono* is insufficient since it must be worn correctly (Kealiinohomoku 1979). The *kimono* must be tightly tied, constricting movement, to lead to proper dance (Kealiinohomoku 1979). The constricting properties of the more elaborate versions of (especially women's) *kimono*, which do not offer much in the way of limb movement, are also crucial for the way that people both *can* and *should* walk; hence the shuffle. In light of this, Ingold's account of Japanese walking/movement (as the opposite of the restricting and encasing mechanics of the boot) is rather ironic. Ingold's account is actually quite odd in that it makes no mention of what traditional Japanese wore on their feet or on their bodies, leaving one with the impression that maybe they were naked. Of course, that does not hold up and Ingold would likely consider that a caricature of his position, but his neglect of this issue remains troublesome. It strikes me as a bit dubious to imagine that the traditional Japanese are any more "in touch" with the ground than their Western cousins. I do not mean this to disparage the (traditional) Japanese. Rather, I think this is the trouble the term "in touch" and the way it is used to take Ingold's analysis in certain directions.

Anyway, the people I knew rarely, if ever, wore traditional footwear such as *geta* or *seta* nor traditional dress such as *kimono*. And Ato-san's athletic running-shoes would not be out of place in any Western city. Indeed, Ingold also notes that the so-called traditional Japanese "fundamental orientation towards the ground” is now changing with westernised living arrangements. In Ingold's eyes, the change in living spaces is characterised by “traditional, wood-floored houses...giving way in Japanese cities to internally carpeted, western-style apartment blocks,” (2011: 41) The choice of materials seems inaccurate because traditional Japanese homes are usually not wood-floored (which, arguably, is actually very Western) but rather covered in *tatami* mats, while modern *manshon*[14] condominiums often have *faux*-wood vinyl “flooring”, an often desirable attribute that is associated with modernity (Daniels 2010: 45–46, 113–114). Still, the sociological claim that there has been a broad movement from the traditional Japanese (*tatami*-floored) home to the westernised modern (“flooring”-floored) home does hold some validity. Nevertheless, many Japanese homes are more accurately characterised by an eclectic mixing of styles, and the inclusion of both “traditional” Japanese aesthetics with modern “Western” aesthetics is not necessarily problematic (Daniels 2010: 46).

Regardless, traditionally valued Japanese styles of walking do not, I think, have much everyday relevance for my informants if for no other reason than the fact that they actually *do not walk*. It is from this perspective that I wish to take up Ingold's focus on mobility as an interesting way for thinking about perception, skill, thinking, and culture. It is not through Ato-san's (traditional) “Japanese-ness” that I wish to explore his unique perspective on the world through the ground. Rather, I want to explore his unique perspective as it relates to his distinctive tool of mobility, which is not the boot, but rather his wheelchair.

Mobility, Machines, and Wheelchairs

As I have suggested above, the implication of Ingold's essay is that walking is a universal human experience, and to the extent that “machines” “mediate” that experience, we are not “in touch”.

14 In Japanese, *manshon* refers to a condominium, whereas *apāto* refers to older apartments, that are usually smaller and not as nice. The current trend in Japan is therefore towards condominiums/*manshon.*

Elsewhere Ingold argues that technology and machines are the end of skill, if in principle more than actuality (Ingold 2011: 61–62). He links the notion of the chair to one who is immobile, and since he believes mobility is crucial to ("grounded") thinking, those that are immobile do not really think (at least not in the way that Ingold believes they should). While he is not talking about disabled people, these ideas start to take on a much darker tone when we stop to think about what this might logically imply about people in wheelchairs. Are these people "encased" in machines (such as their wheelchairs), machines that never allow them to touch the ground, to be "in touch"? If mobility is fundamental to thinking and cognition, what do we make of those who are less mobile?

I do not think that Ingold's discourse about machines and "artificially monotonous" surfaces accurately reflects how Ato-san and the others I worked with experience the world. For them, paved surfaces, wheelchairs, smooth ramps, and so on serve to reduce barriers to mobility. Such aspects of the built environment have the potential to allow for freedom of movement. In this section, I want to discuss Ato-san's wheelchair and his mobility, in order to move backwards and qualify some of Ingold's ideas.

Apart from the morality tale about Western modernity, Ingold's theoretical proposal is a call for a renewed focus on mobility as the site of cognition and perception. Ingold suggests that perception changes depending on our relationship to the ground. He claims that in fact perception depends on movement, that "if perception is thus a function of movement, then what we perceive must, at least in part, depend on how we move" (Ingold 2011: 46). This leads him to make a call for "a whole new field of inquiry...concerning the ways in which our knowledge of the environment is altered by techniques of footwork and by the many and varied devices that we attach to the feet in order to enhance their effectiveness in specific tasks and conditions" (Ingold 2011: 46). What I would like to do here is take up such a call. If differing movement implies differing perception, then people in wheelchairs must perceive things very differently than those who walk. He places great theoretical importance on artifacts that modify mobility, that is in boots and chairs, in shaping how we think and perceive the world. Wheelchairs are clearly one such artifact, and they present both an elaboration and a counterpoint to Ingold's analysis.

Ato-san is almost always in his wheelchair throughout his waking hours. He does not walk at all (which is not true for all the people I knew who were often in wheelchairs). It seems a common observation that we are increasingly growing attached to our technology, that our mobile phones and laptops are becoming necessary to our contemporary life, even that we form intimate relations with and through these objects (Bray 2008). But the necessity (or intimacy) of a mobile phone or laptop seems second-order, or perhaps metaphorical, compared to the necessity of Ato-san's wheelchair.

Still wheelchairs are not all the same. They are different for each person depending on their needs and desires. They are expensive commodities. On a return visit to see Ato-san, after the conclusion of my original fieldwork, he had purchased a new wheelchair, a Swedish import. The new chair, he showed me, had an automatic back recliner and raising foot rest, controlled from the panel on his arm rest. He and his helper joked that for the price of the new chair, he could have bought a new car.

Like Ato-san's wheelchair, models are offered with a range of elaborate functions, designs, and colour schemes. They are also frequently adorned, and those at the centre often had stickers or decals—cartoon characters, baseball team logos, and so on—decorating their chair. But of the differences, perhaps the of the most important was the method of locomotion. Wheelchairs can be either manually or electrically powered, and I will describe briefly the difference between these two.

Among those I knew, there were two general kinds of manual chairs. The first type is a manually powered wheelchair where the person uses their arms to spin the wheels beside them (though they may need someone to push them, for example, to get up ramps or curbs). These wheelchairs are (comparatively) cheap, light, and small. They can be easily stored and transported. Some people I knew, who regularly used more elaborate models, kept such chairs as spares in their cars. Another reason for their use was reassurance in their simplicity. Fujita-san said she uses a manual wheelchair because the automated, electric wheelchairs are frightening (something she also said about aeroplanes). On another occasion, she clarified that this is because she has poor eyesight (as a result of a detached retina) and that therefore an automatic chair would be dangerous to operate.

The second kind of "manual" chair is quite different in shape and function. These chairs are not powered, and yet they are very large, padded, and comfortable looking. Two members of TOP (the local day centre for disabled people), Nakamura-san and Inoue-san, used these large wheelchairs, larger even than automated chairs. Such chairs contain detachable table surfaces and a great deal of storage space in the rear and underneath the chair. These chairs have many straps and are used by those who lack the physical ability to remain upright in their chairs, never mind the ability to move their chairs by themselves. These people also lack the hand dexterity to control a joystick. To move anywhere, they require a helper to push them.

Electric wheelchairs, as the name implies, are motorised. These chairs, like those owned by Ato-san, are often used because they are faster and more convenient. The speed of wheelchairs is generally up to 6km/h. According to Ato-san and the others I spoke with, this is a matter of general policy and agreement among the Japanese manufacturers, though not technically a legal limit. The chair that Ato-san used throughout my original fieldwork was imported from the United States (which has a higher limit), because he specifically wanted a wheelchair that can reach up to 10 km/h (even though he rarely uses this full speed). His new Swedish chair was likewise faster than Japanese models. Ato-san is unique in this regard but most others found these higher-speed chairs frightening. But Ato-san preferred such chairs because he likes to go fast, he said. Whether Japanese or American, automotive wheelchairs are faster than a walking person. When I asked Yamano-san, a woman in her early 30s and one of the main staff members at the centre for independent living, what she wanted in a wheelchair, she said that she would like one that flies because often she is held up on the side walk by slower walking people.

Apart from the speed and convenience, automated chairs are also used by those who have the physical capability to handle the joystick but would not be able to grasp and turn an actual wheel themselves, whether due to a lack of manual dexterity, strength, or a combination of the two. Ato-san, for example, is not able to operate a manual wheelchair himself. But he can handle the joystick and this grants him a degree of independent mobility. He can move around himself without needing to ask someone to move him. For those who cannot operate a joystick with their hands, there are often other ways to allow them to control the electric wheelchair. One woman, Ishikawa-san, often uses a ring attached to a pole and fastened to her arm to hoop her (especially long) joystick, and then uses that arm to control the chair.

Journeying through the World

In order to explain how wheelchairs are used to move through the world, I now describe a journey to Ato-san's home on a day when he had invited me to come view his barrier-free lifestyle. Such a description means using ethnography to explore living and moving about with Ato-san. If perception depends on mobility, as Ingold argues, then an examination of Ato-san's movement in the world should help us understand his perception of it. After discussing the initial journey, I will continue to discuss the material culture of his barrier-free home as well.

Ato-san set a date for when I could visit his home a few weeks in advance and told me to meet him at ILC. On the appointed day and time, I arrive at the centre, which is a Monday. I am a bit early and have a seat at the main table. The staff at ILC are surprised to see me since it was a holiday for

TOP (as are all Mondays) and that is where I would usually go for fieldwork. But they accept my presence, and we chat while I wait for Ato-san, who is was scheduled to arrive at 1pm. By about 1:20pm I ask Yamano-san if she knows where Ato-san is or when he will arrive. She does not; in fact, she knows nothing about our meeting and is actually quite shocked that Ato-san had invited me to come (because of his reputation as a rather private person who is not overly friendly). She would not have imagined Ato-san, of all people, would bring me to his home and thought he must have taken a liking to me, because if he had not, he would not even bother talking with me. At any rate, she says she will contact him, by mobile phone, to find out. Yamano-san picks his number out of her contacts, and calls him up. "Ato-san? Ato-san?" she says, as I watch (and wonder how she would have a telephone conversation with a man who cannot speak). After a minute, she explains that I am waiting for him. She then hangs up and tells me that Ato-san and Taira-san (his helper for that day) will come now to pick me up. After maybe 20 minutes, he arrives, at which time he is very apologetic. He continues to bow in his chair, and others explain that he is indicating he had forgotten that I was visiting his house today. Anyway, with everything settled, we say goodbye to everyone at the centre and continue on to his home.

ILC is on street level and at the door they have placed a ramp. Ato-san has set his speed with the use of the buttons on his panel. He presses the joystick forwards and we proceed along into the urban street. He turns the corners by slightly nudging his joystick to the right or the left, and we maintain the same position with myself and Taira-san, his helper, walking alongside. He manoeuvres around any potholes though, comparatively, in Japan there are remarkably few. Yamano-san, who frequently travels as part of her work at ILC, told me that the poor paving of roads and side walks in Mongolia was the worst part about her trip there (though she complained of the food as well), while an Indonesian man, temporarily at the centre as part of the Asian exchange described in the next chapter, said that the biggest barrier within his society (in achieving something like the independent living lifestyle of the Japanese disabled people he has met) was the fact that the streets are too full of potholes to get anywhere by yourself in a wheelchair. While in this way Ato-san is fortunate, he still must take care to navigate up ramps, avoid riding off the side of the curb, and circumvent any obstacles (whether small children or telephone poles). After a short walk (or "drive," in his case), we arrive at the local train station and take the trip to his home by underground subway (*chikatetsu*).

There are a number of elevators, winding throughout the station, which any person using a wheelchair (and her/his helper) must navigate. To start, there is an elevator down from street level, which ends at the main level of the station and the ticket gates. People with disabilities, as well as their helpers, ride for free on the subway if the disabled person has a valid disability ID (*shōgaisha techō*—described further in the next chapter), and when I am accompanying ILC or TOP members they always tell me to ride free with them instead of paying for a ticket. After going through the extra wide gate for disabled people, there is a long walk to the far side of the station (running parallel to the train platform on the level below) to take the next elevator. This elevator moves between the main level of the ticket gates and the train platform below. After waiting for the elevator, Ato-san carefully backs his chair into the small elevator which can fit one or two wheelchairs (two is quite a tight squeeze). Afterward, myself and Taira-san also enter and we press the button indicating the platform level, the doors close, and we move down one level. These elevators are also used by elderly people, mothers with strollers, or by those who do not want to bother walking down the stairs.

After arriving and exiting onto the train platform, a train staff member, in white gloves and conductors uniform, meets us with what looks like a long board, perhaps about a meter long. This long board is actually a foldable ramp used between the train platform and the train. The ticket gate staff have radioed ahead and instructed him to bring the ramp for a disabled passenger who has just entered the station. The conductor who is now meeting us knows the specific car we should enter and he leads to the correct spot on the platform (as is well known, Japanese trains stop consistently in the same position each time). The train approaches the station and stops exactly where expected. The other passengers first get off and the staff member then places the ramp on the ground between the platform and the train, and indicates, with his hands and the word *dōzo* ("Please go ahead"), that Ato-san may now freely enter the train. Ato-san's wheelchair is quite powerful and he simply drives up the ramp; in other cases, some disabled people with either manual or less powerful electric wheelchairs need assistance to get up the ramp by having their helper push their chair from behind. The ramp is about the size of the train doors and covered in a gripping, sand-paper like material to give traction. After Ato-san gets on, the staff removes the ramp and leaves the platform, Taira-san and I enter the train, along with any other passengers waiting to get onto the same car, the doors close automatically, and the train continues on its way. We wait in the spacious area near the door, often a priority area for wheelchair users, while the other passengers fill the seats and sleep, read, or silently use their mobile phones.

As we ride the train, train staff at the destination are informed of our pending arrival. This is possible because when Ato-san first entered the gate, he (or in this case, his helper) informed the ticket staff of our final destination. This happens each time someone with a wheelchair uses the train. Their destination is communicated through the train system, and when Ato-san gets off (in this case, only one stop away) another train staff member, also in uniform and white gloves, is already waiting on the platform at the correct door of the train and again provides the ramp. Ato-san exits the train over the ramp, the train staff takes the ramp away and walks off, and we continue to take an elevator back up to this station's ticket gates and then another elevator to street level. From there, we have a few minutes walk/ride to his apartment. Arriving at his building, we take the tiny elevator (just big enough for the three of us) to his 3rd floor flat. All in all, this trip has taken roughly 30 minutes.

This is, I think, a rather typical journey for Ato-san. In fact, it is one he makes at last five days a week when he travels from his home to ILC/TOP. The description emphasises the way that mobility influences perception because Ato-san must be constantly thinking about his own movement, going far out of his way to take elevators instead of skipping up a few steps of a staircase. His trip also needs to be highly planned so that he can communicate his journey to the train staff and they can prepare special assistance for him.

Despite the use of many machines, I think it would be a mistake to see this as "mechanical" or as a wheelchair "mediating" his relationship with the world. The introduction of machines does not make moving through the world any less of a skilled practice, I think. Maurice Bloch has written about the fundamental linguistic bias within anthropology, noting that much cultural knowledge is passed on in non-linguistic "practical, everyday tasks" (Bloch 1991: 186). Although Bloch and Ingold's conceptions of cognition differ greatly, in this specific regard they are not so far apart. One of Bloch's memorable examples is learning to drive a car, and he describes how beginners have to turn propositional statements about driving into "non-linguistic, integrated procedures before the task can be effected rapidly, efficiently and automatically—one might say properly" (Bloch 1991: 187). Bloch's example is about how people become expert drivers, in other words how they become skilled drivers. I have tried myself a few times to use Ato-san's wheelchair, and without much practice, I must say I am rather horrible at it. Rather than seeing machines as mediating skill out of existence (which Ingold admits never actually happens in practice anyway: 2011: 61–62), or machines as fundamentally alien to skilful activity, I think that we should see Ato-san's wheelchair in the way that Ingold suggests we see movement like walking:

> Thus its movements, continually and fluently responsive to an ongoing perceptual monitoring of the ground ahead, are never quite the same from one step to the next. Rhythmic rather than metronomic, what they beat out is not a metric of constant intervals but a pattern of lived time and space... it is in

> the very ‘tuning’ of movement in response to the ever-changing conditions of an unfolding task that the skill of any bodily technique ultimately resides (Ingold 2011: 46).

Ato-san's home and barrier-free Lifestyle

Now that we have arrived at Ato-san's home, I will turn the attention back to houses and, among other things, floors as they were discussed in reference to the Japanese “orientation to the ground.” I want to begin by describing what Uchiyama-san (ILC's director) told me on the final day of my fieldwork. As a conclusion to my time with them, he and the others at ILC had asked me to give a final presentation (which I later fortuitously learned should spend more time on a description of the various kinds of foods found in both Canada and the UK than on anything about my actual research). I agreed and they set a date for me to give a power point presentation (with many pictures of food) and everyone listened. After it was over, I opened the floor up for questions. Uchiyama-san took this opportunity to ask me what I thought of “Japanese Culture” (*nihon no bunka*) for disabled people. Did I think it was good? Or that it should be changed? And how? I was a bit taken aback by this question, unsure how to respond. Luckily, Uchiyama-san did most of the answering for me. He explained that there are aspects of Japanese culture that he thinks are good for disabled people. According to him, the value that Japanese place on family is one. But there are also parts of Japanese culture that he does not need and does not want. His specific example was *tatami* mats. He explained that *tatami* mats are quite the bother for him since they do not lend themselves to wheelchairs at all (for readers who are not familiar with Japan, the reason is that you cannot ride wheelchairs on *tatami* mats because of “cleanliness”), while (flat, hard, easy to clean) flooring, in which you can remain in your chair, is much better. It struck me at the time that Uchiyama-san's response was fascinating because he quite readily compared cultural values with material culture. A such, and recalling Ingold's title “*Culture on the ground*,” we can see that t*atami* mats are, for Uchiyama-san, both “culture [on the ground]” and “barrier [on the ground]".

Ato-san had brought me to his home in order to show me his barrier-free lifestyle. Barrier free often refers to modifying existing buildings and structures to allow equal access for disabled and non-disabled persons. For example, adding a ramp to allow wheelchairs is part of barrier free; it may be one the most prototypical examples of barrier free. When I asked Fujita-san what barrier free meant for her, she said stairs and spoke of how, as a child, elevators were not available in train stations and she had to get the local staff to carry her. When I asked her if she could think of anything else that was a barrier, she responded *dansa*, which can be glossed as "differences in level" (examples from the Japanese home will be given below). Her answers are a good example of the strong prototype that stairs, steps, and so on hold as barriers.

But the term barrier free is also used in a way that "accessibility" is used in English to refer to the wide-range of artifacts, arrangements, and structures used to enable people with disabilities. Each year, in Osaka, there is a barrier-free exhibition, drawing disabled people from across the city. Taking up three or four large exhibition halls, the number of products is extensive. Some of the things exhibited here include: cutlery, tools that can grip pens or hairbrushes, specialised shoes, specialised clothes, voice synthesising keyboards, books, reclining beds, elevating beds, wheelchairs, cars for disabled people, chopsticks, robotic walking legs, support bars for the toilet and bathroom, lifts to move wheelchairs up home stairs, and lifts to lower people so they can sit on the tatami floors. The term barrier free casts a wide net, but primarily relates to material culture and artifacts.

Ato-san's barrier-free lifestyle, therefore, has much to do with the heavy modifications he has had made to his home. Japanese homes usually have a small entrance area called a *genkan*. This is physically and visually separated from the main floor of the home. In the case of such apartments, it is often about 5 cm lower than the main floor (which is an example of the *dansa* that Fujita-san spoke of).

For Ato-san, in a wheelchair, this *dansa* is a barrier in itself, and the usual flat and level *genkan* has been modified into a ramp that gradually slopes from the lower level outside the apartment to the floor level of his flat. One of the main purposes of the *genkan* is as a shoe removal area. As is well known, in Japan, it is customary, and required, to remove your shoes at the front entrance of an apartment or home. In Ato-san's case, when entering the home, his helper cleans the tires of his wheelchair using a nearby hanging cloth, maintaining a similar separation of outside dirt and pollution from the inside floor of the home.

Ato-san's flat is small by Western standards but not necessarily for a single Japanese man living alone (single people do not often share accommodation with non-relatives, as they often do in the UK). It has a main room, which is a combined kitchen and living room, along with a separate bedroom (a so-called 1LDK). As we enter, we are in the main room. The kitchen area (sink, counter, cupboards, and stove) is opposite the entrance. Beside us, to our left, is a large clothes dresser. Straight ahead is his bath and shower room, and directly to our right is the toilet (most Japanese prefer their bathroom and toilet to be separated, and this configuration is common in Japanese residences). The bedroom is on the other side of the main room, to our left.

Ato-san shows me around his apartment and the various artifacts, objects, and modifications to make it barrier free. First is the toilet and bathroom. Similar to the *genkan*/entrance, common in Japanese bathrooms and/or toilet is a raised or lowered floor. This *dansa* makes a physical barrier which literally and symbolically splits the area of washing or relieving oneself from the other rooms of the home. A large step, similar to those barriers which separate cabins on a ship, is also usually directly in the doorway, further emphasising the split. This symbolic and material barrier is also an access barrier for people like Ato-san. In Ato-san's apartment, this barrier has been removed, modified to make a flat surface ramp between toilet and main room. The doors have also been replaced, changed from a swinging style to a sliding style (arguably a change from Western style to a more traditional Japanese style), which makes it easier for Ato-san to open the door himself. The physical barriers that separate his bathroom from the main living area remain. As Ato-san and Taira-san explain, there was no reason to modify the bathroom because he does not take his wheelchair with him to bathe and he does not have a bath without helper assistance anyway.

Both the bathroom and toilet have handlebar poles attached to the nearby walls, and the toilet also has a drop down handle that looks and operates similar to the adjustable armrests on aeroplanes. Ato-san has some ability to manoeuvre himself independently out of the chair and onto the toilet, but it is difficult and usually a helper assists him. In this and on a separate occasion, he made a point of showing me his toilet routine, which he seemed to feel was a way of helping me in my research. Taira-san, the helper, positions himself towards the chair, face to face, and supporting Ato-san under his arms and behind his back lifts him out of the chair, pulls down his pants and underwear, and supports him as they both shuffle towards the toilet. While sitting, Ato-san can handle himself (compared to others at TOP, who sometimes use special plugs or hoses or other attachments for the toilet). Afterwards, the helper reverses the process and manoeuvres him back into the wheelchair.

While some readers may find it surprising that such a "private" toilet routine was shown to me and that I chose to include it in this ethnography, I did so because Ato-san, I think, felt it was important and not necessarily "private". On the other occasion in which he showed me his toilet routine, he had approached me at TOP and queried me about my research progress in general. As I replied, he astutely sensed my own uncertainty and anxiety over my research. In response, he called over one of the (male) helpers and explained that he wanted to show me how he uses the toilet (which he then did, as well as having me assist him so that I could gain that participant experience). For Ato-san, it is very normal to him to have a male helper assist him in the toilet. He considered it a part of his everyday barrier-free life. To the extent that it might make an anthropological audience uncomfortable, I think that it is worth questioning our own notions of privacy, notions that have a specific kind of bias. Anthropologists are privy to all kinds of personal and intimate details through words, which they analyse with more words, but the intrusion of "messy" bodies can still be unsettling. My inclusion of his toilet routine in the ethnography is one way of challenging that bias.

Afterwards Ato-san shows me the rest of his apartment. In his bedroom, he has a special bed. The head and feet can be inclined by an attached remote control, and the entire bed can also be elevated and lowered by the same remote control. In the closet is a *futon* for the helper who stays over each night with Ato-san. Ato-san uses the bed because a *futon* would be a lot trouble to get into and out of all the time, including during the night if he has to go to the toilet. Like the tatami mat, *futons* are another aspect of "Japanese culture" ill-suited to the daily lives of disabled people like Ato-san.

His kitchen is unmodified and there are no barrier-free changes to it that I was aware of. Presumably, this is because his helpers do the cooking. During my time there, Taira-san made me coffee while Ato-san was showing me around, but otherwise the kitchen remained unused while I was there. He also has an old television which he occasionally watches, though not often because of his poor eyesight. Still he has an extensive taped VHS collection of *jidaigeki*, literally "period drama", which is a genre of mostly samurai films. He also explained that he sometimes watches *jidaigeki* as they appear on regular TV as well. He often listens to old tape cassettes of *enka,* a type of post-war popular music that expresses melancholic nostalgia for an idealised Japanese nation and tradition (Yano 2003). Both his interest in *enka* and *jidaigeki* are consistent with stereotypes of a (probably conservative) older or middle-aged Japanese man.

Much of his flat's decoration is dominated by his extensive Ultraman (*urutoraman*) collection, a science fiction television series about a giant superhero, along with a team of scientists and soldiers, that continually battle huge monsters. Ultraman is a “costume drama” first launched on the Mainichi/TBS TV network in 1966 by Tsuburuya Productions (Gill 1998). The series has had continual spin-offs since its original inception, including: *Ultra Seven* (1967), *Ultraman Jack* (1971), *Ultraman Ace* (1972), *Ultraman Taro* (1973), *Ultraman Leo* (1974), as well as animated versions called *The Ultraman* (1979) and *Ultraman 80* (1980) (Gill 1998: 34). The monsters vary from episode to episode, and “after an hour of complicated plotting and suspense-building, the monster is usually disposed of in a couple of minutes with a couple of judô throws and karate chops” (Gill 1998: 36). Ultraman himself wears a red protective jumpsuit, with grey detailing and stripes down the side, and a helmet with large glowing eyes.

Ultraman is “perhaps the most popular character to emerge from children's television in Japan...a widely recognized icon, on par with Superman in American culture” (Gill 1998: 34). But unlike the more individualistic Superman, who “possesses an inner strength which enables him to emerge victorious against overwhelming odds,” Ultraman relies on an extensive network of brothers and kin that has gradually been introduced through numerous iterations of the character, a reliance on others that arguably makes Ultraman “Japanese to the bone” (Gill 1998: 36). Ato-san has been a big fan of *Ultraman* since he was small child. He says that he likes it because it is cool (*kakkoi*) and interesting (*omoshiroi*). Many people in Japan are fans and collectors of some specific pop culture icon. This includes women such as Yamano-san, whose room is full of cartoon character paraphernalia (especially Snoopy).

Ato-san's collection includes masks, figurines, mugs, DVDs, books, magazines, and other knick-knacks. These collectibles are displayed over his dresser in the living room, as well as throughout his bedroom. He has a few *Ultraman* posters hanging on his wall, *Ultraman* curtains over the sliding glass doors to his veranda, and an *Ultraman* cover for the pillow on his bed. In addition to the Ultraman merchandise, he also has other items, posters, and a *happi* (a kind of traditional Japanese coat often worn to festivals) imprinted with images from the series Space Battleship Yamato (*uchū senkan yamato*). Space Battleship Yamato is a science fiction *anime* series originating in the 1970s, which has also become very popular in Japan and Ato-san is likewise a big fan. His room is also decorated with numerous of photos of himself taken with his girlfriend.

Although not much of a technology enthusiast (other than his elaborate wheelchair), he also has a cell phone and computer, which are usually operated by his helper (under Ato-san's direction). In the case of the computer, both will sit together in front of the screen and Ato-san will pass on necessary instructions while the helper will type the text and handle the mouse (Ato-san can handle the mouse a little bit but does not have perfect control). His cell phone is handled for him similarly as per the following example: Ato-san is planning to meet his girlfriend after she finishes work, and Taira-san drafts an email to her on Ato-san's phone. Taira-san asks Ato-san what time and where they should meet, and Ato-san responds. Taira-san confirms the message and then sends it. When they receive a response, Taira-san will check the phone and pass the message on to Ato-san. At home, the phone will often just be on the desk, table, or bed, while, when he goes out, Ato-san usually carries his phone dangling by a lanyard from his neck.

Taira-san himself, as that day's helper, is also a crucial part of Ato-san's barrier-free lifestyle. Taira-san is a young guy, in his 20s, with a straggly stubble beard and medium length and highly stylised hair. He wears a t-shirt and half-length droop down pants (a popular style during my fieldwork in Japan, where the groin area is cut so that it is almost at the knee). He is a fairly quiet person though not unfriendly, but in this circumstance speaks often as a proxy for Ato-san. A lot of the time he stood around swinging an imaginary baseball bat, though he is always quick to jump in when Ato-san needs something. When I comment on the Ultraman collection, it is Taira-san that tells me Ato-san is a fan and has been since he was young. Taira-san then asked me whether I have ever seen the television series. This is seemingly done for Ato-san's benefit—facilitating easy communication, Taira-san answers questions for Ato-san if he knows the answer, and even asks questions on Ato-san's behalf, if he has an idea of what those might be. Taira-san also answers many of my questions about the barrier-free aspects of the room, the bed, the sliding doors, and so on. He is the one that explains that when Ato-san first moved in they spent a few weeks of construction on the apartment in order to have it set up for Ato-san. Only on reflection it appears unclear to me whether Taira-san himself was actually witness or party to this construction, or whether he is just speaking on behalf of Ato-san (this is also facilitated by the Japanese language, which frequently drops subjects and pronouns).

Earlier I spoke of skill, and the job of helpers is also one of skill. A helper's job is to do anything that the (disabled) person cannot do by themselves. Both ILC and TOP members have use of helpers during the evening and sometimes during the day (such as Mondays or other holidays when TOP is closed, when they travel domestically or abroad, etc.), while a few helpers are also assigned to TOP or ILC during the day to assist anyone who needs it. When assigned to one individual specifically, these helpers are on shifts and rotate each day, so that one month beforehand, a full schedule is drawn out for each helper at ILC. They have shifts of usually eight hours, and, to reiterate, during this time they help the person they are assisting do all of the things that people need to do in their daily lives. These include cooking, cleaning, fetching things, assisting in bathing, assisting with the toilet, assisting eating, moving the body and wheelchair around, physically handling and dispensing money, and so on. As will be described further in the next chapter, the management of this pool of helpers is one of the primary purposes of a centre for independent living such as ILC.

This job may seem quite mechanical in the sense that machines could maybe do the same physical things (at least sometimes or at least hypothetically). For example, a helper will assist a disabled person in eating by handling the utensils (chopsticks, fork, spoon), holding the container of food, picking up that food, and moving it slowly towards the person's mouth so that he or she can eat it. Some machine could maybe be designed to do the same thing and the introduction of this thesis gave examples of robots that are designed to do exactly these things. Therefore, in practice, the elimination of barriers is the result of both enabling actions by people (helpers, train staff, and so on) as well as the use of certain kind of artifacts. These artifacts can be machines (wheelchairs, elevators) as well as aspects of the environment (architecture, design). The roboticists discussed in this dissertation are likely to imagine a fully functional robot that could replace the helper. If they made such a thing, only the machines and built environment would be necessary for a disabled person's barrier-free lifestyle. But, currently, no robot can fill this role. Nor are robots particularly close to matching the full range of a helper's responsibilities.

These responsibilities are always changing. Helpers adapt to each situation uniquely within that context. For a helper (or any adult human) this is not especially difficult, though it is for a robot or a computer program. The entire set of such actions is not defined in a bounded space and even seemingly mechanical movements are in a constant state of "tuning" (Ingold 2000: 353) depending on the situation, environment, and task. There is no definitive list of everything a helper must do as part of his or her job. Programming a robot, in most current implementations of complex task performance, requires generating a list of finite tasks and designing a specific algorithm for each of those individually. It is a matter of speculation as to whether all the possible tasks required of a helper, given enough time and resources, could be actually identified and individually programmed. But if this were so, robots would do their work in a very different way than helpers.[15] Helpers do not learn all these

15 Though in Chapter 1 I did show that there is some movement, such as the "baby" robot at Murakami labortories, to design robots that can dynamically learn in a social environment. Still, these robots perform only the most rudimentary of tasks and are nowhere close to being able to do a job like that of a helper. The CB2 robot is part of a "rationale of science" nascent research program, while "rationale of engineering" service robots, picked to perform some specific

tasks beforehand from a giant helper manual. Rather often they have little or no training (though this depends on the specific helper as some study in human welfare or receive other training, for which they are awarded official certification). They learn through their work as helpers, and more experienced helpers get assigned to those disabled people needing the most assistance; the most experienced helpers are the most skilled practitioners. Even something as simple as pushing a wheelchair is a skilled action. As we have seen, wheelchairs are actually quite diverse in their design and functionality. Most Japanese have no experience with wheelchairs, having never even touched one, and are unable to help a disabled person get up a curb without detailed instruction from that disabled person (Stevens 2007: 267).

By focusing on people (and their bodies) as relations within the environment, rather than focusing on the abilities innately inherent in individuals, the role of a helper becomes more clear. Helpers facilitate the connection between a disabled person and his or her environment. In so far as a disabled person does not need help, the helper does little. But when there is a difficulty, whatever it might be, the helper is there to assist. Because of this uncertainty and unpredictability, helpers tasks are constantly in flux and are a matter of judgement. The helper works with the person they are helping in an ongoing dialogue and dwelling.

This does not imply perfect harmony and there is sometimes tension between helpers and those they assist. One example is when helpers "do not do their job" properly. In the case of Fujita-san, she (apparently) often complains to the ILC staff because she does not think her helpers are doing all the small tasks she wants done. Usually being a friendly and outgoing person ("hot"—*atsui*), I have also been told that she has a more "fussy" or "bossy" (*urusai)* side. Especially with new helpers, who are often University students and/or in their early 20s, and have not received much specific training, these

function, generally are not designed in the same way at present.

kinds of conflicts emerge. The CIL staff invariably tell her to try to be patient, because the helper is just a “rookie”. They encourage her to try teaching her new helper.

But Fujita-san is not, I think, always being “fussy”. My wife, who worked as Fujita-san's helper for a brief period a number of years ago, said that when she looked in Fujita-san's fridge, she found it filled with old and expired foods. According to my wife, Fujita-san often buys new food for the helpers to make—whatever Fujita-san happens to feel like at the time. But Fujita-san cannot manage the fridge herself because she does not have access to it. Since the helpers constantly rotate, she is continually buying new food. Therefore old food, maybe used just once, builds up and no helpers take the time to look at what is already there, instead just putting the new food in the fridge and ignoring the rest. So Fujita-san's refrigerator is filled with half-used, but now expired and inedible, food. My wife feels that this behaviour is atrocious and these other helpers should be doing their job properly. She felt really sorry for Fujita-san and understood why she is often complaining to ILC staff about her helpers.

“Mainstream” Japanese homes and (dis)continuities

It is useful to highlight both similarities and differences between the homes of disabled people and “mainstream” Japanese homes. As studies of modern urban Japanese home have shown (Daniels 2010; see also Tsuzuki 1999), urban Japanese dwellings are often hybrid projects modified and organized to suit the needs of the people who live there. Japanese homes often show a surfeit of goods, creatively packed into small spaces. Ato-san's collection of ultraman memoribilia, souvenirs, mementos, and personalized aesthetics mixed into a fairly tight urban living space fits this trend. While Ato-san's home is not an example of the idealized order stereotypical of Japanese living spaces, it is similar to the other pragmatic dwellings of contemporary Japan that exemplify a “messy order”.

Meanwhile, recently built living spaces are increasingly becoming barrier free. For example, the state-run and funded UR project for urban renewal has recently constructed its new apartment complexes with the explicit intent to be barrier free—including elevators, ramps and smooth surfaces within the rooms, and wider doors and bathrooms to facilitate their use by people in wheelchairs.

Nevertheless, there are a few areas of contrast to emphasize. Although many single people do live alone in rented accommodation, the ideal still centres around a nuclear family who strive for home ownership (Daniels 2010: 17). Ato-san and other similarly disabled people cannot feasibly strive for home ownership due to the clear financial constraints. Although they may wish, all else being equal, to own their own dwellings, they barely subsist on the government support they receive. Even those disabled people who wish to work will likely not fit the ideology of the middle-class white collar salary-man. Nor can disabled women fit with the gendered assumptions of the ideal. Disabled women cannot reasonably try to fit the dominant housewife image: this would obviously require dexterity in the home that most of the disabled women I worked with do not possess. Indeed, as we saw, they express their frustration in managing their own, single-person household, since they know in principle what they want done (in the way of cooking, cleaning, etc.) but are unable to do it themselves. So they rely on helpers. Often they feel frustrated since they cannot communicate their wishes effectively, or the helpers (who are young and inexperienced) are unable to competently perform household tasks. As such, the consumption practices inside the homes in my study contrast with those studied by, for example, Daniels (2010), as most homes in her sample fit more closely with the ideal of the home-owning nuclear family.

Another area of contrast is with respect to DIY and modification of the home. Ato-san modifies his home to make it barrier free, which is unique, but other Japanese people also modify their homes in various ways. Still, Ato-san has to make many more changes to make his home liveable than the average tenant. Indeed, the necessity of such extensive modification is the major reason that people like

Ato-san have comparatively more trouble finding suitable buildings and accommodating landlords.

Further, Daniels notes that DIY is still relatively unpopular in Japan and many people hire professionals when upgrading their home. And disabled people are perhaps less positioned for DIY than most mainstream Japanese people. For example, while replacing a lighting fixture is probably not a major issue for most Japanese people, it can be for disabled people who must invest more time and effort into planning. They need to consider who will transport the new product to the home, who will install it, and who will fix it if it breaks. Of course, helpers usually do these things, unless the disabled person pays for an expensive professional. But that creates, or at least potentially creates, the same issues of friction with helpers that have been discussed above.

There are many other idiosyncrasies and specificities of Ato-san's living arrangement—which relate to domestic consumption—that show the specificity of disabled domestic life but also reflect the diversity in "mainstream" Japanese homes. In other words, while it is true that Ato-san has a number of unique characteristics in his residence, some of these characteristics can potentially be found in the residences of non-disabled Japanese people. For example, Ato-san is unable to use a futon and has a special bed, which takes up a substantial amount of space. Nevertheless, some disabled people sleep in futons, while many "mainstream" Japanese people sleep in beds. Likewise, Ato-san makes relatively little use of his kitchen, and most disabled people who employ helpers full-time are likewise unable to engage with their kitchen directly. Still, they engage with their kitchen by proxy through instruction to their helpers. But many Japanese people, perhaps especially men who live alone, make only marginal use of their kitchen. Indeed, perhaps the very idea of the "mainstream" needs to be challenged, and this is one of the main goals of disability politics.

Movement and Barriers: Agency, Politics, and Materiality

In highlighting such politics, it is crucial to start from the fact that disharmony is just as much a fact of dwelling in the world as is harmony. For Ingold "it is as their lines of movement, not as mobile, self-propelled entities, that beings are instantiated in the world" (Ingold 2011: 71). I want to conclude by asking what happens when these lines of movement are blocked by barriers. Ingold cites Clifford Geertz in claiming that humans would be "crippled without [the environment]" (Ingold 2011: 76). But the word "crippled" here is quite instructive. "Cripple" is actually a word for disabled people, and a "nasty word" at that, a word that has nevertheless been reclaimed by some (Linton 2006: 227). And so, we might ask, what "cripples" Ato-san? Is he not "crippled" *by* the environment? This is the basic political dilemma that faces someone like Ato-san and others at ILC. In the conclusion of this chapter, I want to examine the themes of barriers, mobility, and environment as they relate to politics, starting from a few notable examples from science and technology studies.

Barrier free is political because, following Langdon Winner's famous phrase, artifacts have politics (Winner 1999). Winner illustrates this with the example of a highway system that was built from New York City to the beach on Long Island, a highway that Winner shows was built to have a specific social and political effect. The goal was to exclude poor people, in particular poor black people, by making the highway system unusable by buses, while being perfectly accessible to car-driving, affluent white people.. This was achieved through the many low overpasses along the highway. These politics have been inscribed into the very material substance of the built environment. And, in this way, the highway serves to protect the beach on Long Island from black people and keep it as a segregated white space. Not only does this example clearly illustrate Winner's point that artifacts have politics, but it is also a clear example of an artifact constructed such that it is a (in this case purposeful) barrier to movement and mobility. In fact, its politics depend on the fact that it is a barrier to movement and mobility.

Another good example of an artifact with politics comes I think from Bruno Latour's discussion of the speed bump (Latour 1999: 186–190). Latour argues that the speed bump is “delegated” social action. It forces us to slow down. It makes us obey speed limits and laws. And in this it has effects much like that of a social person (in particular a policeman). In drawing the powers of an agent into the artifact, Latour's ultimate purpose is to refute the distinction between humans and non-humans, to reclaim the agency of objects. But, following Winner's insight, his example captures not only the agency of objects but also the politics of artifacts. The speed bump is more effective in its purpose than signs or perhaps even than policeman, because its very material substance effects changes in the possible actions of people. It makes them change the way they drive by changing the way they *can* drive. And, like Winner's highway example, these political and social effects are achieved through barriers to movement and mobility.

Ingold, on the other hand, criticises Latour's argument and his example, and by extension the entire approach of Actor-Network Theory (ANT) (Ingold 2011: 232). This criticism is levelled against both the notion of “objects” and the notion of “agency”. According to Latour, the speed bump has agency; it has the effect of forcing us to slow down. In this way, it takes the place of the policeman. It is also clearly an object, a nonhuman. To refute these points, Ingold describes an experiment he has conducted with his students. They build kites out of sticks and paper, take those kites outside, and then start flying them around in the wind. Ingold poses a rhetorical question: is it the agency of the kite that causes this movement, a movement which cannot be anticipated precisely either by his students nor by himself, an agency that the kite has imposed on them? Of course not, he says; the kite's movement is caused by its movement in the flow of the wind. The observed behaviour of the kite arises out of a whole field of relations within the environment, of pathways and flows of movement in the substances of the world. It is only by taking the kite as an "object", cutting it off from the world, that we are able to impute agency in it. Ingold believes that in construing something as an object, we first split the world off into various pieces. We are turning living things into dead objects, which are collected as a kind of hodgepodge assemblage. And it is only through the mystical term "agency" that we sprinkle life back onto that assemblage of dead objects. Ingold's example of the kite is meant to show that we should not split the world into so many objects, and that, in so doing, we are led into absurd claims about "agency".

On Actor Network Theory

In light of both Ingold's work and the technoscience themes of this thesis, it is worth attending to the literature on actor network theory (ANT). Although ANT is, in some ways, quite difficult to pin down, there are a few key tenets for ANT that have been developed by Latour, Law, Callon, and others. Perhaps the important place to start is with Latour and Woolgar's ethnography *Laboratory Life* (1986), which arguably laid the groundwork for most of the later theorising.

According to Latour and Woolgar, scientific practice in the laboratory is primarily a matter of "inscriptions", a term they use to encapsulate the numbers, diagrams, writings, markings and so on which are produced out of various machines, devices, and practices. These inscriptions, they argue, are the primary "product" of the laboratory. It is through such inscriptions that the objects of science can be said to be constructed. As such, it is only through the production, interpretation, and translation of special inscriptions that a statement comes to be a scientific fact. Derived from this ethnography, two main tenets of ANT arise. The first concerns the notion of symmetry and the second the notion of translation.

Symmetry

ANT is at great pains to critique what its proponents argue is a problematic asymmetry in the description and assessment of different kinds of things. In the first instance, drawing on the strong programme in the sociology of scientific knowledge, this symmetry applies to the assessment of truth and falsity. According to proponents of symmetry, successful science needs to be explained in the same terms as unsuccessful science. It was a mistake when successful science was explained by the simple "fact" that it is "true" while unsuccessful science was explained by external (i.e. social) factors. Extending this argument, ANT not only claims that the social needs to be considered in the same terms as the scientific, but also insists that we need to overturn the dichotomy between nature and society. As Latour (1993) develops this position in *We have never been modern*, the hallmark of modernity is the insistence on the "purity" of both nature and society in the face of their increasing and multiplying mixture in the form of "hybrids". Analogously, ANT has argued for symmetry, or a "flattening", of the relations between humans and non-humans. Within this perspective, inscription devices, but also other kinds of non-humans such as microbes, are actors just as much as the scientists who work in the laboratory. It is through the collaboration and assembling of these actors, what is termed a network, that certain kinds of "objects" take form.

Translation

Following from these principles is the notion of translation. Again we can trace this back to the analysis of inscription devices, in which inscriptions undergo a series of translations. The more generalised point is that there is a process of translation between actors in a network. It is important to note, therefore, that the word "network", as Latour (2005) makes clear in *Reassembling the social*, was meant to stress this kind of translation. Of course, since that time, network has come to be associated with electronic communication and particularly the World Wide Web, with an image of clean and instantaneous connection and transfer, a change in terminology that Latour laments insofar as it has confused many people who try to understand ANT. As Callon's (1986) work makes clear, in ANT, actors enrol as translation nodes in a network and try to make themselves necessary. These actors can be many kinds of things. In the case discussed in this thesis, we may include disabled people, helpers, wheelchairs, stairs, and so on. Such a material perspective in the study of modern assemblages of humans and non-humans does seem to hold a certain resonance here.

Is ANT a framework?

Nevertheless, there are certain uncertainties in my own understanding of ANT that, while informing my thinking in some ways, made it problematic to apply as a framework. Perhaps the most important is that, in *Reassambling the social* (Latour 2005: 141–158), through an imagined transcript of an early PhD candidate coming to ask for advice in constructing a thesis, Latour (as the senior professor advising the student) advices him that ANT cannot be used as a framework and he had best abandon it. Although clearly making a point about how the words “apply” and “framework” are used in academic projects, this quip also made me quite wary about working with ANT in an “orthodox” way. Law (1999) has noted that ANT is in a somewhat paradoxical and inimical position because by its nature it resists being pinned down or described in any particular way, yet it has nevertheless been quite successful in creating its own orthodoxy of ANT practitioners.

A further issue that applies to the “design” of this thesis in particular is its possible incompatibility with one of the main tenets of ANT, encapsulated in the slogan of “follow the actors.” ANT, insofar as it can be categorized methodologically, is intent to doggedly follow empirical traces, or translations, between actors and therefore trace out a network. In other words, this seems to imply a strongly empiricist metaphysics. While in some senses this may be a sound strategy, in this thesis, as I have outlined in the introduction, the project starts from an intent to study sites of production and sites of consumption. Rather than generated through “dogged” following of translations, this framework, admittedly, was developed *a priori*. The consequences are that this thesis reads much different than one that would be produced by ANT. While connection and translation in a network is important, this thesis also highlights friction, disconnection, and mistranslation between the “worlds” of laboratory life and disability life.

Speed Bumps, Agency, and the Politics of Artifacts

Still, when considering such friction we inevitably return to barriers and it is therefore useful to revisit Latour's example of speed bump in light of Ingold's critique. At least in the context of this chapter, barriers are quite a bit like speed bumps and not that much like kites. As I have said, the crucial point for me about Latour's example is not in the objects and in the agency, but in the politics and in the artifacts. Barriers, like the speed bump, have political effects on people's actions. As far as I can tell, the kites Ingold describes do not. Kites do not seem to act as barriers. Ingold argues that Latour and ANT unnecessarily separate the world into various assemblages of objects and then imagine agency to be the magic that unites them. This may be a fair critique, but it is not necessary to imagine the world as discrete objects in order to accept the world as full of barriers. Barriers do not really need to be objects at all. Many of Ingold's examples can in fact be barriers, such as the river:

> In fluid space there are no well-defined objects or entities. There are rather substances that flow, mix and mutate, sometimes congealing into more or less ephemeral forms that can nevertheless dissolve or re-form without breach of continuity. Every line – every relation – in fluid space is a path of flow, like the riverbed or the veins and capillaries of the body. As the sanguinary image suggests, the living organism is not just one but a whole bundle of such lines. In a quite material sense, lines are what organisms are made of (Ingold 2011: 86).

Politics and Materiality

A fluid space is one of movement, but those flows can be misdirected or blocked completely. They can also block other kinds of movement; rivers are often quite difficult to cross. These facts are easily forgotten in the terms that Ingold often uses. Rather than harmony, often people, things, and the environment strike a discordant chord. Ingold has said himself that, for this reason, he regrets using the word “dwelling” because “for while we may acknowledge that dwelling is a way of being at home in the world, home is not necessarily a comfortable or pleasant place to be, nor are we alone there” (Ingold 2005: 503). Like him, I am asking “if dwelling implies an openness to the world, how can it accommodate struggle, defeat and closure?” (2005: 503). In other words, how can we accommodate barriers in what Ingold calls a “political ecology” (2005: 503) which Ingold seems to contrast with a politics based on design and representation (which seems to be another way of saying utopian politics).

As such, at this point it is useful to discuss the concept of “materiality”, a term that has been debated by Ingold (2007a, 2007b) and Miller (2007) but that I have not employed much in this thesis. In this section, I want to explain my own thinking with respect to these debates. I think that Ingold makes a convincing case that the term “materiality” is ambiguous and without a clear meaning, and I find his philosophical points attractive. Still, apart from the term itself, Miller makes a number of arguments that sit closer with the approach that I have tried to develop in this thesis. In other words, my discussion of materiality does not reject the arguments of Miller as such, though it does express my uncertainty about the analytical value of the term itself.

In the introduction to his edited volume *Materiality,* Miller (2005) explores some of the ways that materiality can inform anthropology. He states that the main aims of the volume are “to acknowledge the central role played in history by the desire to transcend and repudiate materiality,” to consider “the consequences of acknowledging this fact and subsequently accepting materiality and to go on to explore the nuances, relativism, and plural nature of both materiality and immateriality," and to "follow through the most radical of these implications, which leads us to repudiate the privilege accorded to humanity defined by its opposition to materiality as pure subject or social relations" (2005: 41). Miller sees this desire to "transcend and repudiate materiality" in a wide range of human thought and action. He notes how the dichotomy between materiality and immateriality is the basis for many religions, and how these religions place ultimate importance in immateriality. But he also sees the privileging of immateriality as embedded in social theory, which he believes is a mistake and an "emperor with no clothes." He argues that anthropology has focused on society, social relations, and the subject (and he understands these words to refer to basically the same thing) when it needs to fully integrate an appreciation of materiality in order to understand how people are framed by artifacts and other parts of their environment. For him, materiality offers a way to investigate how different things are important to different people and offers a profitable way to understand material culture in context. In this way, he intersects with a range of thinking in anthropology, philosophy, and social theory that wants to incorporate materiality with social relations, and thereby transcend many kinds of dualism (such as the dualism between nature and society). Miller's main references are from Marxist dialectics, the work of Latour, and the work of Alfred Gell. Where he claims that his position breaks from this other work is that he asserts that his approach is based not on philosophical development but rather on the process of ethnography as a way to understand the lives of people being studied. Miller's position is that the philosophical analysis of materiality tends to reproduce the same dilemmas and the same arguments: one group of theorists claims that another group has simply reproduced dualism, while that other group makes the same claim in reverse. As such he states that "while [the] resort to philosophy is essential to our academic purpose, the integrity of anthropology demands another commitment: a promise to betray such philosophical resolutions and return us to the messy terrain of ethnography" (2005: 41).

Since that volume, Ingold (2007a) has written about the spread of the term "materiality". Ingold notes the increasing prevalence of this word but he argues against its utility, because he sees it as obscurantist at best and confused at worst, and instead favours the term "materials", whereby a consideration of materials is a consideration of materials in themselves. He wants to investigate the pathways of materials that tie the world together organically, and asks how the world grows and changes over time. Rather than a world fabricated from one kind of generic, inert matter, he sees an organic world populated by a variety of materials, each with their own special properties, immersed in other substances and mediums. While Miller may see Ingold's philosophical position as essentially compatible with his own, Ingold believes that those who employ the word "materiality" reproduce a dualism between the material world and the representation of the material world. As such, he considers their perspectives to be radically different. He notes how Tilley, a proponent of the term materiality, states that "the concept of *materiality* is required because it tries to consider and embrace subject–object relations going beyond the brute *materiality* of stones" (Tilley 2007, emphasis added) Ingold points out that paradoxically this sentence seems to use the word "materiality" twice to mean two opposite things. The first use, as "the concept of materiality," seems to refer to the "meaning" or "social context" of objects, which contrasts to the second use as an object's "brute materiality." On reflection, Ingold's identification of this slippage seems quite astute. For example, the quote from Tilley appears to sit uneasily with Law who, discussing Latour and Woolgar's foundational importance in science studies, notes how they "are very much into *materiality*. This means that they focus in the first instance on the physical stuff of the laboratory, and how this is laid out architecturally" (Law 2004: 19).

While Ingold's philosophical and semantic points seem valid, it is still worth remembering that Miller explicitly rejects philosophy for its own sake. Rather he employs it only insofar as it is a useful tool in the service of ethnography and anthropology. As such, it is crucial to note that Miller's (2007) main critique of Ingold centres less on Ingold's philosophical musings in social theory and more on his concrete analysis of actual people in the world. For Miller, Ingold's writing expresses a latent nostalgia for “authentic” non-modern life and is tailored to the “stone age”—not the “plastic age” of current real-world ethnography. Miller's critique, therefore, is actually quite close to my own critique of Ingold as I have developed it in this chapter. I have held to the contrast between the foot and the wheelchair precisely because an antagonism to machines seems to underlie Ingold's writings, but machines are a major part of disabled people's lives. Much more than a “crude” reading of Ingold, critiquing his (implicit) denigration of the wheelchair echoes Miller's critique about ethnography among modern people. Like Miller, I question the repercussions of such romanticism in any theory that tries to do justice to everyday ethnography.

For my own analysis, both the perspectives of Miller and of Ingold are valuable. Both argue that anthropology needs to connect people to the material world in a fundamental way. As I have just noted, I find Miller useful because he consistently maintains that ethnography is essential for considering the effects and importance of things and environments in actual people's lives. What I find interesting in Ingold's work is his attempt to incorporate the importance of movement into politics. I find Ingold's focus on movement through the world to be particularly productive in the context of disabled people, where movement in the world is one of their prime political concerns.

Perhaps it is therefore useful to consider what a “political ecology” approach can tell us about disability politics. In the description of Ato-san's train journey, I spoke fairly little of the other people on the train platform, in the train, on the street, and so on. In fact, I know little about them specifically; no more than the generic things someone knows about the anonymous others living in the same large city. But these anonymous others also make a difference. Yamano-san explained to me that often nondisabled people are quite inconsiderate towards disabled people when they meet them out in the world. She said that, for example, when she is waiting for the elevator, such as those in the train station, often perfectly young, healthy, able people, who do not *need* to take the elevator, push ahead of her and get on the elevator before she can enter. For her, it is time consuming and difficult to get a wheelchair into an elevator, and so she needs the time to go first (before it is already full of people). If people rush ahead of her, she ends up having to wait for the next elevator, but if that other person had taken the stairs, they would arrived at about the same time as her anyway. Such behaviour, understandably, makes her quite annoyed.

Indeed, it is telling how Ato-san described barrier free to me. When I asked him what barrier free is for him, he replied that physical and material barriers “cannot be helped” or are “inevitable” (*shou gai nai*), but that easing or doing away with “people barriers,” barriers in people's “hearts” (*kokoro*—see previous chapters), are what barrier free is about. He explained that often people have narrow views of disabled people; for example, they think disabled people like himself are scary or “funny in the head.” This was his experience especially when he was younger, and for him this is an important meaning of the term “barrier”. For Ato-san, barrier free means an elimination of prejudice.

I think barrier free, as described in this chapter, hints at what a “political ecology” might look like because it is political (it is about the elimination of barriers) but it is not, I think, a utopian project. A utopian project has a design. It is representational in its goals for the world. Now, it is easy to confuse barrier free with such utopian projects. For example, Tom Shakespeare (2010) has criticised the social model of disability, a close relation of barrier free. The social model will be described in greater detail in the next chapter, but the main point is that disability is not caused by physical or medical condition, but is rather caused by society. While Shakespeare acknowledges the political utility this model has had for disability, he believes it is ultimately unrealistic, potentially contradictory, and so on. But

Shakespeare's criticism depends on his analysis of the social model's utopianism, which he says is often implicit yet nevertheless ever present. In this barrier-free utopia, the world is without any barriers and any disability. But Shakespeare argues that such a world cannot be operationalized. He gives many practical reasons. For example, natural barriers such as “mountains, bogs, beaches are almost impossible for wheelchair users to traverse,” while, according to him, it would require a huge and unrealistic investment to make every line and station of the New York subway or the London Underground wheelchair accessible (Shakespeare 2010: 271). Further barrier-free changes for one disabled person might end up creating barriers for other disabled people. Blind people might prefer steps, while those in wheelchairs prefer ramps. Shakespeare also stresses that eliminating all barriers for those with learning disabilities or mental disabilities would pose even more of a challenge.

Yet, Shakespeare's criticism of the barrier-free utopia is not necessarily a criticism of the way the lived reality of barrier-free politics. When I asked Ato-san, Fujita-san, and others to describe to me their image of a barrier-free world (that is to imagine a possible barrier-free utopia), not only were they completely unable to answer the question but they also said that they had never thought about it in that way. Their answer makes perfect sense, I think, if barrier free is a way of dwelling in the world with a constant pursuit of eliminating barriers *as they are encountered* in the world, and not a project about realising some ultimate imaginary aim of eliminating all barriers, as if those barriers had already been counted and put into a list. In fact, I think this may be a position that Shakespeare would endorse. Such an understanding of barrier free is not, I think, a totalising system held within the imagination (cf. Graeber 2001). Taken this way, barrier free is quite compatible with Ingold's notion of practice and skill unfolding, not as pre-determined design, but as continued development through the lines and pathways of life. If movement and mobility, as dwelling, is paramount to life, and barrier free is the politics of movement and mobility (as dwelling), then it should not be too much of a stretch to say that barrier free is, to borrow Nikolas Rose's phrase (2007), though for different purposes, *the politics of life itself*.

Chapter 4: The Social Life of ILC: Independence, Identity, and the Social Model of Disability

Introduction: Uchiyama-san's Life

The previous chapter ended in a discussion of politics, and this chapter continues that concern by focusing on the organisation and politics of ILC. ILC is run by Uchiyama-san, its director, as well as both disabled and nondisabled staff, in order to help disabled people within the community by providing services, training, education, and advice. They help disabled people live independently, such as Ato-san (who was discussed in the previous chapter). Independent living means that the disabled person lives neither in an institution nor with his or her family, but, as with Ato-san, on his or her own. As an introduction, I want to briefly describe Uchiyama-san's life history up until the point he formed ILC, because his story makes concrete the themes of disability identity, independent living, discrimination, family, the state, and activism that are the crux of this chapter, themes that will be explained in more detail below. Of crucial importance is the notion that, for Uchiyama-san and others at ILC, disability is not an individual defect, but rather an identity and/or social category, and that the "problems" of disability are therefore socially produced.

Uchiyama-san is a disability advocate who, due to a bone condition called *Osteogenesis imperfecta*, is small in stature, uses a wheelchair for mobility, and is prone to broken bones. His impairments are physical (i.e. neither mental nor intellectual). He is 45 years old, born in the late 1960s. Uchiyama-san's parents are from Kagoshima, a city on the southern tip of the Island of Kyushu, but the couple moved to Osaka together after they met. It is in Osaka where Uchiyama-san was born and raised.

Uchiyama-san was born into a family of five. Uchiyama-san's father worked as a carpenter, and his mother a housewife. Of his two older brothers, Uchiyama-san's oldest brother was born without disability. His next oldest brother, also a member of ILC who I will call K. Uchiyama-san, to avoid confusion, was born with the same condition as Uchiyama-san. Although not always the case with this condition, his brother is also small in stature (about 130cm) and requires a wheelchair.

After K. Uchiyama-san was born with an unidentified disability, Uchiyama-san's father, when he was intoxicated (which was often), would say he did not want another child. This happened with more frequency after Uchiyama-san was conceived, and Uchiyama-san's father continued to tell his mother, during the pregnancy, that he did not want another child because it might be disabled. Still, Uchiyama-san's mother wanted to "wait and see", since they did not know that Uchiyama-san would be born with a disability. From Uchiyama-san's perspective, other parents of nondisabled children are happy when their children are born (for example, Uchiyama-san said that my parents were happy when I was born). But, Uchiyama-san told me that when he was born his father was not happy. Uchiyama-san explained that while I had started my life from "zero", he started his life from a "minus". He said this is not just his own experience, but is the same for all disabled people who have such impairments from birth.

According to Uchiyama-san, his father drank a lot, would usually come home drunk, and would often beat Uchiyama-san's mother. This continued throughout Uchiyama-san's childhood, and his father was also sometimes violent to the children as well. Eventually, when Uchiyama-san was in 6th grade, his mother ran off with another man (which Uchiyama-san believes was in order to escape her husband's domestic violence). Around the same time, Uchiyama-san's older (nondisabled) brother became a *yankii* ("yankee"—a delinquent youth subculture in Japan). The brother left home, leaving just Uchiyama-san, K. Uchiyama-san, and their father.

Uchiyama-san explained that he was therefore raised by his father, rather than his mother (as is usually the case of Japanese children). Still, from what Uchiyama-san described, the phrase “raised by” should be taken with a grain of salt. His father would wake up at 6am to go to work, and would leave 1000 Yen on the table (equivalent to about $3.50 USD at that time). With this money, Uchiyama-san and his brother would buy bread at school for lunch, and usually McDonald's or *gyudon* (a Japanese dish of beef on rice) for dinner. During high school, Uchiyama-san would often gamble his money on *pachinko* (Japanese slot machine): when he won, he would be okay, but when he lost he would just “bear it” *(gaman*) for the day without food. His father would drink extensively after work and usually return home around 1 or 2 AM.

Uchiyama-san grew up attending mainstream, regular schools (i.e. he did not attend special schools for disabled children). These schools included elementary school, junior high school, and high school. He said this may have been rare, especially in his time: disabled children often attended special schools.

When he was a high school student, he entered a residential institution for disabled children, as preparation for, and then rehabilitation from, for a surgical operation related to his impairment. He was at the institution for one year. During his time there, before his surgery, he often teased and bullied the other children, especially those with cerebral palsy (CP). When I spoke to him, he explained that this was part of his “disability complex”, rooted in his childhood. He had grown up feeling bad about being disabled, and he took out his resentment on the other more severely disabled children. He now thinks this was the result of his own prejudice and discrimination against disabled people.

After his surgery, he had a formative experience that changed his perception on disability. As part of his recovery, he was unable to get out of bed for an extended period of time. This was a very tough period in his life, but it was made much easier because the other disabled children at the institution stood by him, supporting him and encouraging him. This surprised him since he had been so awful to them in the past, but he was very happy and grateful. It made him feel very sorry for the way he had previously acted. Even the children with CP that he had bullied the most had not held it against him, and they genuinely stood by him. His attitude, he explained, was transformed. Rather than being bound by the negative stigma associated with disability, he started to gain a new kind of "power". While he had begun with a "disability complex," since that time at the institution he had grown to see disability as a form of personal strength (*buki*—literally weapon).

After he left the institution, he continued in school, and then, after graduating, moved into the work force for most of his 20s. He held a variety of different jobs in that period. For a time, he worked as a radio control person for a taxi cab company. He also studied to make *inkan*, individualised name stamps that Japanese use as personal seals on official documents (*in lieu* of the Western practice of signing one's name). Despite these various jobs, his main work was as a wheelchair salesman, where he worked for 8 years. He said it was during this time that he visited many institutions, hospitals, and elderly care homes, and grew to learn about the difficulties that many disabled people face.

In light of this eye-opening experience, and recalling his earlier experience at the children's institution, he wanted to get more involved in the disability movement. Uchiyama-san started working with the Osaka Independent Living Center Research Group (*osaka jiritsu seikatsu senta kenkyukai).* During this time, he was mentored by one of the heads of the Osaka Living Center Research Group. For a two year period, he gradually learned about independent living and became involved in the independent living movement. After this initial experience, he started working at an organisation (now defunct) called *Peer Osaka. Peer Osaka* was ostensibly the first independent living centre in Osaka. But Uchiyama-san told me it was actually a "fake". According to him, *Peer* Osaka was set up and run by the state administration, and therefore they did not have the real "spirit" to push for true independent living. They were unable to effect positive and substantial social change. In fact, Uchiyama-san told me that the main reason he worked there for 8 years, starting from when he was around 28, was because the salary was good.

During this time, he also started organising a recurring recreation event for people with disabilities. Through these events, he met many people who would eventually be the original members of ILC (or its customers). His desire to start his own centre for independent living grew, until, eventually, he was spurred to act on this ambition at the words of one of the senior figures at the Japanese Council for Independent Living Centers (JIL), Kadota-san. Uchiyama-san had invited Kadota-san to attend one of his events, and at the event Kadota-san called him over and told him that, rather than try to effect happiness with superficial things, he should make people happy by exerting his entire self. Uchiyama-san was affected by this greatly, and realised himself that he had been going "halfway" (*chūtohanpa*). He started from then, 2001, making plans and preparation for ILC, which then started the next year. At the time of my fieldwork, ILC had been in existence for just over 10 years.

Having laid out a brief description of Uchiyama-san's life course, the rest of this chapter will give an overview of ILC. To begin, it will briefly describe ILC's setup and services. It will then move into discussions of both disability identity and the "social model of disability", in order to show how these key concepts are at the core of the independent living philosophy as it has been developed overseas and then adopted in Japan. The chapter will then turn to discussing the meaning of "independence", and how this notion of independence relates to the provision of welfare in Japan and to the development of the Japanese disability social movement historically. Finally, the chapter will conclude with a brief look at friendship and sociability at ILC. These discussions will help show that the nature of ILC is rooted both in the Western disability movement and in the specifics of Japan, driven both by the activists and organisers who work to construct a coherent disability movement and also by the everyday actions of regular disabled people who use ILC's services. All of this is necessary in order to understand what ILC is.

Overview of ILC

Entering ILC from street level, on a ramp, I am immediately confronted by a large table with a number of people sitting around joking and laughing. About a half dozen people say (or shout?) “OH MICHAEL (*maikeru*)!” followed by either “*OHAYO!”* (“good morning!”), “KONNICHIWA” (“good afternoon!”), or often “MAIDO!” (Osakan dialect for “hello!”). I sit down, and the same people start joking with me, for example, telling me that I look naked (because the colour of my pink shirt is too close to my pale skin tone). They ask me questions about food in Canada or how my wife is doing. Someone will definitely say *“mada asobō na! nomi ni ikō!”* (“Let's go drinking sometime!”). Various snacks are spread out across the table, *omiyage* (souvenirs) that someone (no one is sure who) has brought back from a trip, and I'm told to have to have some. The room is filled with both noise and laughter, and yet many people are busily working as well. There are always a few people doing their own thing, filling out paperwork or using a computer, writing emails or preparing documents. People continually move back and forth between the fun chatting, and the serious, intent working: staff and “customers” of ILC see themselves as fusing work and play. In fact, the staff are not even readily differentiable from non-staff (to those who do not know the individuals), and there is a continuous stream of people coming and going.

ILC is a centre for independent living (CIL—I will use this term to refer to centres in general, rather than the specific site of my field, ILC), and follows many of the outlines set out by the Japan Council on Independent Living Centers (JIL), which was established in 1991. The JIL provides a way for CIL to be coordinated at the national level, and the meaning of independent living and centres for independent living to be standardised to some extent. Currently, to be a member of the JIL requires:

first, that the member is actually a centre for independent living (i.e. members can be neither individuals nor other kinds of non-CIL organisations); second, that the CIL satisfies these conditions:

> 1. The executive director of the organization is an individual with disabilities
> 2. More than half of the decision-making committee member are people with disabilities
> 3. The organization offers advocacy services and information referral as its core services, as well as more than two services among the items below for unspecified recipients;
>   - Personal Assistant Referral
>   - Peer Counselling
>   - Housing Services
>   - Independent Living Skills Training
> 4. Able to pay membership fee
> 5. The organization offers services to the needed regardless of the nature of their disabilities
>
> (Japan Council on Independent Living Centers)[16]

JIL's mandate is to assist the creation of new CILs in Japan through training staff, provide a network in which representatives from many CILs can meet and interact, publish newsletters and distribute information, and promote independent living to both the public and the government. Currently, JIL has over 120 members.

Like other members of JIL, ILC is organized as an NPO (Non-Profit Organisation). The notion of an NPO is actually a fairly recent phenomenon in Japan, for the most part only arising after the 1995 *Hanshin* (Kobe) earthquake and the unprecedented number of people who volunteered to help. Up until that point, NPOs had little place in Japanese law and the Japanese state looked on them suspiciously, tightly restricting which organisations could legally become NPOs (Ogawa 2009: 2–3). But, in the aftermath of the earthquake and the resultant volunteerism, which was in many ways more effective than the actions of the state or other traditional Japanese organisations, NPOs started to gain a more prominent role in Japan, especially with the 1998 “NPO Law” to facilitate the ability of small

16 http://www.j-il.jp/jil.files/english/aboutjil.html Accessed 2012/07/11

organisations to attain NPO tax exempt status (Ogawa 2009: 3). Since that time, the number of NPOs in Japan has continued to grow. Further, as a result of the March 2011 Tohoku earthquake, new laws further easing the creation of NPOs have also been proposed to the legislature and are likely to be introduced (Matsunaga 2011).

ILC as an organisation is funded through two different schemes. All but one of the disabled people who work at ILC receive their salary from a consultation grant from Osaka city. Non-disabled staff, one specific disabled staff member (Uchiyama-san's brother K. Uchiyama-san), and the business costs of the organisation are officially paid through an ILC-associated “nursing dispatch project” which I will call *suttopu-in* (STOP-IN). STOP-IN receives its funding from the Japanese government. The salary each person receives varies, but for a basic attendant the salary is usually around 200,000 yen (£1600) a month. While disabled and nondisabled staff are funded through separate programs, in practice they work together at ILC as ILC members.

Many of ILC's “customers”, those disabled people who employ ILC's services, do not work steady jobs but instead receive various welfare and stipends, under the Person's With Disabilities Act, from the Japanese government. The amount they receive depends on their personal circumstances, but the basic amount they receive is under the pension (*nenkin*) system, which for disabled people, is around 80,000 yen (£650) a month. Those with severe disabilities are granted roughly 25,000 yen (£200) extra in a special disability allowance *(tokubetsu shōgaisha teate)*. Further, many receive additional funds, including rent stipend, under the welfare system *(seikatsu hogo seido*). The total amount for a severely disabled person who cannot work, like many of my informants, is usually about 1,600,000 yen (£1300) a month. The government also grants approximately 170,000 yen (£1380) a month to pay for personal attendant care, a care fee provided to those people with disabilities who require ongoing attendant assistance and opt to live independently.

According to the ILC pamphlet, they offer the following services: peer counselling, an independent living programme, advocacy, independent living seminars, consultation and information services, and an Asia Network. The purpose of peer counselling is to support disabled people with advice from other disabled people, building confidence and a sense of empowerment. The purpose of the independent living programme (ILP) is to help people implement their own framework for independent living, assisting in aid, organisation, transportation, medical care, cooking, and public resources. The purpose of advocacy is to work as an organisation to protect the rights of disabled people. The purpose of independent living seminars is to provide venues in which anyone can participate and learn more about how to lead an independent lifestyle as a disabled person. The purpose of consultation and information is to provide a way that disabled people can get assistance or advice on anything they might need; for example, if a disabled person cannot find personal attendants (a term which I will use interchangeably with "helpers"[17]), if a disabled person wants to live independently but does not know how to do it financially, or simply wants to make friends, the centre can help.

Finally, the Asia Network brings disabled people from across Asia to Japan so that they can learn about independent living and CILs while building knowledge and confidence. These Asians spend time in different parts of Japan, travelling to a few different CILs (including ILC) as well as spending some time studying the Japanese language in Tokyo. Those disabled Japanese who are in favour of the trainee program believe it is their responsibility to help grow disability movements abroad, particularly in developing Asian countries. Many Japanese at ILC explained to me that they had learned (either personally or speaking on behalf of Japanese disabled people in general) from Americans and other Westerners, and now they felt a desire as Japanese to help other Asians. Meanwhile the frequent Asian visitors to ILC, from countries such as Indonesia, Nepal, and Korea, explained to me that Japan is the

17 The literature tends to use the term 'personal attendant', while the people at ILC in my fieldwork almost always used the term 'helper' (*herupā*)

only country that offers such programs to people from countries in Asia; America and Europe only have special programs for subsets of disabled people (such as disabled women) and otherwise do not have programs specifically offered to people from Asia. Therefore, as Asians, they have better opportunity in Japan (i.e. than in other developed countries) to get training in independent living and running a disability organisation. After these Asians spend time in Japan, the expectation is that they will return to their home countries, with the knowledge and confidence they gained in Japan, and start their own movements at home, perhaps even starting their own CILs.

As a brief aside, according to a paper on the Asia Network program by Hayashi & Okuhira (2008), there are very few CILs in Japan that invite Asian trainee's to stay at their organisation. Hayashi & Okuhira claim this is primarily due to funding reasons, and the CILs that do have these programs are large and well-funded. In fact, they say the Asia Network program is only offered fully in two CILs in Japan: one is in Kanto (the region surrounding Tokyo) and one is in Kansai (the region surrounding Osaka, Kyoto, and Kobe). They describe one as business-like and formal, with a receptionist desk, clear job titles, and so on. They describe the other CIL as more like what they call a "social club":

> We then visited another ILC that trained people from other Asian countries. The office of this ILC came across as more of a social club than a business, as if it were a favourite gathering place. People were crowded around a large, centrally located table, working and talking. At first glance it was difficult to tell who was the director, who were staff members, who were trainees and who were customers from the community requesting services. The comfortable and friendly atmosphere was noisy with jokes and laughter. The staff, both disabled and non-disabled, addressed one another by their nicknames, and commented that it was fun to get involved in the independent living movement. They described it as like friends getting together – working, playing and enjoying life (Hayashi & Okuhira 2008: 420).

If what they say is true about the rarity of organisations with an Asia Network program, then the ILC they visited (the one in Kansai) is likely (and coincidentally) the same organisation as the one in which I did fieldwork. The CIL they describe as a "social club", the one described in the quote above, very accurately portrays what ILC is like, as we can see from my own description above. Apart from the specific points about the Asia Network program, it is worth keeping their description in mind because I will come back to the friendly and sociable atmosphere of ILC at the end of this chapter. Since they contrast this with other CILs (smaller CILs, “business-like” CILs), I should emphasise that my ethnography cannot be a universal description of all CILs in Japan.

Returning to the main description of ILC's function and organisation, arguably, the main service it provides is the recruitment, management, and employment of helpers for the purpose of assisting local disabled people. As described in the previous chapter, these helpers provide the at-home assistance to enable disabled people to live by themselves independently by helping with cooking, cleaning, going to the toilet, taking a bath, handling and manipulating objects, pushing wheelchairs, and so on. For “customers” who are disabled and who come to the centre during the day (described below as “TOP members”), these helpers will usually start in the evening, stay over night and finish their shift in the morning. Helpers rotate each day. Some helpers are young students and have little experience, working at ILC part time for extra income. Others are much more integrated into the social fabric of ILC, working for years and being familiar to everyone.

These helpers, or personal attendants, are organized under the previously mentioned “nursing dispatch project” STOP-IN. At the official level, that is the level of funding (described above), it seems that STOP-IN is a separate organisation from ILC (although they are associated). From the day-to-day perspective of those at the ILC, STOP-IN is more like one part of ILC. It is the part that deals with personal attendants/helpers. STOP-IN provides a place where local disabled people can “stop in” and get help. STOP-IN helpers assist people with many different kind of impairments, impairments such as cerebral palsy, spinal cord injury, quadriplegia, intellectual disability, multiple impairments, etc. The staff of STOP-IN at the time of my fieldwork included 37 men and 34 women attendants, in addition to two men and two women who work as coordinators. At ILC, disabled men always have male helpers and disabled women always have female helpers. People explained this to me in at least two ways. The first was that same gendered helpers are more preferable for going to the toilet. The second was that, in the past, some disabled people had taken an attraction to their opposite sexed helper and this had presented “problems” (which of course assumes the dominance of heterosexuality, which did not actually reflect the full reality of all members of ILC, but this is not a topic I will discuss here). Disabled people pay their fee for helpers, the funding they receive from the Japanese state, to STOP-IN, which in turn pays the helpers.

STOP-IN support is government funded, in the form of the personal attendant care fee noted above, through the Ministry of Health and Welfare. The process to receive support is as follows. First the disabled person must complete and fill in an application form which is submitted to the Ministry through the Regional Health and Welfare Department (*chīki hōken fukushika*). After receiving the application, the department interviews the person about their situation, at which point they will make a first judgement by committee on what special arrangements are needed and desired. If the person is also applying for financial assistance, for example in a situation where the disabled person is unable to work a regular job (like most of those I did fieldwork with), a second judgement by committee will also be made. This judgement requires further paperwork, such as a supporting doctor's opinion made in writing. The second judgement will decide on the level of impairment and therefore the level of financial support. At this point, whether or not a second judgement was necessary, there will be an investigation into the kinds of services, including special tools and/or living arrangements, that are needed by the disabled person. A decision is reached through a combination of the judgement committee's recommendations, the individual's personal opinion on their needs, and the financial arrangements. At this point, the full amount of money that the “patient” receives will be decided and the services can begin.

The final service provided through ILC is the associated “take-off point” for disabled people in the community. I will call this service, which acts as an organisation in itself and (at the time of my fieldwork) had its own separate physical space down the street from ILC, TOP. TOP is where many of the local disabled people, CIL's “customers”, go during the day, those who cannot work but live independently. These people are referred to as the TOP members. On the one hand, this means they are distinct from ILC members: those disabled people who work at the ILC are generally more able to easily interact with others through speech and writing, and ILC also has many staff who are non-disabled. On the other hand, ILC and TOP members often do things together, and move freely between both physical spaces. Still ILC members are usually busier than TOP members during the day, and TOP members mostly sit at TOP, participate in and plan new activities, play (board or card) games or do other leisure activities, as well as actively try to integrate these activities within the “outside” community (such as nurseries, elementary schools, etc.). They aim to make connections with other organisations and people in the local community, such as local shops, schools, and businesses. They gather and try to come up with new ideas to meet these goals. By participating in TOP, members can stay active and engaged with their community, and yet still stay independent and in control of their own daily routine. TOP provides a social space and a social network for its members. TOP has one permanent (non-disabled) staff member, a man in his later 20s, who acts as the centre administrator.

What is a disabled person?

As quoted in the introduction, within Japanese law, a person with a disability is someone “whose daily life or life in society is substantially limited over the long term due to a physical disability, mental retardation, or mental disability” (shōgaisha kihonho cited in Heyer 2000a). According to the 2010 Japanese Disability White Paper (*shōgaisha hakusho*), the annual census and status report on people with disabilities in Japan produced by the Japanese Cabinet Office, there are 7.4 million disabled people in Japan. Of these, 3.66 million are people with physical disabilities (*shinteki shōgai*)*,* 555,000 are people with intellectual disabilities (*chiteki shōgai*), and 3.23 million are people with psychiatric disabilities (*seishin shōgai*) (Cabinet Office 2010). With a population of 128.06 million, this means that disabled people are 5.78% of the population. This is a rather low percentage compared to other industrial countries, such as Germany and the UK (about 10%), the United States (about 19%), and Sweden (about 30%) (Heyer 2000b; Waldrop & Stern 2003). Katharina Heyer (2000b) suggests two possible explanations for this discrepancy. The first is that Japanese law is quite restrictive and limited in what gets categorised and recognised as a disability: excluded are most conditions of the inner organs (except the kidneys, heart, and liver), HIV/AIDS, alcohol/chemical dependency, non-permanent disability (such as temporary use of a wheelchair), rheumatism, and a number of psychiatric disabilities (Heyer 2000b: 111). Further, in order to receive benefits, which include pension and financial support (explained above) as well as eligibility for a range of assistance schemes such as reduced train fare (as in the previous chapter), Japanese disabled people are required to carry a *shōgaisha techō* (literally "disability passbook," a registration document that acts as a disability ID). The official numbers reported in the white paper only count the disabled people who carry this disability ID. Both of these explanations are also suggested by other commentators, such as sociologist Yōda Hiroe (2002), and the same points were also made by an activist speaker at an ILC-organized seminar that I will return to below.

While ILC, in theory, supports all disabled people, the fact of the matter is that most people at the centre have physical, and especially mobility, impairments. There were no blind or deaf people at ILC that I encountered; both groups have historically had their own organisations somewhat apart from other people with disabilities (see Nakamura 2006 for a study of the deaf movement in Japan). While some members apparently had a degree of mental or intellectual impairment, heuristically it is still useful to note that their impairments were often mobility impairments. As I stated in the previous chapter, all disabled people at ILC (at least that I was aware of), either as employees or as “customers”, used a wheelchair. Among these people, especially the “customers”, cerebral palsy was very common. Other conditions of specific members included Uchiyama-san and his brother's *Osteogenesis imperfecta*, Charcot-Marie-Tooth disease (a genetic condition of the peripheral nervous system characterised by loss of muscle control and touch sensation in parts of the body such as the hands and limbs), *Cerebral arteriovenous* malformation (a condition characterised by abnormal connections between the veins and arteries of the brain, which in this case also resulted in brain haemorrhage and left-side paralysis), *rhabdomyolysis* (a breakdown of skeletal tissue that also causes numbness and a loss of muscle tissue), Marfan syndrome (a genetic condition of the connective tissue often characterised by long limbs and issues in the heart and aorta, which in this case also resulted in a brain haemorrhage, left-side paralysis, and reduction in higher brain function), and also spinal cord injury. In contrast, there were no people with conditions such as, say, autism or schizophrenia.

Likewise, centres for independent living were developed by people with mobility impairments. The first CIL was established by the disabled activist Ed Roberts, who had cerebral palsy, in 1972 in Berkeley, California. As we shall see, the movement was (and continues to be) based on the notion that disability is caused by social barriers under the notion of the social model of disability. It is worth pointing out at that the social model is better suited to analysing a specific kind of physical disability than it is for other kinds of disabilities (intellectual disability, mental disability, chronic and painful illnesses, etc.). From a theoretical perspective, this bias has been a source of some criticism within the disability studies literature (cf. Shakespeare 2010), but from the practical perspective of those at ILC, it is crucial to understand that that these models work well for them because of ILC's specific pragmatic and political goals. This should hopefully become more clear in the rest of the discussion.

Disability activism, as it developed in the time of Ed Roberts, was heavily influenced by civil rights, especially African-American and feminist, movements. The independent living movement worked to make disability into a human rights issue, where disabled people are an oppressed group and therefore disability is a political and social category. This contrasts with the notion that, politically, disability is a welfare issue and disability is primarily a medical condition that should be managed, treated, or cured by professionals. The premise of independent living is that disabled people can best help themselves. This premise has at least two major sub-points of analytic importance. The first is that disability is a kind of identity, such that there is a group of people called "disabled people" and/or "people with disabilities." The second is that there are other ways of looking at disability than as a medical condition, and therefore other valid viewpoints than those of medical practitioners. In order to understand these points, I think it is necessary to examine further the political and theoretical basis of the independent living movement.

Disability: Identity and the Social Model

When I asked Uchiyama-san what he thinks is most important for the disability social movement in Japan, he said that it is the slogan "*watashitachi nuki ni watashitachi no koto wo kimeru na.*" As he then explained, this is a translation of the English phrase "Nothing About Us Without Us," a phrase that has become well-known within international disability activism since it was the title of an influential book on disability movements across the world (Charlton 2000). According to Charlton, he first heard the term from two South African disability activists, Michael Masutha and William Rowland, in 1993, who in turn had picked it up from someone in Eastern Europe at a disability conference. The phrase has been adopted within disability activism to protest the decisions (in policy, medicine, education, etc.)

that are made *for* disabled people *without* input or participation from disabled people themselves. The slogan is meant to make visible an “us” (i.e. disabled people), and therefore is part of an effort to construct a positive, proactive, visible, and global identity.

Since disability activism in the United States modelled itself after the African-American civil right movement as well as women's liberation, and the US has been very influential in terms of global disability movements (though the UK has also been influential as well), much thinking within disability activism and disability studies has come to be phrased in the terms of identity politics. Disability studies theorist Lennard Davis (2010c) argues that within these terms, there is a general reluctance (within disability studies) to challenge the category of disability as a coherent identity (a reluctance he thinks is problematic, a point that, while well taken on theoretical grounds, is nevertheless not my main focus here in describing the actual empirical foundations of ILC). He argues that the reason that it has not been challenged is because disability as identity has a degree of political expediency. Disability is a political identity that had to be created, but it has also successfully organized a historically oppressed group of people by giving them a sense of solidarity. Before the movement that created that identity, there was no obvious reason why people with disparate medical conditions could be said to share much in common. In the case of the independent living movement, the notion that disability is an identity helps to support the idea that disabled people, as a group, should be in charge of their own care.

Disability identity is crucially linked to the social model of disability (Davis 2010c: 302), which arose from the work of the Union of Physically Impaired Against Segregation (UPIAS) in the UK in the 1970s (Shakespeare 2010). The original statement from the UPIAS declared:

> In our view, it is society which disabled physically impaired people. Disability is something imposed on top of our impairments, by the way we are unnecessarily isolated and excluded from full participation in society. Disabled people are therefore an oppressed group in society...
>
> [Disability is] the disadvantage or restriction of activity caused by a contemporary social

> organisation which takes little or no account of people who have physical impairments and thus excludes them from participant in the mainstream of social activities (cited in Shakespeare 2010).

The social model separates impairment, which is a physical aspect of the private body, and disability, which is socially and politically produced. As in the previous chapter, within the social model, disability arises through the existence of barriers in the environment. Perhaps the prototypical example is a person in a wheelchair who is confronted with a building that has many stairs. According to the social model, it is a lack of an elevator or ramp that disables that person, and not his or her individual physical condition (Heyer 2000b). It follows from the social model that disability is constructed, and that the work of undoing disability, so to speak, is social and political in nature.

The social model of disability is contrasted with the medical model of disability, which is thought to be the dominant model among the mainstream and also, particularly, among medical practitioners. In the medical model, disability is a medical problem, defect, deficiency, dysfunction, or disease. Intervention therefore takes place at the individual level in the form of treatment, rehabilitation, or a cure. Medical professionals should be in control insofar as they are the experts on disability. And social and political changes clearly cannot undo disability, since disability is a fact of the body itself.

Yōda (2002) calls the medical model, in her discussion of the independent living movement in Japan, by a slightly different name: the "rehabilitation paradigm": "The rehabilitation paradigm sees disability as an individual problem; assumes that, if the disability can be eliminated, then so too can the problem; and seeks to enable people with disabilities to adapt themselves to a society centred on normative able-bodied, 'normal' persons" (Yoda 2002: 1). In contrast, "the 'independent living' paradigm generated by the disabilities movement takes a very different view, that the fundamental flaw lies in the society that excludes people with disabilities, rather than in the individuals themselves" (Yoda 2002: 2). Often my informants attended "rehabilitation" when they were younger, either following medical procedures when they were children, or else in their twenties to learn to adapt to "normal" life through instruction in cooking, cleaning, doing the laundry, etc.

Advocates of independent living see the focus on institutionalisation and welfare approaches, including the primacy of "rehabilitation", as being indicative of the medical model of disability. According to Naknishi Shoji, founder of the first centre for independent living in Japan:

> Based on the concept of traditional rehabilitation individuals with disabilities were treated as the defective models who were expected to reach to non-disabled bodies. For instance, the rehabilitation forced disabled people to get dressed by themselves without any assistance and it was positively evaluated. On the other hand, Independent Living Philosophy declared that asking for help was not a shame at all and that it never harm disabled people's self-reliance. It evaluated making own choice and decision was important. Rehabilitation should be limited to the medical treatment for a certain period of time and it must not control the life of a person with disability for through life long (*sic*) (Nakanishi 1997).

Within the social model, disability is a matter of human rights. This is the language in which those I spoke with, such as Uchiyama-san, talked about it, and it is also the model that the disability movement has taken as a whole (Heyer 2000a). According to Heyer, the new generation of disability activists "seeks to politicize the Japanese disability movement by increasing the role of rights and rights consciousness, making rights the main tool towards leading self-determined lives" (Heyer 2000a: 19–20). This shift towards politics comes from "a social model that focuses on social discrimination and stigma as the true sources of disability" (Heyer 2000a: 2).

Within my own fieldwork, the term social model was not often used in everyday conversation, but nevertheless it is crucial for understanding the political basis of the organisation. Uchiyama-san in particular stressed the importance of the social model to me. Uchiyama-san, when I asked him what is barrier free, answered by giving me a description of the medical model (*igaku moderu*) and social model (*shakai moderu*). He explained that the issue is one of discrimination. Within the medical model, disability is the individual's responsibility and the problem is with the individual. In the social model, the problem is in, for example, the school or the workplace that does not accommodate disabled people. He explained that the point of the social model is to effect positive social change, and to emphasise that this has to be done by listening to disabled people. Instead of disabled people being put into institutions (for example, when their parents die), having their life courses decided by others, disabled people should be in charge of their own lives. He thought that people with severe disabilities should be able to move freely in their communities. He stressed that if everyone adopted the social model of disability in their "hearts" *(kokoro*—see previous chapters), if everyone changed their way of thinking to the social model, then the world would become barrier free. In this way, he implied that the social model and barrier free are equivalent.

Apart from Uchiyama-san's explanation of the social model, I also heard it described at a "barrier-free seminar" I attended (a seminar which I briefly mentioned earlier in the discussion of the disability ID). The seminar was organized by the ILC staff and attended both by members of the organisation as well as others from within Osaka (such as people from other CILs). One of the invited speakers, a disabled activist within Japan (also mentioned earlier in the discussion of disability ID), gave an extended description of the social model of disability.

He started his explanation of the social model with the example of a person in a wheelchair who cannot access the second floor of a building because it has stairs. He rhetorically asked whether this is his/her own "fault", and then answered his own question by explaining that according to the social model it is not an individual issue but rather a social issue. Somewhat distinct from many explanations of the social model that I have read in the literature, he focused quite heavily on the question of financing and money (a theme that will be reflected below in a discussion of a children's book written by Uchiyama-san). He said that "often it is said" that there is no money for a ramp or an elevator. But he claimed this is a "lie" (*uso*), because there was obviously money for the staircase. His implication was that the issue is not the existence of money, but rather a question of how, why, and, perhaps most poignantly, from whose perspective it is being used. By adopting the medical model, he felt that the Japanese state tries to avoid such hard discussions and instead continue to discriminate against disabled people (especially financially).

He also focused on recent law. He said that in 2000 there had been a ten year barrier-free plan adopted by the Japanese state, a policy that, while implemented in law, has had little real benefit for disabled people. To illustrate this, he described being told that he could not fly in an aeroplane because he requires a wheelchair. He made the analogy between his disability and being unable to speak English, and pointed out that surely it would be discrimination if someone told him that cannot take a flight because he cannot speak English. By analogy, he reasoned, it is also discrimination to refuse wheelchair users. But, while he thought it was discrimination, the airline thought it was not, and his only recourse would have been to go to court. He said this is an option in the United States, under the American Disabilities Act. But mainstream Japanese do not understand his situation as discrimination. In this way Japan is "losing". After this example, he proceeded to describe in further detail the various intricacies of recent Japanese Disability Law. The overall message was that there has been some movement towards better laws and yet it also seemed, at least to him or other disability activists, that the government had not really intended to stop discrimination against disabled people. He suggested that this may have changed somewhat with the new government starting in 2009, and with this change, the social model had been incorporated into proposed legislation.

I must admit I could not follow his entire explanation of the many legal details, but nor did many others from what I gathered. After the talk, when I asked my informants from ILC what they thought about it, most told me they found his lecture complicated and hard to follow. A similar ambivalence is evident when I had asked Yamano-san, on a different occasion prior to this seminar, about the social model of disability *(shōgai no shakai moderu*). She told me she knew the term but simply avoided using it specifically because it is difficult for most people, especially those at TOP, to understand. When I asked her to tell me about the social model, she directed me to an illustrated children's book I had been given Uchiyama-san some months earlier. Uchiyama-san authored this book and it was based (loosely) on his life. When I referred to that book I also found an extended section in the back (aimed at educators and parents) that described the social model of disability in some detail. Uchiyama-san also told me that most of my questions to him about the social model, independent living, his life, etc. were answered in this book.

The main content of the book is an illustrated story describing two young disabled brothers (based on Uchiyama-san and K. Uchiyama-san) and their battle against a "barrier monster". In the story, the children have disabilities like Uchiyama-san and his brother (i.e. conditions that make their bones very fragile and that make it difficult or impossible for them to walk). No father or brother is mentioned, and the story centres around the brothers and their mother. After introducing the characters, the mother tells them to make sure to eat their carrots because, if they do not, a monster will come and get them. When one of the boys does not eat his carrots, the mother goes missing in the night, a plot device that seems to take on new significance when considered in light of Uchiyama-san's own mother. The boys believe the monster has taken her, spurred by the belief that they had seen the monster in the night. An elderly woman from next door drops by their house and informs them that indeed a monster has taken their mother, a monster that she explains is the "barrier monster". When this barrier monster appears, it brings with it "barriers" such as (wheelchair-inaccessible) stairs to a park, a man placing his bicycle on the detectable warnings on the sidewalk (*tenji tairu*—the coloured and tactile markings on the sidewalk used to help blind people and people with limited vision navigate), or a book that is unreadable to blind people. The elderly woman gives the boys Japanese magical religious charms made of paper (*ofuda)* in order to fight off the barrier monster, turning the park stairs into a ramp, having the man place his bike elsewhere, and attaching a coupon to the book that can be exchanged for an audio book version. The boys use these charms to chase the barrier monster, which runs off. The book concludes with the elderly woman setting the boys off on a journey to pursue the barrier monster, a journey which she says could one day result in the return of their mother.

As mentioned above, there is a further section at the end of the book that is intended to assist teachers and parents in using this narrative to educate young children about disability and barrier free. This section starts by introducing the social model of disability by way of a hypothetical situation. Imagine a "Y-san" who is in an accident and gets paralysed. If we ask most people why that person cannot use the pool (or bath) at a public facility, they will say because it is dangerous and because the person is paralysed. The book says that while this is not exactly wrong, if we focus exclusively on the fact that the person is paralysed as the reason for his or her exclusion, we miss out on the fact that if there was a lifeguard then the person can safely use the pool. The book explains that the social model of disability places the cause (and problem) of disability in such social factors rather than individual factors; in the lack of lifeguards rather than the paralysis of the individual.

The book also explicitly contrasts this social model with the medical model. The book explains that the medical model of disability is based on the idea that fault lies with that individual's body. According to the book, the medical disability has a number of repercussions for disabled people. As far as the government continues to use a medical model of disability, there is a lack of funding for barrier-free things like lifeguards in public pools. The book explains that helpers are needed so that Y-san can safely go in the pool, and money is therefore needed to pay for these helpers. The book continues that disabled people have adopted the social model of disability in order to challenge old ways of handling disabled people. Instead of the thinking that "adults should be able to have baths by themselves," new designs that facilitate an inclusive lifestyle for disabled people and new ways to help disabled people should be developed. The section ends with a call for everyone in mainstream society to change their thinking with regards to disability. The remainder of the book gives concrete activities and teaching methods that can be used to help young children understand these concepts, including cut-out copies of the *ofuda* from the story.

Identity Politics in Japan

Having discussed the social model, I will now turn to the notion of disability identity. Within Western identity politics, disability identity "has been used to build a coalition of people with significant impairments, people with behavioural or anatomical characteristics marked as deviant, and people who have or are suspected of having conditions, such as AIDS or emotional illness, that make them targets of discrimination" (Linton 2006: 225).

But the status of identity politics is arguably more contentious within Japan. Disability identity, as Western (especially American) identity politics, developed within, what Karen Nakamura (in her study of deaf in Japan mentioned above), labels a "frame" of "ethnic multiculturalism" or "ethnic minority," a frame that has far less support in Japan (Nakamura 2006: 7). She points out that it is quite easily accepted in the US that a person can have both a distinctive ethnic identity and yet also remain American. This plurality of ethnicity is accepted as part of multiculturalism. In principle any ethnicity can form its own new American identity: not only are there African-Americans and Japanese-Americans but also Hmong-Americans and Somali-Americans (2006: 7). Ethnicity therefore has a degree of political persuasiveness in the United States. It has what Nakamura calls a "frame", a term, borrowed from Erving Goffman to mean "an interpretive schemata that simplifies and codifies the 'world out there' by selectively punctuating and encoding objects, situations, events, identities, and sequences of actions within one's present and past environment" (Snow & Benford 1992: 137), which has been used to study social movements (Nakamura 2006: 7). Social and political activists draw on the power of the "ethnic minority" frame and extend it to other (non-ethnic) "identities". For example, Nakamura points out that the gay/lesbian movement has presented itself as part of multiculturalism by developing their own rainbow flag. While it is taken for granted in the United States (and other places with a strong ethnic multiculturalism frame) that these various identities fit as pieces in the same multicultural puzzle, as Nakamura points out, there is no obvious reason why sexual orientation, ethnicity, race, gender, and disability should be considered similar kinds of things or thought to have much in common.

Indeed, as Nakamura points out, unlike the United States, Japan lacks a developed sense of multiculturalism and, as I have also argued in the introduction, lacks much recognition of ethnic minorities (2006: 9). Ethnic minorities are often ignored by the mainstream or officially thought to not even exist within homogeneous Japan (M. Suzuki 2008). While many minorities do in fact exist, such as Burakumin (descendants of a feudal "untouchable caste'", Koreans, Okinawans, and indigenous Ainu, "there is no extant notion of an active 'Burakumin culture'; there is no emergent Korean-Japanese culture discussed positively in the mainstream press; Okinawan nationalism is largely ignored by the mainland media, and the Ainu native culture (while still active) has been encased behind museum glass in popular consciousness" (Nakamura 2006: 9–10). In the case of the deaf Nakamura works with, this has been quite important. Within the United States, the movement known as cultural Deaf has built up around a notion that Deaf is a kind of ethnicity. The movement claims that Deaf have their own language (i.e. American Sign Language), culture, and knowledge that should be protected just like any other ethnicity. While they have received a sympathetic ear in the United States, this argument has had much less success in Japan. Mainstream Japanese are much less willing than their American counterparts to accept that deaf people are a different “ethnicity” or have a different “culture”. Most Japanese believe that obviously Deaf in Japan are Japanese. Still, many younger deaf in Japan have, according to Nakamura, adopted the notion of cultural Deaf, imported from the West and particularly the US, and they are attempting to promote this notion within Japan. But they must adapt it to the Japanese context by de-emphasising the analogy with ethnic minorities because framing it in that way does not work.

Nakamura's arguments about deaf specifically also apply in some ways to disabled people as a whole: there is a tension between the identity politics models derived from Western disability activism and the relative weakness of those models in Japan.

On the one hand, independent living, the social model, and so on have been adopted from the West by disability activists. Yamano-san, for example, once told me that disability is a social and societal thing, and that if society changed, there would be no disability. As the concept of a centre for independent living has been imported into Japan, along with it has come the notion that disabled people should be in charge of the such centres. Within more of the “official” discourse of the centre, that is at seminars organized by the centre or in the educational book published by Uchiyama-san, the social model and other concepts are readily framed within the terms of Western disability activism and identity politics. When I asked Uchiyama-san about identity, *aidentiti* in Japanese, he responded that he did think it was very important. As he explained it to me, his understanding of identity was that disabled people should be 1) choosing 2) deciding and 3) taking responsibility for themselves. This emphasis will recur in the discussion of the next section on independence and self-determination.

The relative importance of identity for activists compared to the ignorance of disability identity within the mainstream is also thoughtfully examined in Iwakuma's (2003) discussion of the recent phenomenon of *Gotaifumanzoku*, a book written by a man born with no arms and no legs named

Ototake. The book has been a hugely successful in Japan and the mainstream has taken up his story as an example of what "even" he could do, given determination and hard work. People are inspired by him, and within the mainstream media, he has been adopted as a spokesman for disabled people. But, rather ironically, Ototake never considered himself disabled until the term was forced upon him with the success of his book. Further, Iwakuma shows how many disabled activists respond negatively to Ototake and the success of his book because he does not phrase his narrative in terms of identity and disability activism. For those activists, his story de-emphasises the politics of disability, making it seem that those that do not succeed just did not try hard enough. Iwakuma argues that Ototake has become the disabled spokesman precisely because he is the most like the mainstream, and therefore less like most disabled people. In contrast, for many of the disabled people that Iwakuma quotes, it is the fact that Ototake is not part of their world, a world defined by disability as an identity, that seems to be at the root of their discomfort with the book.

Still, it is worth emphasising the fact that identity holds less political currency within Japan, at least insofar as identity is framed in terms of multiculturalism. The term for identity, the English loan word *aidentiti*, is, as Nakamura explains (2006: 92), cumbersome and not often used in normal conversation. Similar to her experience, the term was rarely, if ever, used by people I worked with other than when I specifically asked Uchiyama-san about it. Nakamura notes that many of her informants did not even know the meaning of the term, and, while I did not make a point of checking this specifically, my inkling is that a substantial number of my informants would also not really know what *aidentiti* means. Also indicating the ambivalence of disability as an "identity", many of the people I worked with told me they did not see themselves as disabled people and/or that they saw themselves as "normal" people. For example, when I asked Fujita-san what disability means for her, she told me that she does not see herself as a disabled person but rather as a nondisabled person (*kenjōsha*). She explained that it is other people (i.e. other *kenjōsha* people) who impose the notion of disabled person upon her.

Disability I think also takes second stage to Japanese-ness in defining identity for those I worked with. Nakamura notes that many of what she calls the middle-generation of deaf, those who grew up after the second world war when compulsory education was first introduced for the deaf, "unhesitatingly and unequivocally argue that they are Japanese first and deaf second" (Nakamura 2006: 8). Within my own fieldwork, asking someone if they consider themselves to be Japanese would be, from their perspective, rather a stupid thing to ask since the answer is completely obvious: they are Japanese (which, it should be noted, is unlike those who see themselves as part of a global Deaf culture). And the proposition to my informants that, because they are disabled, they are any "less" Japanese, they would find downright insulting. Even in the United States, disability in general is not usually modelled as a literal kind of ethnicity (outside of the specific cultural Deaf movement).

In other words, the position of identity politics in the disability movement of Japan is ambiguous. On the one hand, Western ideas of identity are used by disability activists to organise the disability movement and its related organisations (such as ILC). On the other hand, Japan has relatively weak native support for multiculturalism, and therefore weak support for identity politics, which has important consequences for both the way disabled people understand the disability movement themselves and the way they must portray this movement to outsiders.

Welfare and Independence

Nakamura contrasts the ethnic minority frame with what she calls a "disability frame," which she says has overall been more successful in contemporary Japan (Nakamura 2006: 8). She notes that disability has become a powerful frame within its own right, a frame which draws on "human rights, an appeal to the commonality (and thus mutual responsibility) of all Japanese, neighbourhood volunteerism, and perhaps most powerfully with the government, a sense of falling behind the West" (2006: 8). While the United States has a strong ethnic multiculturalism frame, they have a strong suspicion of anything to do with the term "welfare" (2006: 128). Japan is the opposite. Although there are concerns "about the long-term viability of the social welfare system, there is almost no debate about *whether* such a system should exist" (2006: 129 emphasis in the original). Welfare does not have the problematic undertones of laziness or "evil socialism" that it might in the United States, and, at least in concept, the welfare model in Japan is well-supported.

Still, such a welfare model does have its downsides. Heyer argues that "Japanese disability policy continues to respond to the very urgent and special needs of people with disabilities by creating sophisticated yet separate facilities" which creates "a separate world" that "is well equipped to respond to their needs but not to their desire to become part of the regular, non-disabled world" (2000b: 111). According to Heyer, this contrasts with the independent living model.

As Heyer notes, an important aspect of the independent living model is that disabled people are not patients but rather "consumers". This means they have the right to hire (and fire) who they like, instead of having their care providers decided for them. Heyer makes the distinction between a "caretaker" and an "attendant", because the former "suggests a patient, someone who is sick and passively dependent on an assistant's help" while the latter "should be a neutral extension of the person with the disability" (Heyer 2000b: 123). According to her, the key term here is "self-determination."

Heyer does not specify which Japanese term she is translating as self-determination, but it seems plausible that she is referring to the term *jiritsu*, which also translates as "independent" or "independence". For example, the Japanese term for centre for independent living is *jiritsu seikatsu senta*, where *seikatsu* means "living" or "lifestyle" and *senta* is a loan word based on the English word "centre". While *independence* is one plausible translation, Heyer's translation of *self-determination* is actually quite astute. This is because the English term independence seems to be the opposite of the term dependence, and so to the extent that disabled people at ILC are "dependent" on helpers, it may seem logically contradictory to claim "independence". But I think this is a bit of a phantom paradox.

First of all, the Japanese terms do not work quite as neatly as the English terms. There is no slight change of the word *jiritsu* (such as dropping or adding a prefix) that turns it into its opposite meaning "dependence". The Japanese term for dependence is *izon*. While it is almost trivially obvious that independence and dependence are opposites, this is not necessarily true of *jiritsu* and *izon*. This is not to say they are not opposites (Uchiyama-san told me they were; Yamano-san told me they were not). Rather, the point is that the relationship is seemingly more ambiguous than it is in the English terms.

Second of all, and perhaps more substantially, when I asked people about whether they were "dependent" (*izon*) on their helper, they said no they were not. Uchiyama-san, when I posed this too him, conceded that often (mainstream) people do say that disabled people "depend" on helpers and therefore cannot be independent. But, according to him, from the perspective of the independent living movement, disabled people do not (or at least should not) "depend" on helpers. Simply having someone help you is not dependence. He did say that some disabled people *are* dependent on helpers, but he said that this is because those people are weak (by which he refers not to their physical condition but rather something more akin to their will). They should strive to become strong, and in this way build up "companions" (*nakama*) who can work together to change society; that is the goal. He said that helpers aid, assist, and support disabled people, but this should not be conceptualised as a relationship of dependence. For him, it was a matter of human rights.

Yamano-san also explained that mainstream conceptions of independence do not match the meaning that her and others at ILC are using. She told me that many Japanese probably think that *jiritsu* means that you can do everything yourself: do your own laundry, cooking, etc. As such, disabled people cannot be *jiritsu* if they have someone helping them. But she said this is not the meaning of *jiritsu* in the independent living movement. Within the movement, *jiritsu* means that you are in control of your own life and that you make your own decisions. Yamano-san said the only disabled people who are dependent on helpers are those who do not take responsibility (i.e. those who are weak, in Uchiyama-san's terms). For example, those who simply complain if their helpers do something wrong are dependent on their helpers. Rather, Yamano-san says she tries to think about how she could better explain what it is she wants done, thinking how to take responsibility herself rather than placing blame. For Yamano-san, being independent meant thinking about how to better work together with a helper, and she felt that dependence does not arise because someone helps you but rather because you do not try to help yourself.

When I asked Fujita-san if she felt that she was "dependent" on helpers, similarly, she said she did not think so. She said they help her do things in her daily life that she cannot do herself. But those are just simple things like acting as her arms or her legs. To her this was not "dependence" and she had little more to say about it.

When I asked Ato-san the same question, he answered that for him *jiritsu* is to lead a life hand-in-hand with his helper (*herupā to tomo ni ayumu*—literally "walk together with [his] helper"); he may need help sometimes, but both he and his helper have their own responsibilities. His particular answer was interesting because he then explicitly contrasted his understanding with what he perceived to be the definition of independence used by others at ILC. He said that many at ILC believe that, in order to be independent, disabled people should strive to be self-reliant, strive to not rely on others. I think Ato-san's impression is telling because he perceives his own self-difference from an "official" concept of independence (probably imported with the introduction of Western-inspired centres for independent living). As Heyer notes, "self-determination and assertiveness are not always valued positively in

Japanese culture, especially if they imply a separation from the family" (Heyer 2000b: 123). The same applies to independence as well. Heyer cites Higuchi Keiko, the JIL president, to the effect that disabled people are taught since they are young to value the dependence they have on parents and institutions. As Heyer notes, the tricky job of centres for independent living is "to take what might be considered foreign concepts and integrate them into a Japanese setting" (2000b: 123).

Yamano-san, Fujita-san and Ato-san all told me that they understand independent living (*jiritsu seikatsu)* to be living in control of their own lives and schedules, and making their own decisions. In this way, a translation of *self-determination* might be better than *independence*. Uchiyama-san defined *jiritsu* to me as disabled people deciding for themselves. The crucial point is not whether they are "dependent" on others, like helpers, in their day-to-day tasks, nor what this implies about their "independence". The crucial point is that no one else, such as parents or caretakers, can decide how they should spend the hours of their lives. In the evening, if someone like Fujita-san wants to go to *karaoke* with her friends from ILC, and return late, she is free to go. If she wants to stay home and watch baseball, she can do that instead. If she does not like a particular helper, she can try to work with them to change their behaviour, and if ultimately that is not effective, she can go to ILC and find a helper that helps her in the ways she wants to be helped. If she wants to move to a different residence, she can look for a new apartment and move in when she finds one. In this way she, and the others at ILC, have self-determination.

Uchiyama-san contrasted his definition of independence/*jiritsu* with the concept of rehabilitation. He explained that in rehabilitation facilities, people are forced to learn to do things by themselves. Uchiyama-san said that, for example, rehabilitation workers will have a disabled man sweat for 30 minutes trying to put on his shirt by himself without assistance, because they believe that such self-sufficiency is important. But Uchiyama-san explained that the independent living movement is completely different. Uchiyama-san pointed out that a personal attendant could help the same man put his shirt on in about 5 minutes. And, so, he asked rhetorically, does it not make more sense for the man to receive help rather than struggle to fit some abstract ideal of the rehabilitation staff? To emphasise this point Uchiyama-san finished by telling me that “ADL is not independence.” ADL (Activities for Daily Living) is a term from rehabilitation, “an umbrella term relating to self care, comprising those activities or tasks that people undertake routinely in their every day life” (Fricke 2012). It is used as a scale and tool by medical care professionals in order to “achieve maximal increase in function and participation in everyday life for the patient or client” through “functional assessment” (Fricke 2012). In contrast to these standards and assessments decided by medical experts, Uchiyama-san emphasises disabled people's right to receive assistance and right to decide their own fate. The message is therefore that independence is a political condition which is not derivable from bodily condition or ability. The independent living movement, as understood by Uchiyama-san and others, is about re-framing independence in this way.

The Disability Movement: Japanese Case

The quest for independence, self-determination, or *jiritsu* also has roots in the specific history of the disability movement within modern Japan. This includes the historical position of disabled people within traditional kinship structure as well as the history of state policy towards them.

One distinctive feature of the disability movement in Japan specifically is that it focuses not just on “liberating” disabled people from institutions, but also from family (Yoda 2002). Yamano-san told me this is because of the importance of family values across Asia. Yamano-san said often the issue is simply that parents are overly-protective of their disabled children. Parents place heavy restrictions on disabled children because of their beliefs about what disabled people are “unable” to do or what might be “dangerous”. She explained this was her own experience and, while she does not fault parents, the attitude causes many disabled people like herself to seek independence and self-determination.

In addition, the Japanese state has traditionally left the care of disabled people to immediate family members (Goto 2008; Hayashi & Okuhira 2001; Yoda 2002). Although, in 1874, the Social Relief Regulation was passed, which provided some degree of welfare for those in need, care for disabled people remained primarily the responsibility of the person's family (Hayashi & Okuhira 2001: 856). Within such a system, disabled people have historically been dependants who have been kept in their natal homes, often “locked away” by parents who wished to hide them or keep them sequestered from wider society. This was especially true before World War II. For example, Nakamura discusses one of her informants, a deaf woman in her 90s who, as a child and young adult in the pre-war era, was forbidden go to school and to marry (Nakamura 2006: 45–59). Such “hiding” continues even to the present day. According to Nakamura “some families will hide disabled siblings or children from peers, co-workers, and especially future in-laws” because “conservative families are reluctant to marry a daughter or son to a house that has disability in the 'blood'” (Nakamura 2006: 153). Nakamura even claims that private detectives are often hired precisely to “make sure there are no unpleasant surprises hiding in the back room, so to speak” (Nakamura 2006: 153).

Under this traditional system, where the family is responsible for care, “a disabled member of the family, who is viewed as non-productive and in need of support, is denied the chance for independent living, and the mother, regarded as the natural caretaker under the principle of self-help on the part of the family, is obliged to assume all the burden of caring for the disabled person” (Yoda 2002: 8). Yoda argues, therefore, that disability has historically been not only an individual issue but also a family issue as well, and in particular an issue for mothers, making the issue also one of gender. This “‘common-sense understanding’ in Japan, often forces any family having a disabled member to retreat into the closed world of the family unit, in the belief that they have no alternative but to rely on each other" (Yoda 2002: 8). And, as Yoda also points out, the result has been a degree of tension between the women's movement, which has stressed a woman's right to self-determination, particularly in conception, childbirth, and abortion, and the disability movement, which has championed the right to life for disabled people and fought against eugenic practices such as selective abortion. As we will see, the conflict over women's wish to ease the burden of mothers and disabled people's wish to protect disabled rights is at the very centre of the disability movement's origins in Japan.

It is worth clarifying that, in practice, the people I worked with, while pursuing independent living, do not have a forced "cutting of ties" from their kin. Many of the people I worked with continue to be in contact with their family in ways similar to most other urban people I know in Japan (or North America and Europe for that matter) who live independently. For example, during Japanese holiday seasons, particularly Golden Week in May and Obon in August, many members of ILC and TOP returned to their "hometown" in order to visit with their immediate and/or extended families. Others had parents or siblings within the Osaka area, and most people I knew (though not all) remained on good terms with these relatives. Yamano-san told me that she had no issues with her parents, who have always been very kind and encouraging to her. She said that they have always been quite open and allowed her to do what she wanted (though this sentiment does seem to contradict what she said about her parents being overprotective).

While there is often the sense that it is primarily the family's responsibility to care for a disabled member (Yoda 2002), since the end of the Second World War, the Japanese state has continued to introduce new policy measures in order to address the need for disability welfare (Hayashi & Okuhira 2001). In 1949, three new welfare laws were passed, one of which was the Law for the Welfare of People with Physical Disabilities. This law, though, was primarily intended to help injured war veterans with the purpose of rehabilitating these soldiers so that they could work and therefore be economically productive. This project included the construction of rehabilitation facilities for these veterans but not really for other disabled people. In 1961, the National Pension was introduced which, though mostly aimed at workers who would contribute wages to the pension, also had provisions for disabled people. But this pension was tied to the income of the disabled person's family (as well as the severity of the impairment). This fact kept most disabled people bound to their family, and family care was still assumed to be the primary means of welfare.

Also in the post-war reforms, mandatory education was introduced in the Fundamental Law of Education (*kyōiku kihon hō*) in 1947 (Goto 2008). While this established some “special schools for children with disabilities,” according to Goto, “the law, however, turned out to be a form of tokenism: Special schools were available only to children with mild disabilities who were regarded 'educable' enough to contribute to the economic revival of Japan” while “the other children with significant disabilities were left outside the umbrella of national education, and their rights to education were simply abandoned” (Goto 2008). Especially in rural areas, this was done under an “exemption” system, nominally by parent “request”, which all but guaranteed that severely disabled children were kept out of the school system (Goto 2008; Nakamura 2006). Under such policies, disabled people remained primarily in the private sphere of the home, removed from public spaces.

Still, some disabled people were being moved to residential institutions and this trend continued through the 1960s (Hayashi & Okuhira 2001: 856–857). This was spurred by the increasing nuclearisation of the family, which put a greater burden on parents, who in turn requested the creation of such residential institutions (Goto 2008). Many of these institutions were in fact rehabilitation facilities originally developed for the veterans from the post-war law, but were changed into permanent residence facilities (Hayashi & Okuhira 2001: 857). During this period, children also started to be removed from their parents homes at an earlier age and placed in residential institutions for children. When they turned 18, they would then be moved into adult facilities.

According to Hayashi and Okuhira, the living conditions in these residential institutions at that time were incredibly poor (Hayashi & Okuhira 2001: 857–859). In their interviews with disabled people now living independently, they found that many disabled people faced physical, emotional, and sexual abuse. Medical treatment was inadequate, while some residents were subjected to mandatory surgeries. These procedures were often intended to make the residents easier for staff to deal with rather than improve the health or condition of the person being operated on. An example of such is the apparently widespread practice of hysterectomies for women, intended to reduce the "clean-up" for care staff (Hayashi & Okuhira 2001: 857). Further, abuse was particularly common in facilities for people with psychiatric and mental disabilities (Heyer 2000b; Yoda 2002). Apart from these more sensational examples, everyday conditions in institutions were reputably very harsh, with strict schedules that would, for example, require young disabled children to wake up at 4am, and discipline was enforced on all residents. Adults were treated as children, expected to be cute and passive. Newspapers were censored so residents would not long for the outside world (Hayashi & Okuhira 2001: 859).

Ato-san, as I described in the previous chapter, was in an institution in his early and mid-20s (which would be in the 1970s). He did not speak to me of abuse but did tell me that schedules were very rigid and his time was tightly managed for him. He would, for example, only be given 30 minutes to eat meals and this would happen at specified times. He also said the staff at these institutions were very strict and harsh (*kibishii, kitsui*).

Reacting to these poor conditions, and inspired by the activist climate of the 1960s and 1970s that saw the rise of social movements (anti-Vietnam war, students, environmental, feminist, and

Burakumin), a number of disabled people started to organise (Hayashi & Okuhira 2001: 859). One early example was at the Fuchu Ryoiku Centre, a residential institution in Tokyo that, like many such residential institutions, had poor and often abusive living conditions (Hayashi & Okuhira 2001: 859–860). In 1970, the residents began a hunger strike against their treatment and in 1972 this protest continued with sit-ins at the Tokyo Municipal building. The demonstration drew widespread attention in the media and forced the government to pay attention to the lives of disabled people. Further, in the aftermath of these protests, many disabled people started to think about other possibilities, in particular independent living.

Another strong influence on the early disability movement was a group called *Aoi Shoba* (Hayashi & Okuhira 2001: 860–862; Osamu 2008). Organised by a group of people with cerebral palsy, *Aoi Shoba* formed in 1957. The members were all graduates of *Komyō Gakkō*, the first school for disabled people in Japan. Therefore, unlike many disabled people in Japan, they were also well-educated. The group expanded as they took in a smaller group called *Kurume-en*, as well as the members of a commune for people with cerebral palsy called *Mahabora*. *Aoi Shoba* came to prominence in 1970, as a result of a child killing. A mother had murdered her 2 year old disabled child. In response to the criminal prosecution of the mother, an association of mothers with disabled children had petitioned the government to drop the charges against her (such petitions were apparently not unheard of at that time: Hayashi & Okuhira 2001: 861). *Aoi Shoba* responded by vocally counter-petitioning. They insisted that the mother be prosecuted and that killing disabled infants was unacceptable. The group's action were ultimately successful and the mother was prosecuted.

The killing of disabled children or abortion of disabled foetuses remains a contemporary aspect of Japanese society. According to Nakamura, “the belief that disabled children will be a burden to the family and society and that suicide (or abortion) is a valid option still runs deep” (Nakamura 2006:

154). Nakamura cites disabled activist and poet Murayama Miwa, who, in her autobiography, describes a close friend who was murdered by her mother in "a joint suicide-homicide (*muri shinjū*)" (Nakamura 2006: 154). The logical basic of this practice is that, by both dying simultaneously, the mother can take care of her child in the after-life rather than having the child "suffer" after her mother passes away. Yamano-san told me how, when she was in the third grade of elementary school and her parents found out that Yamano-san would be disabled for the rest of her life, her mother cried every day and seriously considered killing both Yamano-san and herself. Yamano-san, who only found out about this much later in life, said her mother was worried about the tough *(taihen*) life that Yamano-san would be forced to live. It was only after Yamano-san's father intervened and insisted that, disability or not, Yamano-san was still their child that her mother decided to persevere and do her best.

As Nakamura points out there are often religious aspects to both the interpretation of disability and the practice of killing disabled babies/children (Nakamura 2006: 154). She quotes Akiie Henry Ninomiya who writes: "In May, 1986, a mother strangled her one year-old child who was diagnosed as mentally retarded. Her mother-in-law blamed her for having a disabled baby saying, 'Our family does not have such sinful dirty blood; because your family blood is contaminated and sinful, a disabled baby was born'" (Ninomiya 1986: 205 cited in Nakamura 2006:154). The basis of this quote is in the Buddhist belief that disability is the result of impurities in the blood, transgressions by the parents, or *karma* from a past life (Nakamura 2006: 34). In the quote from Ninomiya, the mother-in-law could therefore blame her daughter-in-law's family for the disabled child since it was her impure "blood" that "caused" the disability.

Nakamura notes that Murayama, in response to her friend's murder, instructed her parents bluntly to never consider killing her because she would be fine by herself. In the wake of her friend's murder, Murayama also decided that she must move out from her parent's home and, when Nakamura met her, Murayama was running her own independent living centre (Nakamura 2006: 155). Likewise, *Aoi Shoba* encouraged active engagement rather than passive dependency, a radical break from the way disabled people were expected to behave up until that point (Hayashi & Okuhira 2001: 861). *Aoi Shoba* focused on raising consciousness about, and changing thinking towards, disability.

Aoi Shoba's platform was stated in the following brief manifesto:

> We Identify Ourselves As People With Cerebral Palsy (CP).
>
> We recognize our position as "an existence which should not exist" in the modern society. We believe that this recognition should be the starting point of our whole movement, and we act on this belief.
>
> We Assert Ourselves Aggressively.
>
> When we identify ourselves as people with CP, we have a will to protect ourselves. We believe that a strong self-assertion is the only way to achieve self-protection, and we act on this belief.
>
> We Deny Love And Justice.[[18]]
>
> We condemn egoism held by love and justice. We believe that mutual understanding, accompanying the human observation that arises from the denial of love and justice, means true well-being, and we act on this belief.
>
> We Do Not Choose The Way Of Problem Solving.
>
> We have learned from our personal experiences that easy solutions to problems lead to dangerous compromises. We believe that an endless confrontation is the only course of action possible for us, and we act on this belief.
>
> (cited from the translation by Osamu 2008)

In the wake of such activism, some disabled people in the 1970s began experiments in independent living, relying mostly on volunteer helpers to assist 24 hours a day. But it was really during the 1980s when independent living became a major option for disabled people (Hayashi & Okuhira 2001: 863). During the 1970s, the Japanese state usually only interacted with disabled people as either objects of care to be handled by institutions or else as protesters in demonstrations. But starting in the 1980s, organisations of disabled people started to negotiate with the various levels of

18 According to Osamu, this “means the denial of love that kills disabled people, and justice that shows sympathy to parents who kill their disabled children” (Osamu 2008).

government and in this way disabled people also became interlocutors to negotiate policy. In Osaka, this led to a personal attendant program in 1986 funded by the municipality, as well as "workshops for the disabled," also supported by the local government (Hayashi & Okuhira 2001: 864).

The Japanese Emergence of Centres for Independent Living

The 1980s also saw the influence of the disabled movement from the United States. In the early 1980s, Ed Roberts (who, as we recall, was the founder of the first CIL in the United States) came to Japan to help educate Japanese disability activists who wanted to form their own independent living centers. After the International Year of Disabled Persons (IYDP) in 1981, this led to the first centre for independent living in Japan in 1986, which was formed in Tokyo by a number of Japanese disabled people who had been trained in the USA. As I mentioned in my discussion of the Asia Network, in my fieldwork, many of the people at the centre spoke of how they had learned about independent living, and how to do it, from the West and in particular from the United States.

Perhaps under pressure from the UN mandates for disabled people during the IYDP, the Japanese state made some important changes from the perspective of independent living. In 1986, the "basic disability allowance" (*shōgai kiso nenkin*) replaced the "disability welfare allowance" (*shōgai fukushi nenkin*) (Yoda 2002: 10). As was explained above, under the previous system, the allowance was paid to the parents of disabled people, and was based on their families income (in practical terms this means it was paid to the father based on his income). Since 1986, the allowance is paid to the disabled person directly. And it has also increased in value substantially (Yoda 2002: 10). Since 2003, a person with "severe" disabilities is also eligible to receive funding that pays for personal attendants if the disabled person wishes to live independently (Nakamura 2005). The administer of this funding happens at ILC through the STOP-IN process described above.

Volunteers, Municipal Attendants, and Helpers

Experiments in early independent living during the 1970s relied on volunteers, and the personal attendant programmes run by municipal governments rely on municipally-hired staff. ILC makes a strong distinction between these other systems and no one at ILC uses volunteers (at least any more) nor municipal staff. The personal attendants (or “helpers”) are hired and selected by the disabled people themselves, who are therefore in control of their own lifestyle. In contrast to the municipally-hired staff, disabled people are “consumers” who pick their own helpers. But ILC attendants are still paid staff, and therefore ILC does not have to rely on volunteers. Uchiyama-san is a strong proponent of paid helpers, and while not thinking that volunteers are bad as such, he has concerns about them. In this, he is keeping within the wider ideology of the independent living movement. The reasoning is that paid attendants have a degree of accountability because they are being paid for their services; it is their job, so they should be expected to do it properly. With paid attendants, disabled persons are not relying on some volunteer's good will. Rather, they are consumers paying for a service. In this way, the attendants are thought to be more responsible to the disabled person. Uchiyama-san explained that people often volunteer for only some relatively short period of time. After they have left and gone back to their old lives, “who is left with the difficult situation?” he rhetorically asked me. The disabled person, he explained, who obviously still exists and still needs assistance; in this way, volunteers are insufficient. The previously discussed activist speaker from the barrier-free seminar made similar points about volunteers. He described his early enthusiasm for volunteers, until he learned in University that his professor hated the word “volunteer” for the reasons I have just described. The speaker said that after reflection, he eventually decided that volunteers are “not good” insofar as they are envisioned as substitutes for personal attendants, they are not good insofar as the state might think he does not need assistance because there are volunteers. He was intent in the view that helpers are not and should not be the same as friends (though I do not think this point would be as readily accepted by many at ILC). But he also believes volunteers still have a role (according to him, in helping with natural disasters such as earthquakes).

Fujita-san told me that Uchiyama-san "hates" the word volunteers, and that there is often a conflict between them over the issue of volunteers. She said that in the past, before she had (or could have) paid helpers, she had often visited with volunteers. It was with volunteers that she had travelled to other parts of Japan, such as Tokyo Disneyland and Okinawa. She had enjoyed spending time with helpers, and they had grown into friends (which she evaluated positively, a noticeable contrast with the seminar speaker). Her only lament about the volunteer system was that often the volunteers were men, and so she had no one to assist her in the toilet, unless he was a man, which she did not want. For Fujita-san, the distinctions between volunteers, attendants, and potential friends did not seem as pressing as for either Uchiyama-san or the activist seminar speaker.

"ILC is a family": Conclusion

Fujita-san's feelings lead into one final point, which is that it is easy to lose sight of friendship in discussions of identity, politics, and social movements. Therefore, I want to conclude with an ethnographic vignette in order to emphasise that in the day-to-day life of ILC, one of its important functions is that it is creates an atmosphere of friendship and community, creates a "family".

One day during my fieldwork I was invited to a *ikigomi kai. Ikigomi* means encouragement, zeal, enthusiasm, ardour, or determination, while *kai* is a meeting or gathering. The *ikigomi kai* was therefore a ILC get-together with the aim of building a sense of teamwork and unity across the organisation. It was held in a medium sized seminar hall about 10 minutes walk from ILC. It started in the afternoon, about 2pm. At the *ikigomi kai*, new employees, mostly helpers, were introduced and asked to give a few words. Long-time (usually between two and five years) employees were also brought up and given certificates by Uchiyama-san in honour of their continued work at the organisation (as helpers or otherwise). The *ikigomi kai* was MC'd by one woman (Maeda-san) and two men (Kondo-san and Mori-san) from ILC, who were (relatively) dressed-up for the occasion in white button-up shirts and jeans (compared to the usual t-shirt/sweatshirt and jeans). Maeda-san would announce the next speaker, while Kondo-san and Mori-san ran around with microphone and video camera. They called on a succession of ILC and TOP members to say a few words or ask a question to the person currently being honoured. The speaker might recall some funny story or just thank the person for his or her hard work. After the major figures at the organisation had all had a turn to speak, they then opened the floor to anyone who might have something to add.

After a short break, snacks and bottled tea were provided, and the meeting continued. The MCs introduced the new TOP members, a pair of teenage boys who wheeled up to the front in their wheelchairs and briefly introduced themselves. They explained they were recent graduates from high school and looking forward to getting to know everyone at ILC better. The rest of the meeting included announcements of any other news and introductions for any new notable people (such as myself). After all of this finished, again there was a short break and the party began at 5pm. During the party, beer and *bento* boxes were brought out, and people ate freely, while also moving around between the tables to casually talk, joke, and laugh with other members.

It was during this party period when I asked Yamano-san about *ikigomi kai* and whether they were common in Japanese companies or organisations. She explained that *ikigomi kai* are common, but that they are usually just held for the new recruits of an organisation. It is a way to welcome these “rookies” into the company. Therefore, usually only the new recruits attend. At ILC, she said, all members attend and the meeting also recognises, and encourages, the "veterans" as well. She continued that parties such as the current one were very common at ILC (I attended many such parties myself), perhaps unlike other organisations, because ILC has a friendly atmosphere. Often she and the other ILC members would have dinner together. She said that ILC is different from a normal company because "*ILC is like a family"* (*kazoku mitai*).

This statement, and the entire experience of the *ikigomi kai*, highlight one of the most salient aspects of ILC as an organisation during my fieldwork, which is that ILC is not just a way of providing services but also a way of constructing a neighbourhood community for disabled people. While the services provided are central, also central is the emotional and social support that people get by being involved with ILC. As we have seen in the current and preceding chapter, at ILC, politics cannot be separated from everyday life.

Section 3: Disability and Social Robots: Revisiting Robot Laboratories

At this point, there have been two chapters attempting to grapple with “production” and two chapters attempting to grapple with “consumption”. But it also seems that the “production” is an unusual kind of production and the “consumption” is an unusual kind of consumption.

The production of social robots is not one of mass production. In fact, the production takes the form of generating novel designs for future social robots, and the robots themselves are rarely sold. Social robots are not part of the “normal” economy. Much of their development comes from students, post-docs, and university professors, rather than stereotypical corporate employees. And these workers' labour results not so much in manufactured objects but rather, more often than not, in ideas, designs, and images of robots. Usually the same few robots are continually re-programmed for each new project. Such re-programming results in demonstrations, publications and patents, and it is through this media that the social robots realise most of their real economic effect (since these things help to secure future funding).

Further, production and consumption turn back on each other in “cycles of production and consumption” (Lury 1996). We have seen that roboticists are vociferous consumers in their own right. In particular, they are consumers of various kinds of pop culture. Social roboticists draw on images of robots from both Japanese *manga* and *anime,* as well as Western films, novels, and television shows, as they design new kinds of robots. This gives the field of social robotics a decidedly science fiction tinge.

Moving to the other side of the fieldwork, the “consumption” is also a somewhat odd form of consumption. First of all, the disability people I worked with are not actually using social robots at present. But even in the case of wheelchairs (and a variety of other barrier-free objects), the products are part of a rather unique market catered to a specific niche. Aspects of branding and so on do play a part, but the manufacture and marketing of these products is quite different than many things we commonly associate with "consumption" (such as Coca-Cola: see Miller 2002).

Further, it is also worth stressing that consumption of care, as an act, has been claimed by disabled people because they see the language of consumption as a political means of asserting both individual and collective freedom. One of the main points that Uchiyama-san and others made was that helpers are paid directly by the disabled person, and this gives the disabled person more control over their bodies and their lives. Unlike volunteers or municipally-employed attendants, the disabled person is a direct consumer of the helper's services, which means that the helper is accountable to that disabled person. Since the disabled person is the one who pays that helper, they can easily decide to pay someone else if they do not get the care, as a service, that they want. Further, the provision of these care services is organized around centres for independent living (CIL) which must be run by disabled people. Not only does this reasoning actively assert the agency of consumption (a point that aligns with many of those who have critiqued the notion of the passive consumer such as Miller 1997b), it is a very good example of how consumption can be anti-hegemonic not just symbolically, but as an act with tangible consequences. For members of a specific minority, consumption is here a way to bring into visibility their own diversity, including in the eyes of a Japanese state that has, arguably, historically ignored both that minority specifically and the reality of diversity in Japan more generally.

On the topic of diversity, it has arisen in different ways in the two ethnographies of production and consumption. On the side of production, the first chapter highlighted three different "rationales" used by roboticists, and this variety brings into question any simple or linear explanation for why robots are made in Japan. Further, this ethnography has also made clear the international character of social robot development. In keeping with a critique of homogeneous Japan, the laboratory cannot be made up of undifferentiated Japanese not least because a substantial number of the people in the laboratory are not Japanese at all. The ethnography has shown that, rather than an East versus West dichotomy in robot development and design, there is actually a globalised system of research, with both ideas and people flowing in all directions. This point should not be read as an attempt to flatten all differences, to make Western robots or roboticists the same as Japanese robots or roboticists, but rather to cast serious doubt on essentialized caricatures of "the Japanese and their robots", caricatures that are often reproduced stereotypically in many discussions of this topic.

Turning to the ethnography on disability, we have seen that the theme of diversity is central to the entire ethnographic context because it is one of an active minority movement working to change mainstream society. While the members of that movement obviously identify as Japanese, they do not identify with the notion of a homogeneous and unchangeable Japan. We have also seen that this movement is connected in many ways to the global disability movement, not in a way that subsumes the Japanese movement to that global movement, but rather brings the Japanese movement into dialogue and exchange with other disabled people around the world. This includes contact and exchange with American, British, and other "Western" disability movements, movements which helped inspire many of the ideas and organisational structures that the Japanese movement uses. But it also includes an involvement with a unique Pan-Asia movement, financed by the Japanese. They hope to assist budding movements across Asian developing countries through training and exchange. Through all these networks, we can see how the Japanese movement incorporates what they perceive to be Japanese, or Asian, specific values, such as the importance placed on family, with Western and/or international values, such as the value of independent living.

Through both sets of ethnography, there has been developing theme of "problems". Chapter 2 argued for the primacy of problems and solutions in social robot development in which solvable problems are prerequisites to any kind of technical intervention. Meanwhile, Chapters 3 and Chapters 4 have emphasised that problems are not neutral. Rather, conceptualising something, or someone, as a problem is an act of construction in itself with potential consequences. One such example is the very idea of disability and disabled people as problems to be solved, and the ethnography has shown some of the ways that such people, when categorised, work to combat such images. They do not consider themselves, or even their lives, to be problems, but rather see the "problem" as one of society. In the final chapter, this theme of problems will continue to play an important role as I examine a project to create a social robot to assist people with dementia.

Chapter 5: The Social Robot / Dementia Project: Problems, Goals and Normalcy

Introduction

Two elderly people in different rooms sit at computer workstations. Using a video conferencing program, they have a casual conversation while cameras and microphones send their data streaming across the internet to the other workstation. After about 10 or 20 minutes, they conclude their conversation, leave their respective workstations, and carry on about their day. While these particular people are trial participants using a prototype, if successful, engineers and medical experts hope that a similar system could be used by elderly people across Japan to get their daily dose of social interaction and human conversation without the need to leave the comfort of their own homes.

The problem is that these elderly people have dementia, and therefore they sometimes have difficulty engaging with and maintaining a natural flowing conversation because, for example, they lose interest or attention. For this reason, researchers propose a robot that will assist them by providing guidance and cues. It would keep an elderly person focused on the conversation if her attention wavered, but if the conversation was going well it would not interfere. It would also sustain the conversation if the other person's attention seemed to have wandered, by acting as a replacement listener itself, encouraging the person to continue speaking. This is achieved through what the roboticists term “active listening behaviours” where the robot gives the impression that it is listening through actions in its body. In practice, the robot is a small stuffed panda bear that sits off to one side of the computer monitor. The robot would monitor the conversation and assist (in a non-intrusive way) if it was necessary, but it would not be visible to the person on the other side of the telephone, since one camera would be positioned over the computer monitor and another over top of the robot.

According to the researchers with whom I worked, elderly people live alone without communication for extended periods of time, and therefore live lonely lives in their final days. In order to solve this problem, they have developed communication systems that use video telephone (i.e. video and audio chat software) to allow those elderly people the opportunity to interact with the others in the way described above, which is more convenient for the elderly people and also reduces the cost of having a person travel to see them. In previous efforts to develop such a system, before the current project to introduce social robots like the one described above, researchers had relied on volunteers to assist these elderly people as they spoke. The volunteers needed to work carefully to keep the elderly people engaged through eye contact, feedback, and so on, and therefore they had to employ a specialised conversation style. But volunteers are in short supply, while this kind of conversation is, according to researchers, an unusual conversation style that people do not generally employ in their everyday social relationships.

This chapter will discuss a project, of which I was a member for a time, to develop a social robot system that can overcome this "human-resource problem" by creating a social robot system that can facilitate "elderly-elderly" or "disabled-disabled" communication. For the sake of clarity, I will use the term the Social Robot / Dementia (SRD) project, my own term, to refer to this project. In the SRD project, the elderly with dementia lived alone but regularly attended a hospital in Chiba (a city about 40km south-east of Tokyo). The extent of mental impairment ranged from very mild to quite severe.

In Chapter 3, I introduced the notion of problematization, based in the work of both Michel Foucault and Michel Callon (Callon 1986; Foucault 1983, 1985, 1996, 1997) in order to discuss the ways that problems come to be posed, formed, and then solved, in certain ways by social robot researchers. To review, for Callon (1986), problematization is the stage of "translation" whereby a problem is set out, a network is formed, and the actors defined. For Foucault (Foucault 1983, 1985, 1996, 1997), problematization is the historical development of a manner of defining problems and setting conditions such that, as a problem, some difficulty can become the object of thought and can be the target of different kinds of solutions. With these two notions of problematization in mind, I want to examine how elderly people with dementia were problematized in this project, and how that problem came to fit with the sort of solution that roboticists sought to develop.

The Social Robot / Dementia Project

The SRD project was funded by the Ministry of Internal Affairs and Communications (MIC) of Japan, and the length of the SRD project was to be about six months. I was involved in the SRD project as a team member for part, but not all, of its life cycle. Before the SRD project began I had been working in other parts of the laboratory. I first came to the project, when Ishida-san, a researcher in her 30s, ambitious about research and the main driving force behind the SRD project, heard about my existence and spoke with me about joining her project (which at that time was still a few months away). I explained that my planned time at the laboratory would soon come to an end and, to continue with the next stage of my own anthropological research, I was interested in doing fieldwork outside of the laboratory, especially with elderly using robots. She was excited and said this would be perfect, since they wanted the results from such fieldwork (in her words, "case studies") but none of the existing team really wanted to do such research themselves. She wanted me to join the SRD project because it would benefit both of us. I agreed, she went away to arrange it, and I continued my ethnography with the other team (the basis of the first two chapters). Some months later, she came back to tell me that I had been accepted and my stay at the laboratory would be extended. I would be transferred to their team. This seemed to have taken some negotiating between the main administrative powers in the laboratory, though I had no access to these processes. Originally I joined because I thought my involvement would immediately consist of fieldwork among elderly people, but this turned out to be not the case, and, during my time with the project, I never had the opportunity to work with the actual elderly people who would potentially be using the robot.

Without this ethnography, it is worthwhile to consider the perspectives developed by others who have done ethnography on elderly people's use of technology within the home. Laviolette and Hanson (2007) discuss a telecare project, in the Barnsley area of South Yorkshire, to monitor elderly people who live alone. They show that while telecare may be able to maintain adequate care while also providing other advantages—cost savings for the health care system and more independence and freedom for elderly people—there are problems relating to surveillance. They suggest that telecare may be a new form of panopticism. The sense of being watched and put under anonymous bureaucratic control seemed to be one of the worries expressed by the elderly people in their study.

In a related but slightly different argument, Dankl (2012) discusses the design of smart homes in Vienna, Austria. She argues that the problem-centred approach of designers, who approach their work in narrowly technical terms, ignores the way that people actually relate to their homes. Through two ethnographic examples, she shows how a person or a family creates an ongoing "history" for their home. They develop a relationship and attachment to it. She believes that such relationships need to be acknowledged if designers want to create effective technology.

Dankl's argument can be read as an intervention into technoscientific practices by asserting the value of ethnography for design. She hopes to communicate these arguments to people who are much like the researchers discussed in this chapter. As I have noted, I originally joined the project in order to do ethnography with elderly people, but in the end this is not the ethnography that I conducted during this part of my fieldwork. As such my "collaboration" (Tsing 2005: 271) was not always neat and clean. Although at the time I felt frustrated, in retrospect it was a useful opportunity to further my research on the robotics researchers. This chapter, therefore, continues to be an ethnography of roboticists.

Roboticists, especially with deadlines and funding pressures, as well as an inclination towards favouring quantification and the production of “objectivity”, must make some concessions and compromises in their data. As with any research in any field, data is never perfect and they try to make do with the best they can muster. Lien (1997) describes the related issues of data on consumers in her ethnography of marketing and advertising people working for a Norwegian food manufacturer. For her, project managers live in a permanent state of ambiguity and uncertainty about their knowledge and their production. In an analysis reminiscent of Latour and Woolgar's (1986) ethnography of laboratory life, marketing and advertising work by translations of inscriptions. Documents, graphs, transcripts, and so on are the main data; and these data are valuable commodities that are painstakingly produced. As her study shows, this presents an opportunity to understand knowledge practices as they are enacted in modernity. Likewise, in this chapter we will see some of the ways that data on elderly people with dementia were crafted in such a way as they could become useful for robotics researchers. From the perspective of the anthropologist, that is from my perspective, their approach seemed problematic since actual contact with potential users (i.e. elderly people with dementia) was indirect and non-extensive. Returning to Dankl's argument, we may say that the roboticists are much more concerned with their technical “problems” than with the lived realities of elderly people with dementia. Nevertheless, the roboticists were not opposed to an anthropological or ethnographic approach (at least in theory) and that is why they enrolled me in their project. As such, the misalignment and miscommunication that I describe in this chapter can be read as usefully eliciting the different rationales of robot research: the makeshift balancing of the drive to pursue a scientific research agenda, the need to make a useful “product”, and the desire to make a “cool” or “cute” robot that will feature prominently in news media. As such, my ethnography in this portion of fieldwork is crafted in tension and “friction” (Tsing 2005). It should be read in light of my final discussion in chapter 1, whereby rationales are overlapping and “messy” and represent overlapping but distinct “realities” (Law 2004).

The Team

In comparison to the network robot system team (Chapter 2), this team was quite small. It was made up of five main members, including myself. All of the other members were Japanese. The team eventually included Ishida-san, her boss and manager Tokunaga-san, her long-time co-worker and friend Kishi-san, and a young university student and intern named Yamazaki-san. In contrast to my experience with the larger laboratory team, which was diffuse and rarely socialised as an entire team, this team seemed more tight-knit and intent on forming a strong team bond; for example, at the beginning of the SRD project, we all had lunch out together at a nearby restaurant as a welcome party to the project. Everyone on the team could speak at least a decent amount of English (Ishida-san especially) and their aim was to publish in English because of the higher prestige of English-language journals and conferences. Ishida-san was the sole woman and she was also very outgoing, social-able, and proactive. She was quite young, a recent PhD and a few years older than myself, and she was very hard working (as were all the members of the team). The Japanese men were all relatively shy and restrained, at least in the interactions I saw. Tokunaga-san was middle-aged and the most senior, and he managed the administration side of the project, including the liaison with the various other organisations involved (the details of which I did not have access to, nor were they my primary research interest). Kishi-san was about the same age as Ishida-san. He was very technically inclined, being an excellent computer programmer and technologist. Everyone except for myself was a roboticist, engineer, or computer scientist, though Yamazaki-san seemed to be interested in other research topics as well. He would sometimes ask me about anthropology and at least seemed familiar with the term ethnography (which was a bit unusual in itself). He also showed me his books on the topics of social welfare and dementia.

Ishida-san, Kishi-san, and Tokunaga-san had already been working on at least one project designed to contribute to the creation of "daily partner robots". During this earlier research, they had already proposed the idea that social robots could be used for care because of the increasing elderly population in developed countries.

One of the team members explained to me that such discourse is necessary as a part of funding. According to that person, if they say they are going to build robots for the elderly, they are more likely to receive government grants. The person confided in me, though, that they actually have little personal interest in elderly care. But it was a way to continue the research they wanted to do. In other words, this is a good example of the processes I described at the end of Chapter 1, whereby a researcher may have one specific motivation or interest in a project, but they are still subject to processes to make their robot fit other rationales. In this case, an interest in both science and a robot's intrinsic "coolness" also needs to fit into funding regimes, specifically the government policy to make useful robots to care for the elderly (i.e. the rationale of engineering).

The researchers earlier work on "daily partner robots" had investigated what they termed "crossmodel awareness". This research is based on the premise that robots will often have the need to communicate a message, but that some awareness of the person's current activities (based on gesture and speech patterns) is required so that the robot knows when it is appropriate to deliver that message. According to the members of the team, if the robot simply interceded without a care for whether the person was busy doing something else, it would be like a small child bothering his or her parent.

Rather than such potentially rude interaction, they proposed a two part method: "crossmodal awareness" that gives the robot the ability to detect when is a good time to speak based on gesture and speech, and "anthropomorphic attentive behaviours" that indicate its awareness of both its own and the person's body in order to interact in a human-like way. When the person is looking at someone else and talking to them, then the robot can detect that and wait. The robot can then indicate its desire to speak through "speech-implying behaviour", particularly by its head direction and angle. When the robot indicates its need to speak, by rapidly moving its head between the user and the object of their speech, the user will understand that the robot has something it wants to say. When the person addresses the robot, it can then deliver its message.

Crossmodal awareness was achieved through "gaze-tracking" and "speech detection". Gaze-tracking is the ability to deduce where a person is looking based on her head and eye position, while speech detection is the ability to detect that a user is talking based on audio input (that is, it detects the fact that she is speaking, but not necessarily the content of that speech). Depending on whether the robot is waiting to say something (active state) or not (passive state), the system then either performs speech-implying behaviour or it performs joint-attention attention behaviour. The former are turns of the robot's face between the person and the object the person is looking at, turns that occur every few seconds. The latter simply means that the robot looks at the same thing as the person.

Such a system was implemented as a robot in the form of a stuffed animal, and then tested experimentally for effectiveness. In the experiments, participants sat in front of a computer with the robot off to one side of the monitor. In one experimental condition, the participant would be in front of a black screen. In another, they would have television programme to watch, and in another, they would be asked to perform some calculation on the screen. These different conditions were designed to simulate the effects of different tasks and to test the robots awareness and behaviour in relation to these tasks. Overall, they found the robot's behaviour was evaluated positively when it did not interrupt the current task, and also that the robot was effective in indicating its intention to give a message using their speech-implying behaviour.

The researchers were continuing to build on this research in the new SRD project. Their previous work had focused on gesture, gaze, and communicating “respectfully” with potentially busy people. In the SRD project, these same functions were going to be used to detect when a dementia patient needed assistance and then offer its help, but to refrain from doing so if everything was going fine. The new project entails a similar physical arrangement to the previous experiments; in both situations, a person sitting in front of a computer monitor engaged in some task while the robot sits nearby and attempts to assist (without disturbing that main task). But the SRD project also focuses on a slightly different problem than the previous research. While the previous research developed functionality such that a robot can unobtrusively communicate some necessary message to an otherwise occupied speaker, this robot is instead attempting to facilitate communication and therefore should actively intervene, not based on external input like an outside message, but rather on its evaluation of the conversation state.

Much design discussion took place in meetings (though, of course, not all of it), and I will describe some of the specifics of the project as it developed in these meetings. Some of these meetings were just between the team, while others included outside researchers, such as those from the hospital. The meetings were conducted usually with the aid of Power Point slides, and researchers would give presentations on their work. Researchers could freely ask questions and express their opinions.

In the SRD project, one of the early focuses of the meetings was the discussion of a goal state, an ideal or normal conversation as the reference point from which to judge the acceptability of the observed conversation. The goal state simplifies the problem and makes it tractable. With a goal state, the robot can then intervene as far as the conversation deviates from that state. This requires an analysis of conversation as such, an analysis that proceeded, according to my observation and interpretation, in two main ways. The first way was to carefully observe a series of video telephone conversations (based on the existing video telephone system) occurring between people with dementia, conversations that did not use assistant robots but (sometimes) assistant people (in the case where there was no assistant, the two elderly conducted the conversations by themselves). These conversations had been conducted at the hospital in Chiba, and the laboratory had received digital video recordings. The second method was to think about the problem and consider their own *a priori* ideas of a good conversation, particularly their notion that the ideal or normal conversation is a “catch ball” conversation. I will discuss these two methods in turn.

While the team was working in collaboration with staff at a hospital in Chiba, the distance (about 430km or a few hours by high-speed train) meant that face-to-face contact between the two groups was relatively infrequent and direct observation of the patients was also considered by the roboticists to be infeasible for data-gathering purposes (and my requests to go to the hospital were met with polite replies to wait a bit longer). Rather, at the beginning of the SRD project, the robot researchers obtained the aforementioned videos. The video would be the footage taken directly from the web camera on the user's computer and therefore the image in the video shows the exact image seen by each user during the trial. Although originally the videos from each perspective were in separate files, Yamazaki-san combined the matching videos into one single file that showed the images of the participants side by side, for each conversation, making it easier to get an idea of the whole. In the trials, both men and women participated in approximately equal numbers. My assigned task in the SRD project was to watch these videos using my own methodology and provide some analysis that would be useful to the roboticist team.

The roboticists considered the videos the main empirical data for the project (that is the main empirical data for the start of the project—further empirical work would occur in the testing and experiment phase). In order to give the reader a sense of how these conversations flowed and what they might contain, the following is a description of a fairly typical video as well as a description of how other videos sometimes differed. Two women, both around 65, are seated in front of computers in rooms that seem empty of any other people not directly involved in the trial. Behind one of the women, a hospital doctor (who is also one of the main hospital staff working in collaboration with the SRD team) hangs around, comes and goes, and occasionally gets involved in the conversation. The two women start by introducing themselves. Next, they move into a discussion of the bus trip one of the women had that morning to the hospital, discussing what it is like on the bus, the distance to the station, and so on. They continue to discuss this for a couple of minutes, and then move onto discussing the weather. It has been raining, says the woman who rode the bus, a comment that the other woman seems interested in. After a few more minutes, they discuss the viewing of *hanabi* (fireworks), a common social event during the summer in Japan (the video was dated July). A few minutes later they discuss their children and particularly marriage, which goes on for a few more minutes. After this, the conversation soon ends and they say goodbye. This single example is fairly representative of the videos, though in this situation both spoke roughly the same amount, while in other recordings, sometimes one person speaks much less and it seems that he or she is having difficulty focusing. While in this example the doctor occasionally assisted, often those who speak less have helpers sitting beside them, as mentioned, for the entire length of the video. When these helpers are present, their effect on the conversation varies. On the one hand, in one example, a man with apparently severe dementia spoke almost not at all and mostly gazed off camera the entire time, while his helper, who was actually his wife, leaned in and had a very animated conversation with the other person. On the other hand, there were videos whereby the helper seemed to do nothing at all and just quietly sat beside the elderly person until the end of the video. There were also videos somewhere in between, where the helper periodically interjected in order to assist, but mostly allowed the elderly person to do the talking. For example, if the elderly person either could not hear or could not understand what had been said, the assistant explained it to him or her.

The analysis of these videos was intended to result in clues about gesture, body position and movement, speech patterns, and so on that would be indicators for the state of the user and the state of the conversation. To understand the logic of this point, it is important to note that the robot would probably be unable to understand the content of the conversation because its speech recognition and language abilities would, frankly, not be that good (a problem that has been discussed at length in previous chapters). In order to intervene in such conversation, it would have to identify the state of the conversation in some other way. Therefore, the researchers wanted patterns of gesture and utterance that the robot would be able to measure and act on. Yamazaki-san, who also did some video analysis, developed methods to code gesture as well as track utterance frequency and length (how much and for how long people talked). He then analysed this data across time. An example of such bodily indicators might (hypothetically) be a person's posture—either leaning towards the camera or leaning away. When he presented this data to the team, he presented a graph of one particular conversation, but the methodology could be applied to any number of conversations as a way of determining whether that conversation was good or not. For simplicity sake, we can imagine a graph that shows how much a person talks over time. If one person talked a lot, and another person talked very little, then this would be represented by two lines (or in his case four, since he also modelled the helpers) that were very far apart across the entire interval of the conversation, lines that almost never meet. While he presented a single example of a “bad” conversation, presumably a “good” conversation would be represented by lines that stayed more or less at the same level, with one rising slightly while the other fell, but both always within an acceptable range. While this simplified example is only based on speech frequency, his model was more complex (gesture was either already included or else part of his ongoing work). As more gestures were identified, the researchers could theoretically model those as well and add that data to the equation. Such work is a quantitative and potentially statistical approach to constructing a goal conversation.

Turning to the second method of establishing a goal conversation, much time was spent in the early meetings discussing what makes a good conversation in order to specify this state *a priori*. First of all, it was considered bad to have an assistant dominant the conversation (as was the case in the example of the silent husband and the social-able wife). The point is not for assistants to make new friends, but to give elderly with dementia a chance to have open-ended conversations and to receive the benefits of social communication. It was also bad to have an assistant who never intervened and who did not seem to realise that the elderly person needed help even when she "clearly" did, because then the assistant serves no purpose and might just as well not even be there.

Roboticists also discussed a more abstract notion of an ideal or normal conversation, in order to construct a goal state for the system. This ideal, or goal, conversation was based on the notion of a "catch ball" conversation. "Catch ball" (*kyatchi bōru)* is a term that roboticists used but it is also used by Japanese in general. The same phrase was sometimes used, completely unrelated to robot research and goal conversations, by my home-stay family at the time, a married couple who lived with their 7 year-old son. The origin of the term dates to at least 1914 and it may have been adopted in Japanese with the early introduction of baseball (Warren 2008: 24–25), which has been the most popular sport in Japan for the last 100 years (Kelly 1997). While the most basic meaning of "catch ball" is the game in English called "catch", it can also be used metaphorically to mean a "good" conversation where both sides are communicating well by a shared understanding of conversation flow. The conversation functions like the game, where one person says something, the other person “catches” this utterance and then “throws” an appropriate response in the right direction, which is then “caught”, “thrown” back, and so on. A “catch ball” conversation is where both sides interact and where they both speak about equally. In common usage, “catch ball” is not always exclusively between two people (as opposed to a group of people), but in the case of the SRD project, a one-on-one conversation was generally assumed.

A “catch ball” conversation is an ideal that distinguishes a “good” conversation from a “bad” conversation. Examples of the latter might be a situation where one person speaks far more than the other person, a situation where one person suddenly stops listening and does not “catch” the words of the other person, a situation where one person interrupts the other or otherwise speaks out of turn, and a situation where one person abruptly makes a statement completely unrelated to the subject of the conversation. As the goal state of the SRD project, the idea is that if the robot detects that the conversation is “bad” (i.e. not “catch ball”), then it can intervene and try to correct the course of the conversation by whatever means the researchers develop for the robot (such as gesture, verbal direction, or as yet undeveloped behaviour). While the robot should ideally help to realise this “catch ball” conversation in all its aspects, especially important for the roboticists during these early meetings was that each person should be speaking about the same amount. The goal, therefore, was to have the conversation split about 50/50 (in terms of the number of utterances as well as their duration) between the two participants.

The “catch ball” standard provides a point of departure for the problem of the SRD project because it further specifies exactly what the roboticists are trying to accomplish. One of the most basic distinctions made in the expansive literature on problem-solving is the distinction between well-defined and ill-defined problems (Kahney 1993: 19–22). Well-defined problems have clear goal states, and therefore problem-solving can be conceived in formal algorithmic terms as a path, in a problem space, from a start state to an end state. Ill-defined problems have no such clear goal states and are not easily expressed in algorithmic logic. Well-defined problems are for this reason preferable, even necessary, from a computer problem-solving point of view. In the SRD project, the researchers insisted they must have a goal and that the goal must be very clearly defined. The quantification of speech and gesture, as shown in Yamazaki-san's analysis of the conversation videos, also makes measuring the current state and specifying the goal state much more precise and concrete, both of which make the problem more well-defined and consequently solvable through technical means.

During the early meetings, the team also designed an initial model for the system. This model started by a consideration of user satisfaction and the number of utterances. The model was then graphed across various conversation states. Figure 4 shows a reproduction of one of these early graphs that I recorded in my field notes. This graph shows visually the relationships between various conversation states. The roboticists considered the *Silent* state to be the worst (the states were in English though the meeting was mostly conducted in Japanese). The state *Listening* is considered in the right direction but not optimal, while the *Conversation* state is considered good. Finally, aiming for *Self-Disclosure* is probably the best. Ishida-san emphasised that if one person is passive and/or not talking, then the conversation is not good. The merits of self-disclosure was a matter of debate and ultimately considered a matter for further research.

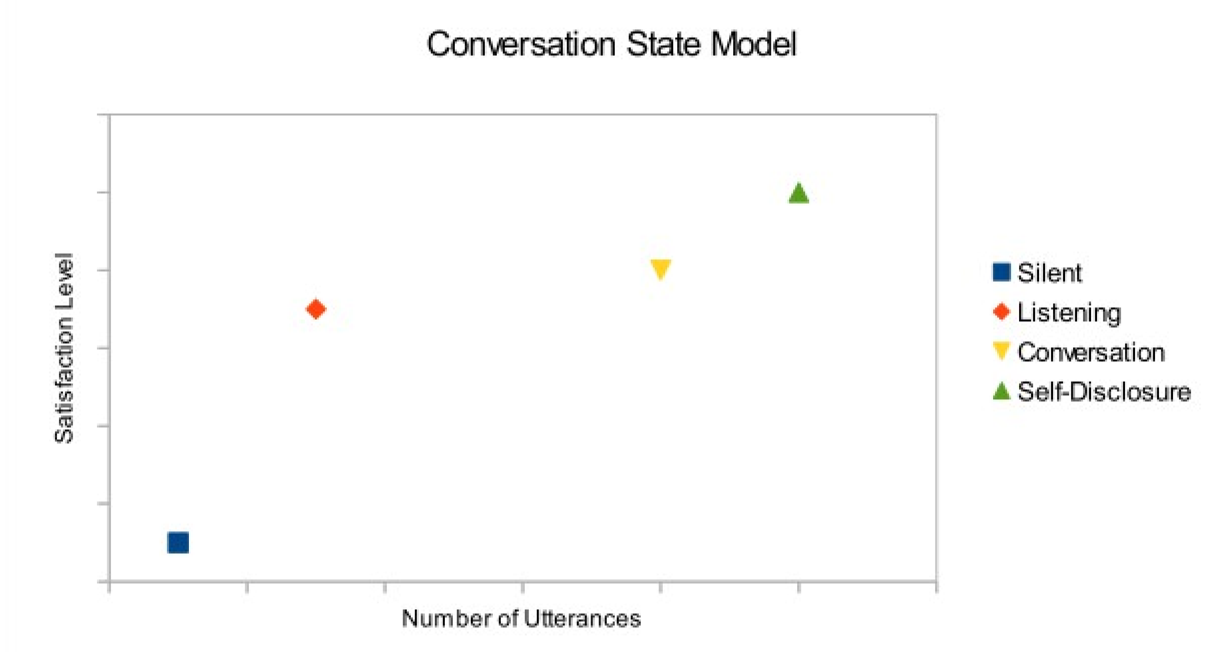

Figure 5: Conversation State Model

During these meetings, the team also discussed the importance of timing, what in Japanese is given the term "*ma*". I want to spend some time describing the term because it is not easily translated in English and yet Ishida-san emphasised the importance of *ma* (literally "interval") to me by claiming it is a fundamental Japanese concept, and that its "importance for Japanese culture is like *zen*." While *ma* roughly translates into English as "interval," whether in time or space, it is a concept that encapsulates more. Returning home that night, I spoke with my home-stay family, in order to find out what "regular Japanese" (i.e. non-researchers) thought about *ma*. Over the remainder of my fieldwork, I also often spoke with other Japanese that I met casually, such as my wife and her friends (who are also Japanese but not involved in robot research), in order to understand the common Japanese meaning of this term. Everyone I asked invariably agreed that *ma* is very important, and that it is best and most easily understood in light of human communication. Most people explained by way of example, which I compiled into the following list: when two people first meet, they speak very little, but as they get to know each other, they speak more; when speaking to a superior (such as your boss) you should use polite language; when a husband and a wife have a fight, they may need to separate physically in space for a short time (the wife goes upstairs, the husband goes for a walk, etc.) but after they have this space, they can reconcile; before a *sumo* match or as *samurai* are squaring off to duel, the combatants stare intently into each other's eyes and decide on the exact moment to begin the fight; for Japanese, sometimes things are better communicated through silence rather than through speech; sometimes a person chooses not to speak in order to create distance between themselves and the people around them. Many Japanese explained to me that to them *ma* is not something you can do self-consciously but occurs “naturally” (*shizen*), in this way some people I had previously asked would comment, weeks or months later, what seemed to me at random, that I myself had just exemplified *ma* in something I had just done (even if I did not really understand why).

My Japanese wife, after repeated questions about *ma*, spent some time constructing a mini-essay as well as an elaborate diagram on the topic which she presented to me. (She explained that it was based on what she remembered from classes in high school). According to her, *ma* is probably translated into English as “time” or “space” and that the origins of the term are in *kabuki* and *noh* theatre (a link also claimed by Crapanzano 2004). She explained that *ma* is fundamental, it is the basis for *kokoro* (a term we have seen time and again in this thesis) and *shinsei* (“mind”). She explained that *ma* makes possible *jocho* (“feeling”), which in turn also makes possible *risei* (“reason”), *kanjo*(“emotion”), and *yūgen*(“mysterious profundity”). *Yūgen* is a term used for things that are subtly, yet deeply, beautiful or profound; the emotion attached to *haiku*, *tanka* (another genre of classical Japanese poetry), and the tea ceremony. *Yūgen* in particular, and also *kanjo*, make possible the twin pair *wabi* and *sabi,* which have penetrated into English to describe Japanese aesthetics (wabi-sabi). *Wabi-sabi* often also refers to the beauty of Japanese traditional arts such as the tea ceremony or *zen* gardens. According to the artist, writer, and aficionado of Japanese aesthetics Leonard Koren:

> Wabi-sabi is a beauty of things imperfect, impermanent, and incomplete.
> It is a beauty of things modest and humble.
> It is a beauty of things unconventional (Koren 2008: 7).

My wife explained that *yūgen* and *wabi-sabi* are the beauty in silence. According to her, none of the things described above, starting from *kokoro*, would be possible without *ma*.

In addition to these uses, the concept of *ma* is also used in architecture and other art to refer to space, especially negative space (Kurokawa 1988; Pilgrim 1986). Anthropologist Edward T. Hall, in *The Hidden Dimension*, a work that focuses on "social and personal space and man's [*sic*] perception of it" (Hall 1969: 1) describes *ma* in the following way:

> When Westerners think and talk about space, they mean the distance between objects. In the West, we are taught to perceive and to react to arrangements of objects and to think of space as "empty". The meaning of this becomes clear only when it is contrasted with the Japanese, who are trained to give *meaning* to spaces—to perceive the shape and arrangement of spaces; for this they have a word, *ma*. The *ma*, or interval, is a basic building block in all Japanese spatial experience (Edward T. Hall 1969: 153 emphasis in the original).

Returning to the SRD project, Ishida-san said that it is important for them to consider *ma* in the social robots they plan to make. Especially elderly people will be very conscious of *ma* and so if the robot makes a mistake (in reference to *ma*) or simply does not abide by a sense of *ma*, this could be very uncomfortable for such elderly and the robot would leave a bad impression. Many Japanese, in my experience, tend to believe that tradition, exemplified by etiquette and correct speech, is being lost by the younger generation. As just one example, in Professor Masuda claimed that the android Didymos could be "more human" in the sense that young Japanese do not speak properly or with correct etiquette, while presumably Didymos could be made to do exactly that. Both the *ma* example and this

Professor Masuda example show a rather common-sense equivalence between formalised principles of traditional speech with actual older people who supposedly embody these principles. Still, as I mentioned above, this is *a priori* reflection, because it did not come from actually asking any elderly people (with dementia or otherwise) what is important to them in a conversation but rather it was derived from philosophical reflection.

In practical terms, the application of this abstract *ma* principle meant a concern with the specific length of time between speech utterances, the length of time after the person is done talking before the robot should respond. This is intuitively understandable: if a robot responded too fast it would seem to be what in colloquial English would be called "speaking over you," barely giving you time to finish your sentence before cutting in; conversely, if a robot responded too slowly, you might wonder what's taking so long, and come to believe it is either ignoring you, poorly designed and cumbersome, or perhaps just broken. They decided that part of future research would be to identify the length of time for these intervals empirically by seeing how many seconds/milliseconds between speech utterances is subjectively considered best. It is interesting that the researchers thought that elderly people would be more attuned to *ma* and they did not really give any specific reasons why. Rather, this seemed rather self-evident to the them. As I explained above, it is my belief that this assumption is rooted in an unstated equivalence between elderly Japanese and something understood as Japanese tradition.

Through these discussions, we can see that the team was concerned with constructing a conversation based on both the physical body, its gestures and positions, and on the timing and balance of speech utterances. They focused on these two issues for a number of reasons. First, it is figured that the main problem elderly with dementia have in reference to conversation is their loss of concentration and/or interest, and that to keep them engaged requires constant feedback (especially through the body with such techniques as eye contact, nodding, and other gesture). Second, the robot in all likelihood will have poor language understanding, and therefore it needs to track the state of the conversation in other ways. Third, and this is more implicit but still in evidence, embodiment is one of the strengths of a social robot (in comparison to other possible communication technologies) and therefore a focus on the body makes sense in this kind of machine. By using the term “anthropomorphic attentive behaviors”, the roboticists intended to stress both the embodied and the human-like nature of the social robot.

Finally, I want to briefly describe the final prototype (completed some time after I left the project). In their construction of this prototype, the team focused on three concrete ways to improve conversation. In order to solve the communication problem presented by elderly with dementia, they implemented the following system behaviours: first, when the interlocutor stops listening, the robot will act as a proxy listener and therefore allow the person to continue his or her conversation; second, in such a case, the camera will switch from the monitor to above the robot, so that it still appears to the interlocutor that the person is still talking to them (even though he or she is now directing his or her speech to the robot).

First, the robot will convey active listening behaviour when the other person seems not to be listening. For example, Person A loses concentration or grows bored of the conversation and begins to stare off somewhere into space. Person B, who had been talking, may feel annoyed, sad, or otherwise disturbed that she is not being listened to. The robot will therefore look at Person B, nod along, and “listen” (without actual comprehension), and in this way provide an audience for Person B. Person B can continue telling her story (or whatever) to the robot and feel satisfied that someone (or something) is listening to her.

The second behaviour compensates for a (potential) problem introduced by the first behaviour. Since Person A is no longer being spoken to, she may lose even more interest in the conversation. But if she still believes that Person B is speaking to her, then she may pick up the conversation again. Therefore, the switch in camera is intended to trick her into believing this is still the case. Since a sudden change in camera angle may be strange or disorientating, the robot will try to distract the user at the moment of the switch.

In addition to these two functions, which happen automatically, they also developed one further behaviour. While active listening behaviour might maintain existing conversations, the conversation might still stall for lack of something to talk about. In such a circumstance, the robot provides a possible topic for conversation. If we refer to the previous conversation state chart, this should be done when both users remain in the "listening" state for some period of time (i.e. a few seconds).

Unlike the other two functions, in the demonstration (see Chapter 1 for a discussion of demonstrations) and testing of the robot, they used the Wizard of Oz method (discussed in depth in Chapter 2) to control the timing of this topic provision. This means that rather than have the robot automatically intercede, an operator (a researcher observing the demonstration experiment in real time) would manually instruct the robot on when it should offer a topic for conversation. The specific topic would be randomly selected from a pre-compiled list. According to their tests, topic provision was usually successful, and when it was not, this was almost always because the person could not understand what the robot said or because the robot was inaudible.

In the analysis of this project, I want to focus on the importance of nonverbal communication, the focus on embodiment in (Japanese) robotics and the inseparability of body and mind, and the use of ideas of (statistical) ideas of normalcy to blur the lines between *is* and *ought*. The combination of these themes has special relevance for a discussion of disability, such as dementia, as a problem to be normalised in the body.

Nonverbal Communication and the Body

In the SRD project, the roboticists focused on the user's gesture, body position, posture, eye contact, and face direction, and therefore on nonverbal behaviour. They attempted to use knowledge about nonverbal communication in order to improve the “naturalness” (a term discussed in Chapter 1) of a social robot by designing anthropomorphic behaviours. Further, there was great attention placed on timing, pacing, and length of speech, including the explicit concern with the Japanese concept of *ma*.

Adam Kendon describes nonverbal communication succinctly in the introduction to his edited volume on the field:

> The term 'nonverbal communication', as it is currently employed, is most frequently used to refer to all the ways in which a communication is effected between persons when in each other's presence, by means other than words. It refers to the communication functioning of bodily activity, gesture, facial expression and orientation, posture and spacing, touch and smell, and of those aspects of utterance that can be considered apart from the referential content of what is said. Studies of 'nonverbal communication' are usually concerned with the part of these aspects of behavior play in establishing and maintaining interaction and interpersonal relations (Adam Kendon et al. 1981: 3).

As I mentioned in Chapter 4, in a discussion of Ato-san's communication style, nonverbal communication is also considered particularly important by Japanese specifically (Hendry 1995). In this case, we can see that in evidence by the stress on *ma*. When Joy Hendry argues that “just as space is important in Japanese paintings, and other forms of art, the spaces in conversation are also said to be vital to obtain a deep understanding of what is being communicated” and that “often what is not said is just as important as what is said” (Hendry 1995: 165), she seems to be alluding to the notion of *ma* (though she does not introduce the Japanese term). This is part of what Hendry argues is the “wrapping” of speech.

In the SRD project, there was really only one instance where the robot would attempt to intervene with the actual content of a conversation. When the conversation has an extended lull or seems to be waning, the researchers proposed that the robot could offer up a new topic for conversation. But there are two crucial points here. First, as we saw, this was also the one aspect of the robot's behaviour that was not done automatically (at least yet) and was instead provisioned through the Wizard of Oz method. All the automatic behaviours are focused on nonverbal communication. Second, the importance of the topic provision functionality was not in the content of the message (which could be anything and in fact would be chosen at random) but the *timing* of that message. It maintains the *ma* of the conversation by correctly managing the spaces and intervals of time between speech, before communication can break down. It is the fact of the lull that is important, not the actual content of the topic.

Also, the camera switching behaviour, which might, at first, seem not to be an example of nonverbal communication, actually is designed for this purpose. The camera switching is the attempt by roboticists to manipulate Person B's perception of Person A's gaze in order to give the impression to Person B that she is being looked at even when she is not. It is an attempt to manage nonverbal communication (a person's gaze). It is a manipulation of the spaces between people (through a kind of “virtual *ma*” if you will) such that the communication seems continuous and uninterrupted.

Nonverbal communication is the focus for roboticists' research because it suits a social robots unique affordances. Social robots have an embodied existence, and embodiment has been adopted as a main theoretical and methodological approach by many roboticists discussed in the thesis and also others around the world (Brooks 1986, cf. 1990). In this approach, a body is seen as crucial to an understanding of how intelligence emerges in an environment and therefore a robot needs a body to be an intelligent machine. Additionally, in the case of social robots specifically, embodiment makes the robot more effective when it interacts with people. Robots like the one in the SRD project can act as companions, daily partners, for people. And people accept them as such. This is achieved precisely through the robot system's understanding of other bodies, in crossmodal awareness, and the system's manipulation of intervals of space and time (*ma*).

In summary, the SRD project approached the problem that elderly people with dementia may lose concentration in a conversation by modelling those conversations and then designing a number of system behaviours. These behaviours are based on detailed attention to body movement and position, along with speech and action timing. While the researchers had many ideas in the early meetings about what behaviours would be good, in the end they implemented three: (1) the robot would use active listening behaviours in order to provide an alternate audience for a person if her interlocutor strayed from the conversation; (2) in such a case, the camera would change such that it seemed to the other person they were being looked at, and, in order to hide this switch of camera angle, the robot would perform some distracting action; (3) in the case where a conversation reached an impasse, the robot would provision a topic for conversation. The focus on nonverbal communication is suited both to the problem that the robot is designed to solve and also to the unique affordances that social robots have as solutions, while also possibly reflecting a specifically Japanese cultural approach as well.

A Return to Problematization

Nonverbal communication is employed so that the problems that people with dementia have can be solved through technology as a problem of the body. Through a manipulation of nonverbal communication in a social robot, these communications can more closely resemble an ideal conversation and in that way become more enjoyable and therapeutic, become more normal. In other words, the attempt to technologically produce ideal conversations works by process of normalisation. But recent investigations at the intersection of science and technology studies (STS) and disability studies has shown the ways that technologies, including communication technologies, are introduced as “a promise” to “undo disability,” but also serve, through normalisation, to produce the “difference” between abled and disabled people in the first place (Moser 2005, 2006). Moser argues that this process happens because of a “premise of compensation,” whereby disability is taken to mean something is lacking (i.e. in the body) but can be compensated for with technology. According to Moser, this “premise of compensation” is based on a kind of normalisation that already introduces limits on itself (Moser 2005, 2006). In other words, the notion that disability is seen as a problem to be solved limits the approaches that can be taken towards disability. We saw in previous chapters that the members of ILC, in line with the global disability movement, drew a distinction between medical and social models of disability. The premise of compensation that Moser identifies is firmly in the medical model, since technology, like medicine, is meant to compensate for disability insofar as disability is simply an individual problem of the body.

It could be argued that dementia, as a “problem” with the “mind”, is radically distinct from the physical disability discussed in earlier chapters, which are “problems” of the “body”. But my view is that such a distinction is misleading and unsustainable. This argument is based on a problematic mind/body dualism that does not fit the way social robots are often conceived and developed. As we explored in Chapter 1, a major claim within the scientific rationale of social robot research is that robotics present the opportunity to rethink our epistemology in ways that would undo such distinctions. Roboticists believe that the brain function of a robot (or a person), the body of a robot (or a person), and the social environment in which that robot (or person) is located are all inseparable. And they take this position not just philosophically, but as the baseline for the concrete instantiation of their systems. They focus on building robot bodies and structured environments because these things are as equally important for making a robot “mind” as internal programming. Within the SRD project, mental disabilities are not separable from their physical “causes”, while the social robot's communication systems crucially depend on the physical body (of itself and of a human being) directly. I do not mean to imply that all disabilities are the same but, rather, without the implicit mind/body dualism, the specific distinction between a "mind" and a "body" problem cannot be sustained with reference to social robot research.

In the SRD project, a social robot that facilitates communication through achieving a goal conversation is meant to compensate for elderly person's lack of ability. The system seeks normalisation for the elderly person, compensating for their individual problems so that they can achieve normal conversations. But constructing the problem in this way subsumes elderly as already outside of this ideal and therefore produces them as disabled. Consider a man who does not speak, such as the man with severe dementia and his talkative wife. There is no inherent problem here. Rather, it is a specific problematization that makes him the object of thought, the object of new technologies. These elderly people fail to meet up to a norm insofar as that norm is introduced through the space and development of the SRD project: the established physical space of having a video telephone conversation by which two elderly will communicate verbally, the decision to elect an *a priori* "catch ball" conversation as the goal conversation, both people must speak an equal amount, and so on. In other words, in this project, such elderly turn into a problem to be solved.

Lennard Davis has argued that the "problem" of disability arises out of the construction of normalcy, "that normalcy is constructed to create the 'problem' of the disabled person" (Davis 2010b: 3). Davis traces the concept of normalcy historically, arguing it arose during the early to mid 19^{th} century. He contrasts this with the idea that came before this period: the notion of the "ideal" (Davis 2010b: 4). In Europe, the "ideal" takes the form of "the divine body," whereby actual bodies "can never embody the ideal since an ideal, by definition, can never be found in this world" (Davis 2010b: 4). In such a world-view "all members of the population are below the ideal" (Davis 2010b: 4). This changes with the introduction of the "norm", particularly through the introduction of statistics. With statistics, the norm is an average body, and the norm introduces the possibility of applying this norm to a population. Hand in hand with the rise of statistics is the rise of eugenics as both a science and a pro-active social policy and "the perfectibility of the human body a Utopian hope for social improvement" (Davis 2010b: 9). Within such a eugenics program, people with disabilities came to be clumped in with all others who had undesirable qualities, such as criminals and the poor, a "defective class" (Davis 2010b: 11) that can be fixed or eliminated.

Ian Hacking has made a similar argument about the rise of statistics (Hacking 1991). He traces the history of statistics and, likewise, links it directly to the rise of the norm. He shows how the explanatory power of statistics arose as a way to understand the world as indeterministic, and how this is related to the replacement of human nature by a model of normal people, Normality, according to Hacking, is peculiar in that it fuses both the *is* and the *ought*. The norm is both the average and therefore a description of fact; but it is also a standard to which everyone is compared and evaluated. Statistics therefore introduces the feeling of better control and intervention, which is also the goal of much of the engineering and technology discussed in this thesis.

In the SRD project, a goal conversation is introduced, one that can hypothetically be measured and provisioned quantitatively. During the project meetings, I expressed my concern with their notion of the goal conversation, specifically the form it took as a "catch ball" conversation based on a quantitative equivalence for both participates (they would both speak 50% of the time). From my viewing of the videos, it seemed to me that some elderly would likely never have "catch ball" conversations, and to structure the problem in that way seemed to be quite problematic to me and potentially stressful for elderly who were being pushed into a conversation style unsuited to their abilities and (I think, though I cannot verify) their desires. In one specific example, when Yamazaki-san represented his graphs of the “bad” conversation, I was concerned about the unique contexts of that conversation (which were at first unclear to me since he presented his data only as statistics in graph format). I wanted to know who these people were, what kind of conversation they actually had, and therefore whether we were making a justifiable comparison between the two. The roboticists searched up the data they had for the videos, and found that the MMSE levels (Mini-Mental State Examination—a 30-point medicalised test designed to screen for cognitive impairment such as dementia) were quite different, with one person (the one who spoke less) having a much lower score. The person who spoke less had a much more severe impairment. And, I think tellingly, the response to my objection continues to maintain the primacy of quantitative measurement and statistics in establishing normality and abnormality. While they conceded that in this case the values were very different, they maintained that nevertheless they need a goal, and, unless I could offer a more plausible goal state (i.e. a quantifiable goal state), the “catch ball” goal is the most intuitive; in fact, it is only one that makes sense. I was unable at the time to phrase my objection within these terms, the terms of a universally applicable alternative goal state amendable to a quantifiable notion of normalcy, and they proceeded with the “catch ball” goal state.

The same objection later resurfaced in another form. In a subsequent meeting, one of the doctors from the Chiba hospital (the doctor I described in the example video) expressed the same concern. He said that there is a wide range of dementia and that it does not make sense to model that as “catch ball” conversations, because many of his patients will be unable to achieve it. The other members of the SRD project replied with the same answer that they had given me, which is that they must have a goal state.

In Chapter 4 I described Ato-san and his style of communication. I referenced how he makes do in the world through what I call his skill, communicating what he needs or wants said through an assortment of gesture, writing, emotive expression, and personal assistance. But it would make little sense to try to get him to have a 50/50 “catch ball” conversation with myself or anyone else, not least because he does not actually talk. It would also be a poor standard by which to compare the “goodness” of the actual conversation, at least in my opinion. It could be argued that Ato-san is particularly disabled and has CP, and therefore is unlike people with dementia. But the entire point of my argument is to reject the terms of this objection because it relies on essentialized discourses about people's bodies, rather than engaging with the lived diversity of their experience.

The goal conversation is both an ideal conversation and a normal conversation, but unlike Davis' concept of the pre-normal “ideal,” the conversation can be achieved and it should be. It is the social robot, and its surrounding technology, that holds out the promise of reaching this normalcy. As described in Chapter 1, the rationale of engineering is based on the notion that social robots can provide some practical benefit or utility. In other words, when employing the rationale of engineering, roboticists seek intervention through technology and insofar as disability is conceived as problem, it is conceived as an engineering problem. While the SRD project can certainly be beneficial for disabled people, it is important to realise that, from the outset, it also reinforces the notion that “problem” is a disability of the person as such.

Conclusion

In the SRD project, a scenario was envisioned in which elderly people would speak over a video telephone but needed a robot to assist them in order to carry out a normal conversation. This normal conversation was a topic of discussion and research, and ultimately modelled as a system of conversation states. Various behavioural patterns were designed and implemented in the robot which include the robot acting as a substitute listener for a speaker if their interlocutor is no longer listening, changing the camera view such that that interlocutor still believes that the speaker is speaking to them, and a topic provision system in order to sustain a conversation that may be waning.

In the introduction to the thesis, I drew a link between not just social robots and elderly people, but between social robots and disabled people, because elderly people are considered to have disabilities, and therefore robots that help elderly with disabilities can help other people with disabilities. I have suggested in this chapter that part of the reason is that disability presents a problem to be solved, and the ethnography above has described how this happens in practice. Through the SRD project, the normal is established, and the SRD project can proceed insofar as that normal needs to be applied to disabled people. In this sense, projects to help disabled people can also be projects that make disabled people.

Conclusion

In the conclusion to this thesis, I will revisit three main areas of analytical focus that I outlined in the introduction: production/consumption, disability and identity, and Japan “uniqueness” *vis-à-vis* the global nature of robot research and disability activism. I will discuss each issue in turn in light of my main ethnographic findings. Finally, I will conclude with a brief return to the theme of “problems” that has informed the core arguments of this thesis.

Production and Consumption: Friction and Difference

This thesis has demonstrated the value of studying both production and consumption together in one study. In part, this entails a connection between production and consumption. But “connection” itself has been problematic. Both the “production” at the laboratories and “consumption” at the disabled centre seem unusual and unique with respect to “typical” production and consumption, and therefore *unconnected* to mainstream Japan. Further, the connection *between* these field-sites, while crucial, is also somewhat unclear and this problem of connection has produced ethnographic portraits that differ quite radically. Still, rather than focus only on connection and normativity, this thesis has shown the importance of tracking production, consumption, and technology through friction and difference.

The “production” in the laboratories seems unique because, first of all, they have an organizational structure that seems unusual. Most research staff are on temporary, short-term contracts. In contrast, the typical Japanese organization has been characterized by the life-time employment system, seniority-based remuneration, worker commitment and organizational “harmony”, and enterprise unionism (Dore 1973; Rohlen 1974). In addition, a sizeable minority of the researchers are foreigners, the laboratories maintain connection to other overseas research institutes, and the researchers frequently use English in both speech and published works. In contrast, Japan is still often presumed to be homogeneously Japanese.

A second way in which the laboratories seem unique (in comparison to other work on Japanese industry) is in the way they organize their "purpose". The laboratories do not have a singular goal, such as an aim to develop a product directly for market, but rather combine a number of "rationales" for making social robots that include their wish to engineer useful products, their hope to do basic science, and their desire to simply make "cool" robots. While some researchers certainly want to make robots that could (ultimately) be commercialized and used to help people, others seemed almost cynical about the use of social robots for elderly care. They simply wanted to do research they liked, and, in order to get the funding to do that, they had to pitch their robots as potential care givers. Yet the media and government often portray social robotics as a highly targeted and rationalized project to solve the demographic crisis. Ostensibly, this clean plan fits the classic descriptions of the Japanese production system in which industry and government are tightly coupled. For example, historically, the government—specifically MITI—has had a very strong role in planning the Japanese economy and in dictating production needs to industry (Johnson 1982). Nevertheless, the ethnographic examination of the laboratories discussed in this thesis makes it clear that inside the clean technocratic plan of social robots as a solution to the ageing population there is friction and difference.

Meanwhile, disabled people, as consumers, also seem unique since many of their needs and many of the things they use are outside the experience of "mainstream" Japanese society. They depend on many specialized artifacts and competencies, and they are also conscious of many aspects of the environment that most mainstream people take for granted. We have seen how communication, mobility, and many other factors of Ato-san's day-to-day life depend on a distribution of tools, techniques, and competencies. When I talk with Ato-san, for example, he uses his body, my body, and other tools to communicate. Both he and I need a great deal of competency, which, in my case, was not always well developed. Further, he enlists helpers and others around him to assist. Likewise, when commuting to his home by train, a range of technological devices are deployed (elevators, ramps) while other actors such as train staff are also enlisted through communication and cooperation. Although the daily importance of such material culture and infrastructure may be almost invisible to "mainstream" people, corresponding to Miller's notion of the "humility of things" (Miller 1987: 85–108), it is less so for disabled people who feel hindered in various ways by their environment.

From an analytical perspective, my discussion of barrier-free life is, if not unique, quite different from early studies of consumption in anthropology because I stress the actual use of goods rather than their symbolic value. In this thesis, I have put the focus on the phenomenological and practical interaction of disabled people with the world. Such an approach contrasts in many ways with the classical approach to consumption. For example, Douglas and Isherwood (1979) see consumption as primarily a way to express and reinforces dominant cultural values and to maintain cultural systems of meaning. In their analysis, consumer goods act as conduits of communication in an information system. Likewise, Bourdieu (1984), in his more sociological analysis, argues that consumption, in the form of "taste", is a social marker of status. He shows how supposedly "individual" tastes are often reflective of social class. These studies focus on the meaning attached to objects in consumption. My argument echoes more recent work such as Shove et al. (2007: 50–51). They have challenged the notion that "all consumer goods signify social status or that they are always conduits of communication". Rather, they develop the "prosaic conclusion" that tools and technologies have practical and pragmatic functions and that goods are purchased to perform these functions (2007: 142). These objects are brought together in assemblies with other objects in order to complete certain tasks or "projects". While the “hybrid” nature of humans and non-humans is now well-established (Latour 1993), Shove et al. (2007: 57) develop this notion further by complicating the implicit one-to-one correspondence suggested in the hybrid image and note that people and objects are part of still wider complexes, whereby “competency” is a widely distributed attribute.

In the case of barrier-free tools, some people had, for example, electronic speaking devices that would generate sound based on textual input—but these high-tech solutions to the “problems” encountered in Ato-san's method of communication were not used on a day-to-day basis. In fact, only after specifically inquiring did I learn that some people were owners of such machines, because I never witnessed their use at the centre. Of course, this contrasts with other tools with a much tighter coupling between “having” and “doing”: wheelchairs for example. Wheelchairs are both owned and used often. In making a similar point for DIY, Shove et al. (2007: 21–34) emphasise the distinction (and relation) between “having” and “doing”. They note that consumption in the home entails a balance between these two. An imbalance between having and doing creates restlessness, and a feeling of not living up to expectations. In other words, it creates friction.

In analysing the connections in my ethnography of production and my ethnography of consumption, I argue that the “problems” proposed by robot designers are constructed in ways that lead to certain kinds of solutions; solutions that may not always work in the ways expected. For those roboticists, elderly people with dementia are the “problem” to be “fixed”. Likewise, these elderly people's use (or misuse) of technology can be construed as problems to be fixed in the user. As I have discussed in this thesis, this perspective contrasts with approaches developed by disability scholars and disability activists (who, in turn, have their own internal disagreements and friction). An advantage of examining both sites of both production and consumption has been to bring such difference in perspective to the fore. While roboticists and disabled people are connected in their interest to “solve” disability, their methods and even their understandings of the “problem” are much different.

Cycles of Production and Consumption

One question is whether the terms “production” and, perhaps especially, “consumption” are even appropriate for my analysis. Graeber (2011), for example, has recently pointed out that the latter term itself has become quite all encompassing. He asks why most activities that are not working for wages are automatically considered to be acts of consumption, and he suggests that this line of thinking itself signals certain prior theoretical and, importantly, political allegiances that dovetail with neoliberalism. He argues that many acts which are labelled “consumption” may also be considered to be “production”, broadly defined.

Graeber's critique invites us to ask: why is a DIY project, as discussed by Shove et al. (2007), an act of consumption rather than production? Shove et al. discuss this issue explicitly by drawing on Campbell's (2005) concept of “craft consumption”. The contrast, they claim, between craft production and craft consumption is “craft consumption is inextricable from mass production” (Shove et al. 2007: 42). This perspective more or less corresponds exactly to what Graeber (2011) suggests is the most common justification for classifying particular acts as “creative consumption” rather than as some kind of production: it entails the use of mass produced goods. But as he argues, this can lead to a *reductio absurdum* because almost any activity that anyone in the contemporary world partakes in involves mass produced goods of some sort or another.

Indeed, roboticists' “production” is one such example. They do not manufacture the keyboards, computers, sensors, monitors, or even the robots they use: does this make their work acts of “consumption”? And, if so, of what kind? But even aside from these questions of semantics, Shove et al's analysis of “craft consumption” in the context of DIY shares important similarities to my own analysis of robot production. For example, Shove et al. note that the purchase and ownership of a certain tool makes it more likely that future projects will be constructed to use that tool: “those who own an angle grinder – or who are confident in using one – are perhaps more likely to formulate projects in which a bit of grinding is involved. Similarly, those who have spare materials to hand often think about how they might be used. In other words, tools, materials and associated forms of competence frame the range of what people take to be possible. But they rarely drive the entire process of ‘project’ definition” (Shove et al. 2007: 60–61).

For roboticists, an available artifact, in particular a robot, makes projects that will use that robot more attractive and therefore more likely. As Shove et al. note, grand visions may play a part, but most often projects take form in a series of exigencies of everyday life. While the work of a roboticist is mandatory and the work of a DIYer is optional, their projects are similarly contingent. Typically roboticists' projects, while in some sense related to the grand visions of those senior leaders such as Professor Murakami and Professor Asada, evolve every day in the laboratory through a series of developments that are not scripted but rather exploratory.

As we have seen, the material practices of research frequently precede any representation of what the final robot might do or might be used for. We saw how in the course of ongoing problem-solving activity, new problems, new uses, and new solutions continue to multiply in many directions. In the network robot project, the technical need to have an operator (partially) control the robot led to new problems in efficiency (i.e. the waste of human time and labour) which in turn led to new solutions (such as multiple robot controllers). That solution then led to new kinds of “imaginary totalities” (Graeber 2001), such as the “nursing sweatshop” where many centrally managed operators control a diffuse array of spatially scattered robots taking care of even more spatially scattered elderly people. Such elaborately imagined uses were never considered at the outset: the image did not precede the product but rather derived as a potentiality, a side-effect, of technical problem-solving. In fact, as Ingold has pointed out, production must be more than the mechanical conversion of a pre-existing representation into a finished artifact, because it takes place in the course of life as an unfolding process, which is never linear (Ingold 2011: 14).

A further issue raised by Graeber's critique is the suitability of the term “consumption” *vis-à-vis* informants' own understandings of their practices. It is therefore crucial to note that disabled people's use of the services provided by personal attendants, “helpers”, has been self-consciously constructed as a matter of “consumption” by disability activists. While Graeber argues that the use of the term consumption aligns us with corporate interests as opposed to activist interests, in this context, disability activists pointedly use the language of “consumption” for their own politics. For certain members of the disability movement, it is crucial that disabled people are considered to be consumers because they are therefore entitled to the rights afforded a customer. The personal attendants are paid service providers; the disabled people are paying customers.

The stress on the “consumption” aspect is understood in contrast to other alternative methods for disabled care: assistance from volunteers and assistance from municipal-employed care workers. As these activists see it, the language of volunteerism has a major pitfall. Volunteers, by their very nature, are voluntary. The person chooses to help, and may choose to withdraw this help at any time. This leaves the disabled person, the person who needs assistance, in a precarious position. They are at the whim of people who may be gone tomorrow. If and when the volunteer does leave, the disabled person is left without necessary assistance in his or her daily life.

The political issue with municipal-employed care workers is again one of accountability but of a different type. According to activists, these kinds of care workers are primarily responsible to the bureaucracy rather than the disabled person they are assisting. In other words, their primary concern is often not the welfare of the disabled person. And the disabled person cannot hold them accountable. As such, many disabled people found municipal care-workers to be inflexible and difficult to work with.

But, as I have discussed, such “consumption” takes place in a complex of competencies, some of which seem to entail the kinds of production that Graeber highlights. In other words, rather than separated spheres, production and consumption are bound and assembled together in “cycles of production and consumption” (Lury 1996). Lury uses this term to highlight how acts of consumption are frequently also acts of further production (and we might add vice-versa). For example, while housework, such as purchasing food and goods for the family, may be often categorised as “consumption,” food, for example, is often processed, cooked, and displayed, making housework a further act of production for the family (Lury 1996: 2–3). The roboticists discussed in this thesis are “consumers” in their work just as disabled people are “producers”.

Still, the notion of “cycles” may sound free-flowing and easy. Cycles may bring to mind planets circling in the vacuum of space, or the consistent and uninterrupted cycles of a computer. Instead, consider the cycles of an actual wheel. Cycles encounter obstacles—friction—in the world. The cycling wheels of a wheelchair cannot go up steps. But, as Tsing (2005) has emphasized, friction is not simply an imperfect reality that is opposed to the perfect models of prescriptive theories. Friction is productive. A wheelchair cannot traverse up a frictionless surface, such as a slope made of ice. Friction is a requirement for traction. As Tsing emphasizes, friction makes connections possible. In the case of roboticists, the friction brought about by a “problem” allows the instantiation of any project they may envision. In a slightly different but related vein, the disability politics discussed in this thesis build upon a different understanding of the person or the subject. The subject is not the fully formed abstract individual, but the partial, incomplete, and disabled person caught between different forces.

Disability

Having discussed production and consumption, this section will turn to disability and review the notions of the "social model of disability" and "disabled identity" (put forward in the introduction) in light of my discussion of ILC in the main chapters of the thesis. We have seen that the "social model of disability" and "identity politics" are indeed employed by disability activists, such as Uchiyama-san, to structure the disability movement in Japan. While there is some tension because these ideas (even the terms themselves) are "imported" from the (implicitly culturally "alien") West, some members of the Japanese disability movement nevertheless make use of them quite explicitly. Still, the success of these ideas has been somewhat uneven. In particular, incorporating disability into an ethnic multiculturalism "frame" (Nakamura 2006: 7) works less well for constructing a disabled identity in Japan because ethnic multiculturalism is not politically valued (or even recognised) as it is in the United States, Canada, or the UK. As such, while the welfare model of disability, whereby extensive but segregated facilities are implemented, may be popularly supported (especially with concerns over an ageing population), the call for equality, an enforcement of the rights of non-mainstream disabled people as a political minority, has held less traction (Heyer 2000b). Narrated in this way, we play into the trope that Japan is "losing" to the West, and that Japan has to "catch up" to become fully "modern". As such, it is relevant (and also somewhat ironic) to point out that these concepts for understanding disability (the social model, identity politics) have recently come under some criticism from within disability studies for being, in a sense, too modern (implying associations with Enlightenment, disembodiment, the West, dualism, etc.). Analysts have questioned whether the ideas of the social model of disability and disabled identity really do justice to the actual lives of disabled people and/or act as sophisticated theoretical devices given contemporary thinking in post-structuralism and post-modernism. Still, these criticisms are often approached somewhat ambivalently in disability studies, because of the concern that the political critiques generated from the social model and disabled identity might lose their teeth. In concluding my look at disability, I want to suggest how my own analysis resembles some of these alternatives in certain ways and provide a brief example of how that analysis can incorporate critical insights from the medical/social models of disability.

Critiques of the Social Model and Identity Politics

Some of the criticisms against the social model include its failure to capture the embodied experiences of many disabled people in the world (Shakespeare 2010), its reliance on under-theorised notions of social construction (Dewsbury et al. 2004), and the general point that alternatives could better facilitate the understanding of impairment, the design of assistive technology, and the relationship between body and technology (Dewsbury et al. 2004; Galis 2011; Shakespeare 2010). Tom Shakespeare argues that the social model's simplicity has been both its strength and its weakness (Shakespeare 2010). It has been a strength because it is easily understood and communicated. But the model has trouble dealing with both the embodied nature of disabled people's lives, which are affected in a myriad of ways by impairments, and the inevitability of certain kinds of barriers. According to Shakespeare, the effects of these impairments cannot be reduced to social oppression alone and therefore the social model faces some rather serious difficulties in explaining and understanding disability. Likewise, Dewsbury et al. question the sociological and theoretical basis of the social model of disability, claiming that it amounts to an “anti-social model of disability” (Dewsbury et al. 2004).

They believe that the social model, using problematic theories of social construction, essentialises disability, while giving full explanatory power to the sociologists at the expense of “experts” (medical, psychological, etc.) who may actually be able to help disabled people in their everyday lives. In particular, Dewsbury et al. are concerned with the design implications of the social model, and believe that it must be re-thought in order to better facilitate the creation of effective assistive technology. They argue that an alternative approach could more fruitfully lead to collaboration between social scientists and designers, which would lead to improved technology that can support disabled people. Galis (2011) makes a somewhat similar criticism of the social model when he argues that disability studies could profit from an introduction of STS, in particular ANT. ANT, in Galis' view, helps to re-think the relationships between disabled people, technology, and their environment through the levelling of humans and non-humans. The agency of objects, as we have seen in Chapter 3, is an integral part of ANT analysis, and Galis believes that such terminology could be profitably employed by disability activists. Rather than reducing disability either to a medical impairment or a social construction, Galis claims that ANT offers a more complex ontology for examining processes in the world.

In addition to the social model, the reliance of disability activists (academic or otherwise) on identity politics has also been criticised. Lennard J. Davis, for example, calls for the “end of identity politics” (Davis 2010c). According to Davis, identity as a political category relies on “antiquated models” which do not acknowledge the insights of the “current intellectual moment” (Davis 2010c: 301). Davis narrates the history of identity politics as an intellectual progression through (numbered) waves. In the first wave, various movements—feminist, black, gay, and now disabled—turn negative stereotypes into positive reinforcement, building a new identity. Such stable identities come to be challenged by a second wave, a younger generation who have grown up with a firm sense of identity.

This second wave begins to question the essential and stable nature of that identity. Davis, in particular, highlights the work of Judith Butler[19] in critiquing earlier essentialized notions of gender found within feminism, and her emphasis on the multiplicity and constructed-ness of identity. Davis argues that such theories derive from postmodernity (and we might add post-structuralism), which increasingly destabilise “grand, unifying theories” and render “problematic desires to unify, to create wholes, to establish foundations” (Davis 2010c: 303). Rather than a coherent, whole, and stable disabled identity, Davis argues for a “dis-modern” turn, in which: “identity is not fixed but malleable,” “technology is not separate but part of the body,” “dependence, not individual independence, is the rule” and “there is no single clockmaker who made the uniform clock of the human body” (Davis 2010c: 311). According to Davis, such dis-modernism would signal new understandings of ethics, universalism, cosmopolitanism, and identity which would reflect “a global view of the world” but not a “return to Enlightenment values” (Davis 2010c: 311). Rather than “the idea of the complete, independent subject, endowed with rights,” the prototype for the dis-modernist subject is disabled and accepts that the completion of the citizen requires social creation through technology, law, and inter-personal dependence. For Davis, disability studies should not try to make disabled people fit into already dominant values of normality (by, for example, asserting independence), but rather seek to re-structure the fields of debate such that those values are called into question (by, for example, challenging the ideology of independence in the first place).

While the details of all these criticisms vary, a crucial commonality, as I noted above, is that they all share an almost apologetic tone for criticising the social model and/or disabled identity in the first place. Each of the above arguments dutifully points out that the target of their criticism has been

19 Davis identifies Butler as a second wave thinker, though it seems to me that Butler is usually categorised as part of a third wave of feminism. Either way, I do not think the numbering of the waves is that important to Davis' argument. Rather, it is the order and intellectual progression that he is concerned with.

invaluable for actual disability politics. Davis even notes that, when he discussed his thoughts about critiquing disabled identity with colleagues, “a prominent disability studies scholar advised me not to pursue this line of thinking. 'We're not ready to dissolve disability identity. We're just beginning to form it'” (Davis 2010c). Shakespeare, Dewsbury et al, Galis, and Davis all seem to agree that the social model and identity politics have political expediency, which makes them attractive and also makes any critique just a little bit perilous. Nevertheless, for theoretical or other reasons, these writers all believe critique is worth the political risk because they argue that getting the ideas right will help to build more effective politics in the long run.

The Social Model and Identity at ILC: Alternative Approaches

I share their concerns and I am sympathetic to their arguments, which also means I feel cautious in applying their critique to my own findings with disabled people. At the base of these critiques is the notion that neither the social model nor identity politics effectively captures the everyday lives of real disabled people. While, in some senses, this may be true for many disabled people, these are the exact concepts that (at least some) disabled people (such as Uchiyama-san) used to explain themselves. Still, the theoretical persuasiveness of these critiques should not be rejected out of hand just because it is not what people I worked with explicitly told me. Further, the importance of “the social model” and “identity” held comparatively little importance for “regular” members such as Ato-san and Fujita-san (who often had little idea what these concepts really mean), and I think some aspects offered in the alternatives above accord well with these people's lives and with their views on disability.

For example, at the core of Davis' critique of identity is the contrast between the modern subject, the enlightenment man (*sic*) with complete independence, and the dis-modern subject, the disabled person who is only “complete” with dependence on other persons, technology, law, and the environment. But, as we have seen, the concept of independence being implied here does not accurately describe the concept of independence as it is used by the independent living movement at ILC. While Uchiyama-san and others concede that mainstream Japanese may imagine independence as the full ability to feed, clothe, and bathe yourself without assistance, they explained that they interpret and define independence very differently ("ADL [Activities of Daily Living] is not independence"). In fact, their concept of independence seems to be completely at home with Davis' argument about the dis-modern subject. He may successfully challenge the terms used but I think not the practical reality that informs ILC's own ideas about identity, disability, independence, and so on.

Further, my own analysis of Ato-san's barrier-free lifestyle, which drew on the work of Ingold (2000, 2011) to stress his interconnection with an environment, is possibly compatible with some of the alternatives suggested above. Rather than place disability inside a body, cut off from the world (or in an ether of social construction), I discussed Ingold's theoretical point that body, environment, technique, tool, and technology are all bound together in the successful (or unsuccessful) application of skill. We have seen the importance of "embodiment" (of, for example, wheelchairs), which speaks to Shakespeare's suggestion. A stress on the relations between people and things in the world, resembles, for example, arguments in ANT, as championed by Galis. Of course, there are also differences. As we saw, Ingold has worked to separate his ideas from those deriving from ANT, through his questioning of both the idea of objects (which are bounded off from the world and therefore killed) and agency (which he says is like a magic dust sprinkled onto the now lifeless objects). While I tend to agree with Ingold, I have also argued that his criticism of ANT highlights the under-theorisation of barriers in Ingold's thinking since he counters Latour's agency of the speed bump (which is a barrier) with the example of a kite in the wind (which is not a barrier). Therefore, I have also critiqued some aspects of Ingold's framework that seem less suitable to understanding the lives of disabled people, such as a universalism of walking and a general disparaging of mechanisation (and smoothly paved surfaces), because these are problematic when applied to disabled people who make use of wheelchairs. Still, I have argued that, despite these limitations, Ingold's framework is helpful in furthering analysis.

Robots, Living, and (Im)mobility

Therefore, I want to conclude the discussion of theories of disability by drawing out Ingold's framework to examine a crucial aspect of the robots in the last chapter: the assumption of disabled people's inevitable immobility. Ingold does an excellent job of emphasising some of the ways that movement and mobility (crucial to human life) can be disrupted, even destroyed, by aspects of modern society such as mechanisation and technology. It is therefore instructive to note the way that prominent robots from the last chapter reinforces the *de facto* immobilisation of disabled people. In the real-world case of the SRD project, elderly people, ostensibly lonely, log on their home computers to communicate with others via video telephone over the internet (assisted by a small robot). Users remain physically inert, jacked into to some technological communication system, while the robot system reinforces that immobility in the very effort to make bodily movement less relevant. While the system potentially open up new avenues for re-imagining communication, these possibilities comes at the cost of resigning actual bodies (especially disabled bodies) to a stationary state. By incorporating insights from the social model, we can argue that immobility follows from a world designed for “normal” people, which necessarily excludes some others (i.e. disabled people). Immobility is therefore not natural or given, but rather the result of particular political and social relations. In contrast, the medical model of disability places disability in the individual where it is caused by some (poor) condition of the body. We can see the logic of the medical model in these two robots: the problem is not that the world is socially, physically and architecturally designed in such a way as to create immobility; rather the problem is that certain individuals are innately immobile and with that immobility comes despair, lack of communication, loneliness, etc. These robots therefore attempt to ameliorate these other problems while accepting immobility itself as inevitable. In making this observation, we may wish to take a step back and consider the counter-factual, consider how this premise could be any different. But, of course, the alternative would be to have projects that do not take immobility as a given, of which there could be any number.

Global Movement: "In" or "About" Japan

Nevertheless, the focus here is on social robot projects. And Japan is the country most heavily investing in social robot development. As the introduction described, the success of robots in Japan is often explained by a supposed "love" for robots found in Japanese culture, in particular pop culture and religion. Popular culture provides many examples of benign, helpful, and friendly robots, while aspects of religious culture, such as Shinto animism and Buddhism, fit much better with the notion of an animated artificial non-human than does the Christian beliefs dominant in the other developed countries of North America and Europe. In this section I will turn to the lingering question of whether, or to what extent, Japan's robots are "unique" and, further, to what extent this thesis is an analysis of Japan as such (both with respect to robot research and disability activism).

"Japanese Culture" for Robots: Essential?

We have seen how certain aspects of what we might call "Japanese culture" may have played a role, with the stress on humanoid robots with bodies (rather than disembodied AI) and with the stress on the specific idea of *kokoro*. All the robots discussed at any length in these chapters have been humanoid robots, and I have suggested that this is crucial for how those robots would fit into the "Dream". Rather than a meaningless encasing, the body of the robot is part of its "wrapping" which, especially in Japan, often gives meaning, through presentation, to what is inside (Hendry 1995). It is crucial that android Didymos looks like a real person. And it is crucial that the SRD takes the physical form of a cute teddy bear. As we have seen, this emphasis on "wrapping" is also adopted theoretically through the importance placed on embodiment and on appearance. Based on this perspective, such robots are designed with subtle but important behaviour, eye movements, head direction, posture, gesture. In other words, the robots very often focus on nonverbal communication, and in this way they may be very "Japanese".

Further, one particular "cultural" word has been recurring throughout the thesis: *kokoro*. *Kokoro* has appeared as the goal for a human-like robot that can think and feel. And *kokoro* has also been related to the way that the robot should interact with the world, for example in the *ma* ("interval") concept as it relates to the SRD robot. *Kokoro* was even the name of the company that built the Didymos android. It was also an important word for disability politics, where it was used to talk about prejudice, discrimination, and barriers.

Still, there is good reason to be wary of this particular word and, in particular, good reason to be wary of lending it too much interpretive power. Sonia Ryang has recently criticised the widespread explanatory power given to overarching generalisations for the Japanese psyche and self, including the word *kokoro* (Ryang 2004: 182–184). According to her, *kokoro* has been used by some—starting with Takeo Doi (1973), one of the pre-eminent Japanese psychoanalysts and also, arguably, a strong example of the culturally nationalist *nihonjinron* literature explained in the introduction—as a catch-all explanation for everything Japanese, a problematic position in light of the complex and multifarious nature of Japanese society. Within such “national character” studies, scholars have assumed that “the study of Japan was the study of 'the Japanese people',” a bias that tends to reinforce the hegemony of the homogeneous Japan image and ignored Japan's heavy interaction with others in the world (both inside its colonial empire as well as across the globe) (Graburn et al. 2008: 4). Further, as Ryang critiques Moeran specifically, she argues that the focus on language to explain culture can be misleading. My own concern here is that I am not sure there is too much value in collapsing the many meanings of *kokoro* into one because of the categorical differences between the name of a company that makes androids, the goal for a “Dream” robot, the source of political prejudice against disabled people, and the supposed site of Japanese uniqueness from outside others. Giving *kokoro* too much analytical power not only essentialises the Japanese, but essentialises the meaning of *kokoro* itself.

In fact, the problem of essentialism is an important one (as any anthropologist is well aware), but particularly for me because of the very obvious non-Japanese elements working alongside the Japanese in my fieldwork. At least at the laboratories where I conducted my fieldwork, it would be misleading to suggest that Japanese develop different kinds of robots from non-Japanese, since many of the researchers discussed in this ethnography are non-Japanese working in Japan. While it may be true that certain kinds of projects are more likely to receive funding in Japan (cute, social robots as opposed to, say, military robots in the USA or, possibly, “pragmatic” robots in Europe), the reality is that many of the people working on the “Japanese” robots are from America, Europe, and elsewhere. Professor Masuda, when I asked him about the supposed Japanese “love” of robots, made this point to me exactly. He said that while many people talk about religion and animism, in contrast to the Christian “fear” of robots, he sees many foreigners working in his lab doing the same things as the Japanese, and those foreigners do not seem to have any problems. Indeed, cute social robots are developed elsewhere in the world, such as Cynthia Breazel's *Kismet* at MIT (Breazeal & Scassellati 1999; Breazeal 1999, 2003).

These facts suggest that a simple dichotomy between the approach of Japanese roboticists and the approach of non-Japanese (or Western) roboticists is infeasible. And following from this point, the narrative that Japanese social robots are somehow different in kind than other robots is also suspect. This is not to suggest that differences do not exist, because clearly they do. But important differences exist not only between countries (or "cultures") but also between individual laboratories and even, as we have seen, between individual researchers. Laboratories in the United States make cute social robots, while some Japanese researchers told me that they did not see the point, or the need, to create humanoid robots with *kokoro*.

The (Japanese) Disability Movement

I mentioned that *kokoro* was also a recurring word in my fieldwork with disabled people, and I want to consider the "Japanese specificity" of that fieldwork as well. In some ways, the disability movement in Japan is very unique. In particular, the role of family and kinship is a point that ILC members continually came back to. Whether lamenting overbearing parents and a social policy that historically made them permanently dependent on family, or boasting of the special "Asian family values" that keep them supported and cared for throughout their life, family and kin is one way they defined their situation as distinctive from foreign countries (i.e. "the West"). But they also stressed how they learned from other countries, and the very history of CILs attests to global exchanges of people and ideas because such centres were originally developed in America and brought to Japan by activists. Having said that, rather than make this an issue of "from Japan" and "not from Japan", I think it better to try to rethink the terms we use. Independence, as a concept, is neither foreign nor domestic, neither imported nor home grown. Rather, independence is open for negotiation, argument, and dialogue between various ILC members as they sort out the messy business of building and maintaining their community. Ato-san has his own ideas of independence, quite unlike the one he perceives to be the official doctrine of the ILC, quite unlike the one we may get if we ask a "mainstream" Japanese person on the street, quite unlike the one that would be proffered by the Japanese state, and quite unlike the one we may (stereotypically) associate with "Western" modernity (although it should be understood in relation to all of these). Likewise, Uchiyama-san can borrow the language of the global disability movement as an activist tool, while also creating a tight-knit "family" at ILC that enjoys a jokey work environment and frequent social gatherings.

"About" Japan or "in" Japan

As such, the thesis has been ambiguous on whether it is "about" Japan or not. But, in building the idea of diversity into the analytical framework, I have tried to make this a problematical question from the start. The question of whether the thesis is "about" Japan very likely hinges on a bias, which in turn is based on hegemonic ideas of what constitutes "Japaneseness". This bias assumes some specific culture that can be essentialized and defined with a few principles, which in the anthropology of Japan, as I have noted above, can be traced back to post-war development in the wake of Ruth Benedict and the culture and personality school (Ryang 2004). While I have tried not to ignore "cultural particularities" as they may relate to Japan, even making an effort to spell them out (and arguably overdoing it in places), I have also not gone out of my way to ignore the actual field experience that includes many non-Japanese, as well as communication (in both English and Japanese) with global movements of research and activism. In constructing this thesis, one of my aims has been to challenge assumptions about what constitutes an ethnography "about" Japan. In this, I agree that "the importance of Others in Japan is that they problematize boundaries of what are 'Japan', 'Japanese society', and 'Japaneseness'" (Willis & Murphy-Shigematsu 2008: 314). The non-Japanese people I worked with in my fieldwork and the "foreign ideas" from abroad are nevertheless *de facto* parts of contemporary Japan and therefore are crucial for any discussions "about" Japan.

Final Thoughts

In the first paragraph of the thesis, I posed two questions. What exactly is a "problem" of the body? And what are the possible solutions to such problems? I want to now conclude by briefly examining these questions in light of my discussion of social robot researchers, disability activists, and the notion of problematization.

Through a discussion of robot research, I argued that researchers conceive of problems in certain ways that then make those problems amendable to certain kinds of technological solutions. This particular mode of reasoning has specific results when applied to the "problem" of disability. As one (Canadian) family member, an engineer, put it to me when I was discussing my research: "for engineers, disability is very simple; it's like, something like missing an arm, so the engineer will design a mechanical arm." We can see such prosthetic reasoning, the fixing of individual bodies, metaphorically throughout the thesis, but most literally in Mori's discussion of the Uncanny Valley (where the prosthesis acts as the "uncanny" to the full human hand). In such reasoning, a problem of the body is a disability, and that disability can be solved with technology, an engineering "cure".

In contrast to such individualised and bodily understandings of disability, we have seen that one of the core arguments from disability activists is that disability is socially generated and constructed. According to such reasoning, disability is therefore not a problem of the body, while any "solutions" to disability would be found in structural changes to society, politics, and policy. In a paper entitled *Solving the disability problem*, Shakespeare makes this point clearly when he states “the best way to solve the disability problem is for public policy to focus on reducing the impact of impairment, as well as reducing the barriers which exclude disabled people by empowerment through employment and independent living” (Shakespeare 2005: 48). Or, as Davis writes, “the 'problem' is not the person with disabilities: the problem is the way that normalcy is constructed to create the 'problem' of the disabled person” (Davis 2010b: 3).

Attention to this distinction, between social robot researchers and disability activists, addresses my two original questions because it turns the analysis towards the very different ways in which a problem (i.e. of the body, of disability) can come to be defined. In other words, it turns the analysis towards what we might call the “problem of problems”. In navigating through this “problem of problems”, I have suggested that Foucault's concept of problematization is one productive avenue (Foucault 1983, 1985, 1997). Through an examination of material practices of constructing problems that are then amendable to certain kinds of solutions, Foucault pursued, what he termed, a “history of thought”. The history of thought explores the conditions for potential solutions, the conditions in which an obstacle becomes an object of thought (i.e. a problem). In exploring such “thought” in this thesis, my aim has been to highlight the different conditions for solutions to particular problems, in particular problems of the body or problems of disability. For Foucault, such an exercise was a way towards freedom (in thought) because it opened up exploration to new possibilities. In presenting aspects of the “production” of social robots (for care specifically) and also the “consumption” of barrier-free and independent living, both of which are engaged in “cycles of production and consumption”, my contribution, I hope, is to have explored some of these possibilities.

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