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Automated Care

A Study of Companionship Between Human and Machine

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Abstract

By talking with people who work in eldercare as well as those involved in work on robotics, I look at how robotic seals are exceeding the traditional uses of automation. During a time of global population aging, technology is put forward as a tool to assist the healthcare sector. The design of health strategy plans in New Zealand suggests that the use of healthcare assistive technology will be useful in the coming years of increased aging and rising dementia cases, with robots being complementary to the establishment of a healthcare system that emphasizes self-management. Some of these machines perform practical tasks, while an emerging new field in robotics is using robots to partake in labor that involves social interaction. The use of robots for companionship is known to generate anxiety about the potential loss of human care. However, in contrast to technology that operates on capitalist principles of growth and progression, Paro, a robotic seal used in eldercare, is proving to contribute to a humanizing effect. I investigate how technology can operate on principles of care and companionship despite the impact of political and economic trends that influence the development and use of technology. With the significance of New Public Management in the welfare state of New Zealand, the use of Paro and other companion robots can be interpreted as a tool used to cut down on healthcare related expenses (for example substitute human carers). However, engaging ethnographically in this field of automated care reveals the use of robots for companionship is more complex than automation; it involves services of care and connection. By studying the introduction of this new species of companions I describe how the robots are positioned somewhere between the boundaries of machine and human in the epistemological view that dominates 'Western' discourse. An epistemological positioning that undermines the assemblage of care enjoyed by older generations with robotic friends.

Acknowledgements

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Introduction

[...] Neilson, 84, a mother of four and a former maternity nurse, doesn't know any other Māori[1] residents in the rest home, and few add their voices to hers. "I do feel lonely, so I generally come in my room and I sing my songs. I put the telly on and sing the music that comes over." So when it's her turn to have Paro, a fluffy robotic Canadian harp seal with large, fathomless eyes, she'll sing a song to him. In the living room of the rest home, she shows me how the robot responds. Deceptively complex and comfortingly heavy, Paro recognises words, and adapts his behaviour to everyone who holds him. He'll even squeal and squirm if you absent-mindedly hold him upside-down. Neilson knows just the right spots to scratch to make him wiggle happily. People aren't meant to kiss the seals, but the fur on his head is nevertheless streaked pink from someone else's lipstick. "He gives you hope," she says. "You're just sort of sitting here on your own, falling asleep, but if you have something like this you're inclined to talk, and he'll give you an answer." At this, Paro opens his eyes and bats his long lashes, and Neilson is delighted. "Look at those beautiful big eyes," she says, and he mewls back. "Aren't you pretty? My goodness. We'll have a hongi[2] now." She brings her nose to the seal's black-button one. "Oh, you don't want a hongi? Oh, you do! Come on then. Now, don't you flirt! You're a flirt, aren't you? Hey, are you doing the haka[3] or the hula[4]?" The seal has started to wriggle again. "If they were to talk back we'd get the shock of our lives," she says to me. "It's marvellous, really. They make lonely people happy. He makes me happy." She looks back down to Paro. "Would you like a cup of tea? Coffee? Milo?" But Paro has stopped purring and lies still, heavy on her lap like a fat, sleeping puppy. "Or would you like a beer?" The seal opens his eyes, flaps his tail, bobs his head at her, and squeals. "You prefer a beer! You do! Well, I can't get you a beer, even if we had a hongi." He is so good, she says, for people like her, who sit here and watch the time go by, (Arnold 2018)

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[1] Māori are the Polynesian indigenous people of New Zealand

[2] Traditional Māori greeting, where two people press their noses (and sometimes foreheads) together.

[3] The haka is a Māori ceremonial dance. It is performed as a group, where participants rhythmically shout, stomp their feet and pound their body with their hands.

[4] Polynesian traditional dance, developed in Hawaii.

Nielson, who was interviewed for the New Zealand Geographic article above, is one of the residents at a retirement village in New Zealand where you can interact with the robotic baby seal Paro developed by the Japanese industrial automation company AIST. The seal, a highly advanced robot that responds to external stimuli, has recently been purchased by several retirement villages in New Zealand as a therapeutic device to relieve residents of stress. Paro is designed to look like a fluffy white harp seal, although far from the size of a real life seal, Paro is only 57cm long, and weighs only 2,7 kilos (Institute of Electrical and Electronics Engineers n.d.)[5]. The baby seal's sensors make it able to respond to touch, sense light, detect the direction of sounds, recognize voices and even respond to its own name. Paro responds by moving its head, front and hind hind flippers, or by squealing similar to an actual seal. The robot is designed to resemble a living animal with heaters to create the illusion of body temperature and programming that makes the robot "sleepy" at night (PARO Robots USA n.d.).

Paro, and other sociable robots, are a part of a new direction to which we use technology. In this thesis I look at the use of robotic healthcare technology in retirement villages in New Zealand. A global trend of an increasing aging population is causing a disproportionate demographic where the older adults are over-represented compared to the working adult population. This will continue to put pressure on healthcare services. To deal with this increase, New Zealand's health strategy plan emphasizes the use of technology and robots in healthcare to help relieve pressure and a shift towards increased self-management in healthcare (Minister of Health 2016b; 2016a). As technology enters a global market of healthcare assistive tools, intelligent robots are developing *socially* to interact and care for humans. This development has caused mixed reactions with some people feeling anxious about the potential loss of human interaction (Turkle 2015a) and the loss of human identity (Richardson 2015).

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[5] Institute of Electrical and Electronics Engineers (IEEE) is a leading technological organization working towards technological advancements that benefit humanity.

Research Question

      With this research into the social uses of robots I look into some of the culturally specific attitudes towards robotics and investigate the influence of capitalist ideals of growth and production in the development and use of robots. The key questions I ask are: How are robots being established as social agents? And: How do assemblages of technological and human components contribute to the experience of care?

      I will be exploring the *multivocal*[6] identity of robots; in economics the robots are recognized as something that automates production and services, while in social interactions with humans the robots are establishing themselves as therapeutic creatures and even companions. The increase in the use of robots, perhaps especially those robots who are used for companionship, are increasingly a part of moral debate. I will look at how the responsibility of eldercare is shifted from families, to the state, and to the individual, while I investigate some of the motivations for using robots in healthcare from an economic perspective. Crucial to this debate is the presence of a global neoliberal trend of *New Public Management* within New Zealand's health strategy plan. While conversations from interviews with staff members, researchers, and a family member of a deceased resident provides alternative perspectives on the use of robots. Emphasized in these conversations is the potential of robots beyond capitalist production (automation for profit). In addition to the economic use-value of the robot, I emphasize the robot's potential as a social actor.

      When discussing the experience of care that Paro gives its users, the term *care* is used to refer to the documented physiological (decrease agitation and depression; Jøranson et al. 2015; decrease in blood-pressure; Robinson, MacDonald, and Broadbent 2015) and psychological (increased mood and engagement; Jøranson 2016) benefits users experience with Paro. However, I also use 'care' to refer to the positive abilities of robots as described to me in analogies by researchers, a family member of a resident, and Selwyn employees. The positive abilities of robots that are emphasized by participants are: to connect people intergenerationally, availability (enable care services around the clock), decrease agitation, and motivate social interaction.

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[6] Multivocal is a term to describe an item or person which carries several meanings and interpretations (Turner 1967).

Background

In New Zealand, District Health Boards (DHBs) fund care services for adults aged 65 years and older (including people who are close in age or interest, by for example having early onset dementia) (Gauld n.d.). The staff members I talked with during this research were recruited from one of the Selwyn Foundation retirement villages (Skyside) or activity center (Sunny House). The Selwyn Foundation operates with three levels of care services: independent living, residential care, and respite care. The Selwyn Foundation recommends independent living for those who want to keep their independence while still a part of the Selwyn community and with the safety of having staff and nurses available. Those who wish to live independently can choose from a number of villas, apartments and rental accommodation.The Selwyn Foundation suggests residential care for those with physical needs who require home care, hospital care, dementia day care, or secure dementia care. While respite care is for older adults recovering from operation or those whose family members or carers are away (for example on vacation) and want their loved ones to be looked after while they are gone[7]. The Selwyn villages all have their own design, but tend to have the same basic layout with one or two lounging areas, a dining area, an exercise room, a hair salon, and a small convenience shop. There are sometimes a cafe, a wellness center, and because the Selwyn Foundation is Christian church based there are in some of the villages a chapel available for religious practice.

A substantial part (approximately 52% (Alzheimers New Zealand 2017)[8]) of the residents who live in residential aged care in New Zealand have a degree of Alzheimer's or dementia. The symptoms of dementia include memory loss, lack of control over mood and emotion, and confusion (National Health Service 2018). Living with dementia can be demanding for the individual, friends, and family. Paro is used as a non-pharmacological tool that seeks to improve depression and agitation in people with dementia (Jøranson 2016). The use of Paro in eldercare closely resembles diversional therapy and the use of animals in therapy pet programs, both are therapeutic strategies used to help people who suffer from symptoms of dementia. The Centre for Automation and Robotic Engineering Science (CARES) had run a number of studies with robots in the Selwyn villages, with people living independently as well as dementia patients who require more support from carers. The

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[7] All information about the level of care offered at The Selwyn Foundation is found on their website: https://www.selwynfoundation.org.nz/villages/what-level-of-care-is-right-for-you/

[8] Data originally collected by interRAI, an organization assessing clinical data. InterRAI is mandatory in aged residential care, all District Health Boards in New Zealand use their services to assess the support needs of older adults in residential care (Alzheimers New Zealand 2017; InterRai n.d.).

research center is an interdisciplinary collective of students and researchers who develop and engineer robotics and technological tools. With their guidance and help I was able to get in contact with retirement villages still using the Paro robot in their facilities.

SARS-CoV-2

The presence of the SARS-CoV-2 (Covid-19) pandemic hugely impacted the methods and recruitment of this study. Although the pandemic had a big impact on the methods used during fieldwork, it does not feature as a major topic in this study.

Methods

The Field

I had originally planned to travel to New Zealand to visit one or more of Selwyn's Christian faith-based retirement villages. Some of the retirement villages had participated in previous research projects involving social robots, and had purchased several of their own Paro robots after they saw the positive effect it had on some of the older adults. The main part of the fieldwork, including participant observation, was to take place within a retirement village. Additional interviews would take place with participants from CARES. However, due to the COVID-19 pandemic I was stuck at home in Oslo, going on virtual tours of the retirement village. Traditionally, the methods of anthropology revolve around doing 'fieldwork' – the researcher travels to a physical location and submerges in the local culture, learns the local vernacular, studies local history – during the fieldwork, the researcher engages with participants through conversation and observation, also called 'participant observation' (Madden 2017). Due to the unforeseen changes to my own fieldwork, participant observation was no longer possible and interviews would be conducted online. I was inspired by travel restrictions to look towards digital anthropology for guidelines on this particular type of ethnographic research where the researcher does not travel to a physical location. Anthropologists such as Tom Boellstroff (2015) are influential in this field of anthropology, however, his domain lies in the study of online worlds, whereas my study does not originate online but is mediated through online platforms such as Zoom. I adapted to the idea of 'the field' as a network of flow or movement (Markham and Lindgren 2014),

analyzing policies and plans of management of healthcare (Health Strategy Plans), and technological development rather than analyzing my immediate surroundings in a geographical field. I adapted the length of time and the level of participation during fieldwork (Markham 2013) according to the level I was able to engage and interact with participants.

Recruitment

With the help of a contact at the CARES research center I was able to recruit three student researchers for interviews. The same contact assisted me in my conversations with the Selwyn retirement villages throughout the process of planning for the fieldwork. The contact got me in touch with a manager at the Selwyn Institute, who assisted me further in recruiting staff from the villages and activity centers by reaching out to staff to inform them about my study and urge possible participants to contact me.

In total I had four groups of possible participants: at the retirement village there were three: *residents* at the retirement village, *employees* at the retirement village and *family members* of the residents, and one group of *researchers* from the University of Auckland (UoA). From the retirement village and activity center, three current employees and one former employee – who was also a family member of a deceased resident – participated in interviews. While three researchers from UoA participated, for a total of seven participants combined. Names and other identifying information has been anonymized, including the name of the Selwyn institutions.

Due to the pandemic, the retirement village was continuously adapting to new Alert Levels lowering and increasing their extensive and strict restrictions which caused the retirement village representatives and employees to experience a demanding workload. Strict measures were in place to protect the vulnerable people residing in the retirement village, which put immense pressure on residential care workers as well as family members. In turn the situation left possible participants with little time and energy to take part in a study during these unprecedented and challenging times. These unforeseen challenges have taken a toll on the recruitment process. Recruiting people from the group of residents was particularly challenging because I was unable to communicate directly with possible participants in this group. Because I was not allowed entrance into New Zealand, recruitment of participants took place online using email. This form of communication was alienating for older adults who had little to no experience using online forms of communication. With online fieldwork, Anette Markham (2013) suggests that boundaries are more than the literal or physical

boundaries we encounter, in my case they were both: In addition to the literal border I was unable to cross due to travel restrictions, the online form of communication created boundaries of communication between me and possible participants who did not navigate independently online.

Tools for data collection

For this study I have collected data from seven in-depth interviews with employees, researchers, and a former employee and family member. These interviews were loosely structured around questions and topics, but progressed in the style of 'going with the flow'– relaxing the structure of the interview by encouraging participants to 'keep talking' and expand on topics they found interesting (Madden 2017). To encourage the flow of the conversation I asked follow up questions, and responded to participants statements with continued interest. I found this interview structure to be useful because the participants would remain on the topic of interest, but oftentimes they would talk about subjects that I had not even thought to ask that would prove to be very insightful. I have collected data pertaining to the participant's own experiences, opinions, and motivations for using or working with social robots. The seven interviews I completed took place using the online video conference service Zoom. Participants received a consent form and information sheet over email so that they could read through the information, sign, and send it back to me. Those unable to print and scan the documents, consented to participation on Zoom so that I could record the verbal consent. The online interviews were audio-recorded and later transcribed.

To supplement the data collected from the interviews I include secondary data where journalists or researchers have engaged in interviews with the group of participants that is missing in my own research; the elderly. Due to challenges in completing a 'traditional' fieldwork, these secondary sources provide observations and interactions that were not feasible for me to collect on my own account. The secondary sources will serve to fill the gap of data that has been created by a lack of participant observations. I further analyzed and interpreted the data collected from interviews and secondary sources in the context of broader deductive theories of anthropology (Madden 2017; Bernard 2018). I have used publications on the psychological and physical impact of interacting with healthcare robots, which legitimizes the use and need for Paro as a supplement in therapeutic treatment.

I also watched and analyzed videos of people interacting with robots. One participant sent me a video of a resident interacting with the robotic seal Paro, providing basic visual

evidence to exemplify interactions using the robotic seal. I also analyzed a video recording of a woman interacting with the virtual assistant Alexa as a part of the thesis. These video recordings were particularly useful for me because I was unable to complete participant observations of interactions with social robots. Tertiary sources, such as reference books and encyclopedias, are also used throughout the thesis.

My role in the field was a student researcher from the University of Oslo working in association with the Centre for Automation and Robotic Engineering Science at the University of Auckland. This role was legitimated by an approval from the ethical committee of the University of Auckland as well as an approval from the Norwegian Centre for Research Data (NSD). Data was saved using Google Suite as suggested and approved by the Norwegian Centre for Research Data (NSD).

Challenges and limitations

The fieldwork would provide a chance for me to engage in conversation *with* participants rather than creating a conversation strictly *about* participants. Needless to say, in the planning stages of the fieldwork I had decided that the best way to study the use of social robots in a retirement village would be to talk with the people who actually use the robots. As time progressed this would prove increasingly difficult to facilitate. The challenges of the fieldwork were primarily related to the global pandemic restricting access to the field. On March 19th, three weeks before my scheduled departure, New Zealand closed its borders to all non-resident entries. The fieldwork was delayed and months were spent waiting for things to calm down. Mid-summer, after about four months of waiting I decided to proceed with the fieldwork from home, using tools from digital anthropology. By October the border restrictions had been in place for seven months, surpassing the date I was scheduled to return from fieldwork.

By the time I had decided to start the fieldwork from home (late summer/fall of 2020), Auckland was experiencing a second wave of COVID-19, and was in the middle of an extensive lockdown. In addition to the ordinary lockdown restrictions, the retirement village needed to take extra precaution to protect their residents, an age group vulnerable to serious complications if infected. These circumstances made it an inconvenient time for a student-researcher at the opposite side of the world to execute a fieldwork study from afar. With the global pandemic interfering with my access to the field the traditional boundaries of what constitutes fieldwork were challenged. I approached these challenges of access by

looking for alternative ways to collect useful data; drawing inspiration from *The SAGE Handbook of Online Research Methods* (Lee, Fielding, and Blank 2017), I conducted online interviews, performed text analysis, examined videos, and interpreted health strategies and public management in New Zealand. I was incredibly lucky to receive the help and support I did from contacts in New Zealand who were able to help me broker the fieldwork on my behalf to possible participants. In my opinion the main limitation of the data material is the absence of primary data from participants who have themselves used social robots for therapeutic reasons. Instead the research is substantiated on the experiences of employees, researchers, and family members who have a different yet interesting and important perspective on the use of social robots for care.

The persons who use the social robot Paro for therapeutic reasons are primarily (but some places exclusively) persons who have a degree of dementia. This made recruiting from abroad a challenge because the cognitive state of possible participants from this pool challenged their ability to give informed consent, which meant that recruitment would involve guardians and power of attorney. The fact that I was abroad and all communication happened online complicated the matter, because our conversations had to be mediated by employees or family members. The process of recruiting residents turned out to be too complex; it involved a chain of people at a time when retirement villages and family members were overrun with pandemic related obstacles. In order to accommodate for some of the shortcomings in the data collection I have included secondary data describing interactions between seniors and social robots.

Theoretical Framework

Neoliberalism, New Public Management, and embedded systems

Machines are often discussed in association with capitalistic economic politics –
automation is a tool used to increase efficiency and profit. In order to explore how healthcare
robots such as 'Paro' fit into this picture I investigated the impact of New Public
Management, a political trend within Neoliberalism, on the specific retirement villages and
some of the government plans for healthcare and economy in New Zealand.

Neoliberalism is a recent economic trend inspired by liberal political theory.
Liberalism became popular during the era of enlightenment in the 1700s. The classic
liberalist ideology favored a free market, individual freedom, and capitalism (Ganti 2014).
Adam Smith (1817 [1776]) is one of the major contributors to this era, famous for concepts
such as the *invisible hand*, the idea that economic self interest would be of best interest to
society. *Laissez-faire* economics builds on the idea of an economy with little state
intervention.

The neoliberalist trend is often associated with the politics of Margaret Thatcher,
Ronald Reagan, and Augusto Pinochet, and economists Milton Friedman and Friedrich
Hayek (Thorsen 2021). New Public Management (NPM) is characterized as a wave of
policies popular during the 1980s. The policies focus on the modeling of the public sector in
the image of the private sector. The principles of management under NPM emphasizes the
administration of performance and goals and increased competition within the production of
public services (Hansen 2018). NPM has motivated the development of policies and
regulations that emphasize competition, efficiency, proficiency and growth which are
important to the neoliberal ideology. The definition of NPM comes down to characteristics,
which usually include privatization, tendering, efficiency, decentralization (Hood 1991) .
Outside of the US and Great Britain, the countries that saw the biggest impact of NPM on
policy formation in the public sector were Australia and New Zealand (Hansen 2018).

Economic historian Karl Polanyi criticized the liberalization of the economy even
before the emergence of neoliberalism in the 1980s. His critical take on the market economy
in the book *The Great Transformation* (2001 [1944]) provided us with economic theories that
would be relevant long after its publication. In the market economy anything can be made
into a commodity that can be bought and sold for a price, even labor and land. However,

Polanyi argues not all exchanges are on the grounds of maximizing profit – some exchanges are made to create and uphold social relations; reciprocity, redistribution, and kinship are known to regulate non-market economies. Polanyi argues that economic practices are *embedded* within social relations, meaning that the economy is integrated within the already existing networks of kinship, reciprocity etc. Along these lines *The Great Transformation* has been used to argue that the separation of the economy from society is flawed, as economy is integrated within society. Marcel Mauss (1990 [1925]) for example, describes how gift giving is largely subsumed in networks of reciprocity: by giving a gift, the receiver is invited into a reciprocal relationship with the gift giver. While Bronislaw Malinowski (Malinowski 2014 [1922]) described the kula ring in the Trobriand islands: a circulating economy that operated on extending social relations rather than maximizing profit. Analytically, this suggests that the market economy is not the only economy that exists, and that economic relationships are not necessarily steered by profit maximization. The concept of embeddedness, but also its opposite, disembeddedness will be used to show the integration of neoliberal ideals of growth and efficiency in technology. One of the administrative trends associated with NPM is the privatization or partial-privatization of core governmental institutions (Hood 1991). In New Zealand eldercare is a mix of both public and private services, residents who are eligible for government funding may apply for such funds. With the partial privatization of eldercare in New Zealand, welfare services are subject to market competition and profit maximization. Eldercare used to be a product of informal household labor where the family are the main caregivers, with institutionalized eldercare the responsibility of caregiving is shifted over to the government. One of the interpretations of the introduction of automated technology suggests that automation is a tool to increase profit and efficiency, which is also some of the worry with healthcare assistive technologies.

Epistemological disparity

The concept of ontology refers to the metaphysical study of *what* exists in the world, how people perceive reality and classify things as 'being' or 'existing' (Bøhn 2020). Epistemology refers to which tools humans can use to understand and interpret knowledge about the world. In Europe, North America, Australia, and New Zealand – a region that has been referred to as 'the West'[9] – there exists an epistemology that establishes boundaries between machines and humans. People oftentimes see the machines as ontologically different to humans, and the differences between the two are easily recognized. This perspective has similarities to the influential Cartesian binary organization (based on the philosophy of René Descartes), that establishes boundaries between the subject and the object (Shugg 1968). The subject is, according to Descartes, something that has the ability to *think*. Following his argument animals are therefore understood as objects. This perspective is criticized for using humans as the grounding point of which all other forms of existence are based on.

With the introduction of *social* robots the boundaries between machine and man are less obvious. Donna Haraway (2006 [1985]) uses the term *border war*, when addressing the difficulty in keeping up these imaginary borders between man and machine. In anthropology theories such as the ontological turn (Descola 2013; Strathern and MacCormack 1980), perspectivism (Viveiros de Castro 1998; 1996), Actor Network Theory (ANT) (Latour 1993), techno-animism (Allison 2006; Richardson 2016) provide alternatives to these boundaries. In ANT animals and objects are seen as agents within systems of network, which is a break with the traditional 'Western' centering of humans as the primary or only agents (humanism). In techno-animism, personhood is attributed not only to humans but also to certain objects and animals.

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[9] The 'West' is an outdated collective term for countries in Europe, North America, New Zealand, and Australia. Although the concept is controversial I continue to use the term simply because it is the easiest way to refer to the region in which the epistemological trend related to humanism is common. I continue to use apostrophes because the concept of the 'West' is disputed.

Chapter Overview

In the first chapter, I look at the growing pressure on healthcare as a result of the steadily increasing older population. The future of healthcare will likely require modifications in keeping up with the growing population of older adults, and technology could be a valuable asset in this upcoming project. The chapter will provide an overview of what a social robot *is* and how it can improve the life of someone suffering from symptoms of dementia. Most of this chapter is dedicated to contextualizing the field of study. I provide a description of some of the anxieties surrounding such robots, and explain how a negative portrayal of robots in pop-culture relates to the push against the introduction of robots in social spheres and care institutions. The ontological disparity between humans and robots begins to take shape towards the end of this chapter when I discuss automation anxiety.

In the second chapter, I look at some of the processes that have shaped the development of technology. I look back at some of the economic and societal changes over the last couple of hundred years that have been decisive in how automation and social robots are conceptualized today. Efficiency and automation are often put forward as the main agents that inspire the development and use of technology. With this in mind, I look at the power dynamics inherent in technological development establishing automation as a tool to maximize profit rather than contributing to care and wellbeing. I investigate some of the economic policies and guidelines that are in place in New Zealand today, and to what extent the use of robotics in healthcare is used to increase efficiency. Towards the end of the chapter I talk with staff members to understand Paro's role within eldercare.

In the third chapter, I look at how humans are adapting to interactions with robots. I discuss the *Robotic Moment*, a time period conceptualized by social scientist Sherry Turkle (Turkle 2015b; 2015a), described as a time when people accept the robots as companions. I discuss the normalization of robots in society, and how social interactions are affected with the introduction of machines. As technology enters our social spaces, humans adapt to new ways of interacting, both with technology and with one another. I write about how the increased use of technology has made (especially) the younger generations fluid in understanding and interacting with technology. In this chapter I will look closer at the nature/culture divide that provides an analogy for the separation between humans and machines, and how the robot challenges our ontological boundaries by existing outside of these categories

Chapter four discusses how social robots are designed to transcend the machine-identity. I will look at how the design of Paro has helped create an ambiguous identity or a tabula rasa (blank slate) enabling users to create their own idea of Paro. Moving beyond the imagined boundaries between humans and machines in chapter three, new hybrid conceptualizations of care emerge where technology is utilized as a social actor within our social spheres.

Chapter One – Contextualizing the Field

This first chapter lays out some of the basic structures of the field. Keeping in mind that 'the field' in my case is more than a geographical place – it is also the social and political reactions that deal with population changes and technological development. In order to contextualize the issues at hand, the first chapter is heavy with the distant voices of tertiary sources to explain what is happening in the field, before I introduce the more personal interactions I had face-to-screen-to-face. These topics are broad, covering everything from population aging and healthcare in New Zealand to sketching out what a robot is, the relationship between machines and industrial production, and how robots are used in healthcare.

The Aging Population

In New Zealand, the aging population is growing rapidly (Minister of Health 2013). This type of population growth in the older population is part of a global trend according to the report "World Population Aging 2017": "Projections indicate that the number of people aged 80 or over worldwide will increase more than threefold between 2017 and 2050, rising from 137 million to 425 million," (United Nations, Department of Economic and Social Affairs, and Population Division 2017).

The changing demographic affecting countries in Europe, East Asia, and North America is made up of three components, as described by the United Nations in the report "World Population Aging 2017" (2017), these are: fertility, mortality, and immigration. The mortality rate is affected by an increase in life expectancy due in part to improvement to medical technology and access to medical care (Cornwall and Davey 2004). In turn, the demographic changes will increase demand from local healthcare services with older adults being more prone to disease and illness. According to Justine Cornwall and Judith A Davey, "Older people are known to consume three to four times the amount of health care services than would be consistent with their share of the population,"(2004, 8) with a growing older population there is a correlating need for more healthcare assistance and a substantial increase in economic subsidies to cover such expenditure. Older adults over the age of 65 require more attention from health services, while those over the age of 80 depend increasingly on long-term institutionalized care (Cornwall and Davey 2004).

With the increasing number of older adults and the increase in life expectancy, we can expect a subsequent rise in the number of people living with dementia – the Dementia Economic Impact Report 2016 (2017) published by Alzheimers New Zealand and Deloitte estimates a 29% increase of people living with dementia in New Zealand from 2011 to 2016. Dementia is a condition that affects people's cognitive abilities with symptoms that include memory-and behavioral issues, it is also one of the main causes of dependency and disability worldwide among the older generation (World Health Organization 2020). The causes and cure for dementia are still largely unknown. However, some studies suggest certain lifestyle choices (diet, smoking, activity) earlier in life might be related to dementia development at a later stage in life (Di Marco et al. 2014; Simons et al. 2006). But for those who already have dementia, wellbeing is the main goal.

In this thesis, I look at the technological approach of using robots to achieve or maintain wellbeing for people of old age in retirement villages at a time with increasing demand. To accommodate for the high increase in older adults Geir Selbæk, the Head of Research at the National Competence Service for Aging and Health and Professor at the University of Oslo, emphasized the need to " [...] develop those resources and care models we have today, but also rethink how to provide good services to people with dementia in the future*"* (Hveem and Kirkevold 2020 (my translation)). In Japan, the demographic changes inflicted by the increasing older population prompted the development and incorporation of technological tools to relieve care workers of some of their most strenuous physical labor, freeing up valuable time and enabling Japan to keep avoiding the use of foreign labor (Robertson 2007, 391). Germany has started to look into the development of social robots in preparation for the increasing older population (Parks 2010). In New Zealand, there is also ongoing research into new therapeutic uses of robots in care institutions for people living with dementia. Because dementia affects the elder population, certain robots are developed specifically with people with dementia in mind. These new technological instruments can prove useful in nursing homes where a large number of the residents have dementia – as mentioned earlier approximately 52% (Alzheimers New Zealand 2017) of the residents who live in residential aged care in New Zealand have a degree of Alzheimer's or dementia, in Norway the numbers are as high as over 80% (Norwegian Institute of Public Health n.d.). The reach of this project's relevance goes beyond New Zealand because it discusses some of the consequences of an aging population and the role of technological development as part of the response.

Healthcare in a Welfare State

New Zealand is oftentimes described and classified as a *welfare state.* A term to describe a state where the government is largely responsible for the wellbeing of the people, usually a welfare state will have "[…] public programmes chiefly in the areas of income maintenance, health, education, training, social welfare services and housing" (Anne Marguerite de Bruin 1997, 11). As a part of her PhD, economist Anne Marguerite de Bruin published a thesis on the changes to the Welfare State in New Zealand. The use of the term 'welfare state' became popularized in Britain, according to de Bruin (1997), after the Second World War (1997, 10).

In New Zealand, the welfare state can be traced by looking at the introduction of state funded social and economic policies, such as the Social Security Act of 1938, ensuring government-funded unemployment insurance (A. H. McLintock, George James Brocklehurst, and Taonga 1966). A wave of privatization of parts of the public sector in the 1980s altered the welfare state, and due to the changed nature of the state de Bruin argues in favor of relabeling the New Zealand state as a 'well-being-enabling-state' rather than a welfare state.

> The economic and social reforms that have taken place in New Zealand since 1984, have been designed to radically shift the welfare mix much further in favour of the private sector. (de Bruin 1997, 81)

De Bruin points to the some of the qualities of the New Zealand state that help determines it as a well-being enabling state:

> Targeted provision of subsidised public services and part-user charges, income support at a reduced level and with tightened eligibility rules and a minimalist tax system to act as an incentive to work and production, are all features of New Zealand's well-being enabling state. (de Bruin 1997, 81)

The privatization of public institutions can be observed in the workplace as cutting down on staff members and hours, imposing routines that improve efficiency, or it can mean a restructuring of funding of public services; healthcare services previously funded directly by the government might instead tender the services so that private companies provide the same services on a contract for the government.

Today, healthcare in New Zealand is a mixture of private and government-funded services. Instead of directly government-funded retirement villages, eligible seniors can apply for economic support (residential care subsidies or residential care loans) from the government, or they can pay for care services privately (Seniorline n.d.). Eligibility for economic support is determined by the ranking of their financial abilities. De Bruin argues the goal of a well-being enabling state is "[...] to ensure private provision of welfare through labor market participation in a deregulated labor market, rather than through direct state provision," (1997, 88) which is the case in New Zealand where the government is encouraging welfare provision through private institutions. The retirement villages included in this research are faith based, not-for-profit private companies.

In New Zealand, the district health boards (DBHs) fund residential care services for people aged 65 and over including people 'close to age and interest' – for example someone with early onset dementia (Gauld n.d.; Minister of Health NZ 2020). The DHBs contract to rest homes and hospital owners who provide the services to residents who are eligible for funding (Minister of Health NZ 2020). The welfare services of long-term care are provided for by residential facilities that are mainly private (Gauld n.d.). The DHBs assess the needs of the individual to determine the level of care they require. After the needs assessment the person can do a financial needs assessment to evaluate their assets and income which will determine if they qualify for Government funding (Minister of Health NZ 2020).
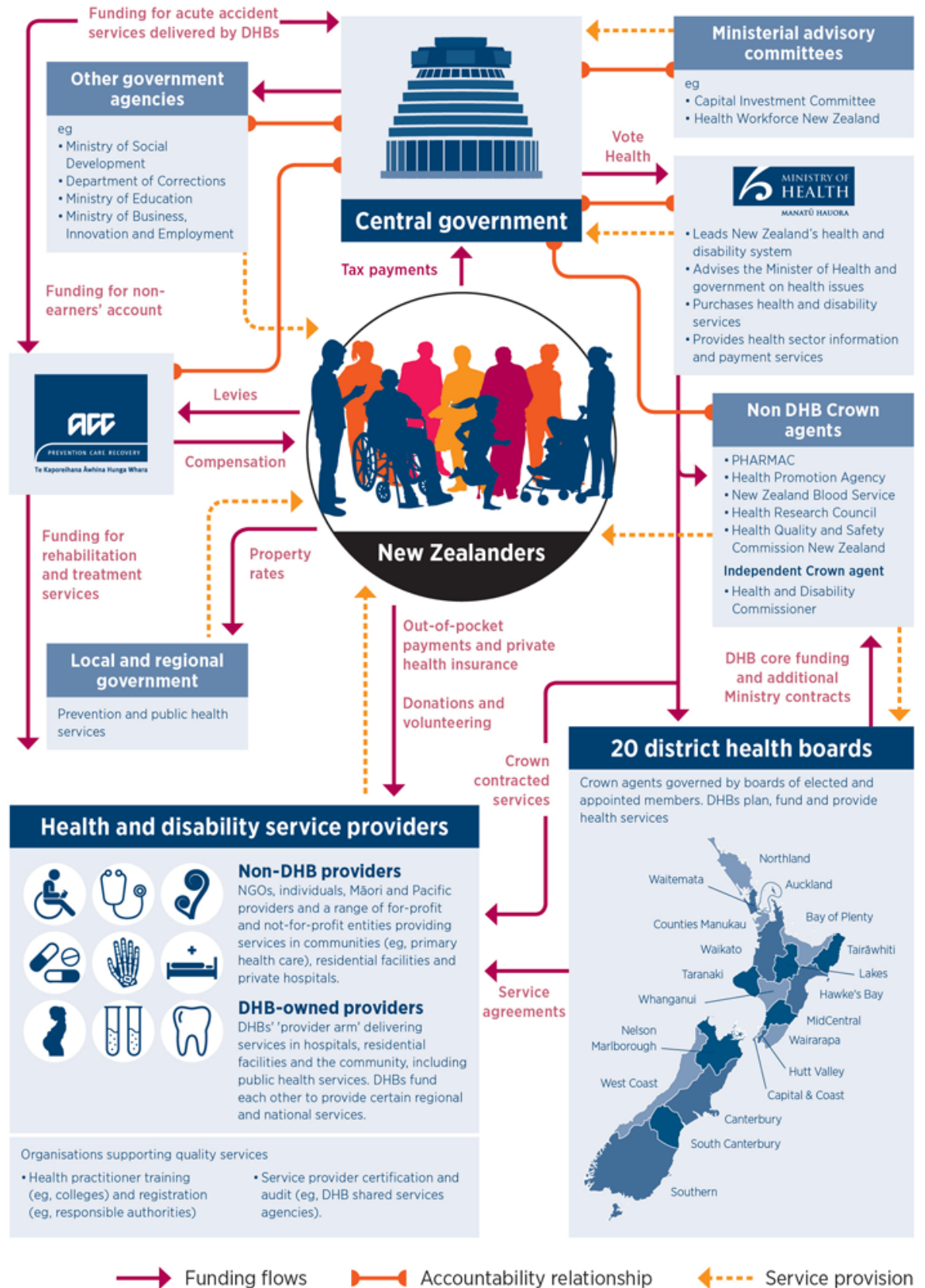
The illustration "Overview of the New Zealand health and disability system" is from the New Zealand Health Strategy: Future Direction (Minister of Health 2016c)

By opening up for competition between public and private healthcare services, the quality of the service is thought to improve (Hansen 2018). Whether or not this is actually the case is disputed due to the difficulty of pinning down exactly what 'quality' entails. Yet, for many people, independent living is prefered over living in a retirement village – particularly for people who value their independence which many New Zealanders do, Lisa, a former employee with the Selwyn Institution told me.

> Living independently at home is really important to a lot of people, and a lot of people would not want to live in a retirement village, and they definitely wouldn't want to live in a rest home. Because rest homes are becoming seen as a place where you go to die. I mean this is just my personal opinion, it comes from experience with my own partner's parents, who want to live at home until they are unable to do so. (Lisa, former employee at Selwyn).

Within New Zealand there are also cultural differences in how people care for their elders. A European Kiwi[10] like herself will usually live separately from one another within the family. This is called a nuclear family model, where parents live with their children while the extended family like aunts and grandparents will live separately (Schneider 1984). The Māori and pacific islander population, Lisa tells me, have the *Whānau*, which can be translated to mean something similar to family or extended family (however it includes physical, emotional, and spiritual dimensions (Walker 2017)). Traditionally in the Whānau-based system, older people are living very close to family members differing from the nuclear family which does not usually include a lot of intergenerational connection (Walker 2017). How many Pacific Islanders live with the Whānau today is unclear. The demographic in New Zealand is also influenced by a wave of immigration of people from Asia (Capie 2012). New Zealand is made up of citizens with diverse ethnic backgrounds and their practices of eldercare may differ according to cultural preferences. I am looking at eldercare provided for in retirement villages and activity centers, where the demographic profile is underrepresented by Maori and Pacific islander residents (Kiata, Kerse, and Dixon 2005). As I will describe further in the thesis, the cultural background of the people who interact with robots might influence their attitudes towards them.

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[10] Kiwi is a term for a New Zealander

Robots and the Market Economy

The term robot first appeared in Karel Čapek's 1921 play *Rossum's Universal Robots* (R.U.R.) Deriving from the Czech word "robota" which has been interpreted to mean 'forced labor' or 'an obligated worker' (Richardson 2015, 25). In the play, the robot is made out of biological matter and it closely resembles a human. But the use of the word robot does not only refer to the machine – it can also come to mean an overworked human-laborer constrained to demanding and repetitive work. The play was written at a time during the early 20th century when the assembly line production style was becoming popular in factories. Similar to real life turn of events, the robots in the play were introduced in factories to increase production and maximize profit, they did not need to be paid wages and they could free humans from some of the more difficult or repetitive tasks. Although the plot of R.U.R. unfolded with a dystopian message, the introduction of robots made it possible to imagine a separation of labor and humans, allowing people to free themselves from the burden of working and to use their time on more meaningful activities.

Anthropologist Marshall Sahlins suggests that the unity of man and labor is not so much a human fact, but rather an issue specific to the Western discourse under the influence of capitalism (Sahlins 2006 [1967]). Hunter-gatherer societies are frequently misrepresented as being marked by poverty as a result of this ethnocentric capitalist worldview. Sahlins argues that people like the !Kung who practice a lifestyle of subsistence rather than accumulation, value freedom higher than material goods. In the case of !Kung, they live a nomadic life, and therefore possessions are cumbersome because it hinders free range of motion. Analytically, this suggests that the relationship between labor and profit maximization is not universal, some people relate to labor in terms of subsistence rather than profit.

Editor of *Take Back Your Time* and founder of the Take Back Your Time Day movement, John De Graaf, argues that after the Second World War the American people made a seemingly collective decision to prioritize money over time. Ever since, this valuation has caused a steady increase in the working hours of Americans, making the people overworked and at a loss of time. The idea of using technology in order for people to spend less of their time laboring is therefore especially appealing in the US where generation after generation people are seeing less leisure time compared to European workers (Graaf 2003).

Back in the late 1960s, I studied sociology. I remember distinctly some of the class discussions we had then. We were told that American society would be facing a serious social problem by the end of the twentieth century. That problem was *leisure time!* With all our advances in labor saving technology, with automation and "cybernation," we'd be working less than 20 hours a week by the year 2000. Just what would we do with all that leisure time? (Graaf 2003, ix)

Strangely enough the technological developments exceeded all expectations, yet they have not been so 'labor saving' after all? I discuss the use of automation and the substitution of human labor further in chapter two.

The Modern Robot

The robot is no longer simply a figure of speech or a metaphor for automation and industrialism, they have become real-life autonomous machines. Many are familiar with robots from movies and tv, but the real-life robots are not as lifelike as often portrayed on the screen. Some robots are designed to resemble human shapes for example with two feet and arms, these are called *humanoids* – the male-gendered version of the humanoid is an *android* and the female-gendered version is a *gynoid* (Robertson 2007, 5). The robots that are made to look human might have silicone skin, while robots designed to look like animals often have some kind of fur coating. Robots designed with practicality and accessibility in mind tend to have a more machine-like aesthetic, as seen with the common household robots that clean and vacuum floors. People prefer to interact with fluffy and 'cute' robots for companionship – while they prefer robots that do more practical tasks, like set reminders, to look more like a machine (Broadbent et al. 2009). The design of the robot helps establish the identity of the robot (this will be covered in chapter four), having a vacuum cleaner with silicone skin buzzing around would no doubt scare off even your most eccentric friends.

Robots designed with the purpose of interacting with humans are considered to be *social* robots (Richardson 2015). Researcher with CARES and Professor in Health Psychology at the University of Auckland, Elizabeth Broadbent, (2017) explains how social robots can operate as a companion or a helper. This type of robot can be used to improve mood and wellbeing. As of yet, older adults in healthcare and children with autism are some of the main groups of people that use sociable robots (Broadbent 2017). Machine learning, speech development, and other technological achievements developed under the category of

Artificial Intelligence (AI) are key when creating a social robot that can be used for interactions. With AI, robots can simulate intelligence and can respond and adapt to different situations or interactions. To measure Artificial Intelligence Alan Turing famously created the imitation game, a test to see if a machine could be mistaken for a human. However, social intelligence is difficult for a machine to learn – it usually develops naturally in humans as we grow up, making it easy to forget just how complex social interaction really is. Just a small change in the amount of eye contact, tone of voice, facial expressions, and choice of words can profoundly alter the meaning of a sentence, something a robot will not pick up on easily.

In 1966, 16 years after the Turing test, the first computer program to be used for care purposes entered the stage. The chatbot program, named ELIZA, was created at the MIT Artificial Intelligence Laboratory and written by Joseph Weizenbaum (Richardson 2015). The chatbot, made to resemble a basic psychosocial therapist, follows a script and will respond to messages with text that makes it seem as if it understands what is being said ("Eliza, a Chatbot Therapist" n.d.). Out of interest I looked up some websites that had an Eliza-equivalent chatbot to test it out for myself. I was presented with a chat box with a header that said 'talk to Eliza', underneath appeared a message from Eliza:

> Hello, I am Eliza.

Feeling a bit awkward starting a conversation with a chatbot I wrote back what I figured would be the polite response:

* Hi Eliza, I am Marie
To which Eliza said:
> How long have you been Marie?

Eliza's response could indicate that the program is not up to date on the linguistic changes that have happened over the years. Being a product of the 60s Eliza might expect someone to say 'My name is Marie' and not simply 'I am Marie'. With today's standards you might have to suspend your disbelief a little, to maintain the illusion of talking to an actual person.

Since Eliza, computer programs and AI have advanced drastically. Robots that behave socially are being engineered imitating some of the behaviors used by humans when they interact with each other, which has propelled the user experience of the social robot. Sadie, a

student researcher I talked with from the University of Auckland's research center CARES, was studying how different social behaviors displayed by robots during interaction would influence how people experienced the interactions with the robot. In the different studies they looked at behaviors like having the robot lean slightly forward when people interacted with it, they looked at the different tone of voice, using the name of the person that was interacting with the robot, using humor in the interactions, and having the robot disclose information about itself. Most of these added social behaviors were well received, Sadie told me, and most people liked the robot more with some of these added behaviors.

Interestingly, being the social creatures that we are, many of us adapt our own social behavior to become more compatible with technology. As we are becoming more used to the presence of technology, we are also becoming more fluent in our interactions with technology. We adapt our own social behavior to communicate more efficiently with machines. For example, when using Google's voice activated virtual assistant Alexa, it is not uncommon to phrase questions in a different linguistic format than one would in interactions with people. If I was asking a person where the closest station for Covid-19 testing was, I would say something like "Hey, I was wondering if you could please direct me to the closest Covid test station in this area?". However, when asking Alexa the same question, you would have to follow a certain type of recipe for conversation. To let Alexa know that someone is addressing her you start the question with the command "Alexa," and then begin asking the question while skipping some of the formalities and using only the necessary words to enhance your chances of getting the best match of an answer on the first try. For example, changing from 'this area' to 'Hasle' in case location is disabled on Alexa. The instruction for Alexa might end up shortened down to "Covid test-station Hasle", similar I assume, to how people would look things up in the yellow pages.

In my own experience this change in linguistic format is similar to how certain native phrases and expressions are purposely changed in interactions with people who are not fluent speakers of a language. This type of behavior where a person is changing the way they speak depending on who or what they are talking to is by linguistics called *code-switching,* and is described as a situational modifying of language or dialect so as to adapt to different contexts (Morrison n.d.).

Dewi, one of the students from the CARES team who had been a part of the research center's studies, told me about his experience with older participants who had never used a computer before. The robot they used in this study would stay in the homes of the participants and set daily reminders of appointments or visits from family members. Despite

their lack of experience with this advanced form of technology a lot of them ended up seeing the robot as a companion. Although the participants in the studies had been hesitant about using the robot, Dewi told me that they got used to it towards the end of the week, and would even enjoy its company.

> "In the future", Dewi suggested, "I think it will be more widely accepted. Some of the participants actually said that at the moment it would be hard to implement them widely just because a lot of older adults don't have that digital literacy and they just feel uncomfortable about using technology including robots, but they also said that in ten-twenty years time when the middle aged people now come into the retirement villages, they will be open to using them because they would have used other technology when they were younger so it will be more fluent for them." (Dewi, student)

In chapter three, I will talk more about how humans are adapting to technology in social interactions. Technology has become integral to our societies on a global scale, yet many projects involving robots and AI are still in the early stages of development. In recent years, computer scientists have pushed their way into new frontiers in the field of robotics, with AI systems like Waymo (Google's self-driving cars) and Google DeepMind's AlphaZero (a chess-playing computer program). By reaching into new terrain, AI has forced people to reconsider the imagined borders of what machines can and cannot do.

For years, Japan has been exploring new ways of utilizing robots, and have been one of the leading countries in developing robots for commercial use. Because they have already progressed so far in the field of robotics it makes sense to look to Japan to get an idea of what the future of robotics might look like for the rest of the world.

Japan has gotten international coverage on several different robots. Among those, a giant robotic bear used in healthcare assisting nurses or doctors in lifting immobile patients thus alleviating some of the most physically straining tasks (RIKEN 2015). Two other famous robots are Pepper and NAO, both created by the Japanese telecommunications company SoftBank. According to the company, the robots can be used for social interactions as greeters, service providers, and sales associates (SoftBank Robotics n.d.) . In healthcare, robots can be applicable in the home of users to provide simple services like reminding the user to take their medication (Broadbent 2017). Elizabeth Broadbent has written about the impact of two humanoid robots during her trial studies:

Two robots, iRobi and Cafero, were used to remind people to take their medications, take blood pressure measurements and pulse oximetry, and provide entertainment and cognitive stimulation. People reported talking to the robot and rubbing its head, feeling not as alone when it was in the house, and missing the robot when it was gone. There were preliminary indications that these healthcare robots could reduce healthcare visits. (Broadbent 2017, 631)

Although these two robots were not intended for companionship, Broadbent and her team found that people still developed a connection with the robots who had stayed in the participants' homes for 6 weeks or more. Suggesting that robots who are not developed with companionship in mind, are also able to connect with people on an emotional level.

Offering a wide range of services, the limit of possibility in the use of robots is constantly pushed. One of the fields that have previously been considered incompatible with the use of robots is that of care and companionship. Yet both Pepper and NAO as well as the seal robot Paro, invented by Dr. Takanori Shibata, engage with humans emotionally. Paro is used specifically to connect with people, while the humanoid robot Pepper recognizes emotion in humans and can respond accordingly.

There are also companies that have specialized in creating a different kind of companion robot that is used for sex. These sex robots are, from what I have seen online, primarily advertised for heterosexual men. The sex robots advertised for on the website of the company 'Robot Companion' show a very specific type of aesthetic. The selection of 'Artificially Intelligent Humanoid Sex Robot Companion' is entirely female, 156cm-169cm tall, their skin is pale, and all but one of the twenty-five robots advertised have enormous breasts. Companionship is a new field of usability in the field of robotics and it introduces us to a new set of ethical challenges. Just from browsing the Robot Companion website I picked up on some of the potentially damaging ideas promoted by the company: "The real humanoid AI Robot Sex Doll will never say NO to your fantasies and will never dare to accuse you of sexual harassment". This type of promoted behavior with a doll that looks like a real person is disturbing as it fetishizes the harassment and abuse of women.

With Paro and the type of companion robots that are used for eldercare, the main concern is that the robot will replace human to human interaction. During this thesis, I draw attention to some of the new challenges that arise out of using robots for companionship, but I also present a more hopeful perspective of a future that combines technology and care.

Building on Animal Therapy

One of the people who saw the benefits of interactions with non-humans (or dogs to be precise) was Sigmund Freud, who frequently brought his dog to psychotherapy sessions (Coren 2013), convinced that the Chow Chow had a positive therapeutic effect on himself as well as his clients.

The benefits of animal therapy in eldercare likely helped inspire the development of Paro, who operates on very similar principles. Animals, usually dogs or cats, are brought in to improve the mood of residents and they have become a popular attraction at the Selwyn retirement villages as well. Live animals however, require a lot of attention and maintenance compared to a robot like Paro which is simply turned off when not in use. While the dogs used in Selwyn's therapy pet program visit once every other week, Paro the robotic seal is available for cuddles and companionship at any time. The robotic seal has not replaced the animal therapy program, but rather it has become an extension of the already established care services offered at the retirement villages.

Dewi had not worked on projects with Paro himself but he was familiar with how Paro was used in groups at one of the retirement villages. It was early in the morning in Auckland and late at night in Oslo as he described over Zoom what these interactions look like, "It was like a group based therapy session," he said and continued:

> They had a group of older people in the same room and they brought Paro in and they could all interact with it and sort of pass it around. For them it's almost like doing animal therapy, you have a group of people and you bring a little dog and everybody gets to cuddle the dog and they sort of pass it along and everybody gets a chance to talk to it and interact with it, and then they sort of take it out again. So Paro was similar in that context, where instead of having a dog they brought in the seal and people patted it so most of them were sitting and putting it on their laps, and then they'd interact with it. Paro is quite interactive as well, he[11] can move, he can make noises, he can tell you if he's uncomfortable, so if you're holding him upside down he does this annoying little squealing sound to let you know that he doesn't like being upside down, and he's warm as well. So a lot of people don't really think about the fact that he's a robot, it's not that you're deceiving people, it's just that he just feels so

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[11] Participants talk about the Paro robot using different pronouns. Occasionally throughout the text I mirror the pronouns participants used to address the robot. Sometimes Paro is a he, she or an it.

animal-like that you sort of forget. At the start you're like 'that's kind of weird, a seal. it's obviously a robot' but then when you start holding him you have this feeling of warmth and I think a lot of the residents have that as well, when they pet it they forget it's a robot, they just feel warm and cuddly and really enjoy it. (Dewi, student)

Paro is used in group settings where he is passed around between residents, but he is also frequently used in individual settings where a resident can sit down with Paro together with family, friends, or staff. Unlike a therapy dog, Paro can be used for long amounts of time without tiring and can be sought out more frequently than the visiting pets. The responses and outputs of the robotic seal are reliable and consistent, it would never scratch or bite a resident even if the resident should strike it. A study published by Takanori Shibata et al, suggested the positive effects of interacting with Paro made him a candidate for substituting the use of real animals in animal therapy (2009).

Because the use of robots in healthcare is still such a recent development, studies done to map the perception of these robots are still in the early stages. Yet there are a number of studies that provide descriptions of the physical and psychological effects of Paro as well as other social robots. One meta-analysis found that social robots can ease agitation and anxiety in older adults (Pu et al. 2019), while a systematic review of qualitative and quantitative research showed that 'Robopets' (Paro, AIBO, NeCoRO) improve loneliness and depression (Abbott et al. 2019). Paro is shown to lower participants' blood pressure, similar to live animals (Robinson, MacDonald, and Broadbent 2015). In 'Attitudes and Reactions to a Healthcare Robot' (Broadbent et al. 2010, 608), 57 participants over the age of 40 were recruited from local general practitioner and gerontology group lists to examine their attitude towards healthcare robots. Among other things, participants listed speed, accuracy, availability, perseverance, and privacy (avoiding undesirable contact) as some of the benefits of using social robots. While a 2017 study found that homecare robots could provide therapeutic benefits to those who were mildly cognitively impaired (Darragh et al. 2017). These studies are significant for people with Alzheimer's disease, the most common form of dementia. Progression from mild cognitive impairment to Alzheimer's disease is associated with depression and agitation, and because there is no cure for this disease it is important to use the tools available that will ease agitation and help improve the mood and wellbeing of those who suffer these symptoms. In this section I have pointed to some of the benefits associated with the use of robotics in healthcare, yet still, many people still experience a feeling of anxiety towards robots.

Automation Anxiety

Some of the researchers I talked with from the CARES research center described how they experienced a distrust in robotics from their own participants. In one of the studies at the CARES research center, they looked at the use of a robot that would stay in the home of older adults. The robot would perform simple tasks like remind them of their appointments and daily schedule, but also contact emergency services if it detected a fall and someone needed assistance. Sadie, who was doing her PhD in psychological medicine at the time, described to me how she would go to the participants' home and set up the robot while explaining how to interact with the robot. Sadie noted that the older adults who participated in the study would tend to ask questions that she was not used to hearing from younger participants.

They would say things like 'Where does the robot go when you're sleeping?' and I would say 'Oh, um. Well, it would charge so it would probably just stand in the corner and charge.' and they're like 'Well what corner?' and I'd say 'Well, whatever corner you wanted it to go to' and they're like 'But what if it started moving around in the middle of the night?' and I'd say to them 'it would only do that if you wanted it to because you program it that way. (Sadie, student)

The older adults seemed anxious about the prospect of the robot suddenly developing a will of its own, acting in a way it was not supposed to. Sadie continued to tell me about some of the questions her participants would ask her:

"'What if it comes into the room while you're asleep?' and 'What if you wake up and it's just standing there?', so they were quite nervous about what it would be doing when you weren't aware. Which is giving [the robots] a lot more credit than what they're actually capable of" Sadie said and chuckled at the idea.

Anthropologist and Professor of Ethics of Culture of Robots and AI, Kathleen Richardson (2015), suggested the negative and dystopic portrayal of robots in popular culture and media has impacted how people perceive robots. A negative perception of robots could in turn shape people's attitudes towards real life robots. The negative portrayal of robots generated by movies, tv-shows, and books has created a cultural echo chamber inspiring

distrust of robotics. In the TV series (2004-2009) *Battlestar Galactica*, Cylon robots are at war with the human species, seeking human annihilation. While the movies *2001: A Space Odyssey* and *I, Robot* depict the fatal consequences of a wayward robot/computer. While Frank Herbert's *Dune* book series introduces a universe where intelligent machines are forbidden as a result of years of war between humans and machines, in the book series the fear of intelligent machines is reflected in their biblical commandment "Thou shalt not make a machine in the likeness of a human mind".

This commandment from *Dune* might have been inspired by the 'Three Laws of Robotics' published in the science fiction novel *Runaround* by Isaac Asimov (1942). The laws invented are as following:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm
2. A robot must obey orders given it by human beings except where such orders would conflict with the First Law
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Although these laws were created by a science fiction author, the laws have been appropriated as a sort of baseline for robotic development.

> Consequently, I have my answer ready whenever someone asks me if I think that my Three Laws of Robotics will actually be used to govern the behavior of robots, once they become versatile and flexible enough to be able to choose among different courses of behavior. My Answer is, "Yes, the Three Laws are the only way in which rational human beings can deal with robots – or with anything else." – But when I say that, I always remember (sadly) that human beings are not always rational. (Asimov 1981, 18)

By analyzing the portrayal of robots in pop culture Kathleen Richardson (2015) finds that much of our anxieties about robots are to do with the fear of the annihilation of humans. She discusses the annihilation of humans not only in terms of the physical destruction of humankind but also as the annihilation of the ontological ideas about what a human is as a result of the non-human becoming identical to the human. Richardson uses the term

annihilation anxiety, to describe the experience of anxiety brought about when non-humans become comparable to humans, and the two categories are no longer ontologically different.

The obsolescence of humans was predicted amongst others, by economist John Maynard Keynes in the essay "Economic possibilities for our Grandchildren" (1930) in which he suggests the need for human labor might one day be a faint memory, the same sentiment that John de Graaf (2003) remembers from his class discussions in the 1960s. As automation was growing Keynes' described a point in time in the near future where humans would eventually become redundant in the labor market, he termed this 'technological unemployment'. Unemployment due to the pace of technological development and automation outrunning the speed at which we come up with new jobs. There is however, an internal struggle and a push back from people who do not want to become technologically unemployed. Our jobs create meaning in our lives and we identify with our labor; when meeting new people we often share what we do for work as though this conveys an important aspect of our identity (Moen 2021). By uniting our identity as humans with the principle of capitalist labor we have made ourselves laborers. If the introduction of robots demands a separation of work and man, they are threatening our very existence. The other side of the coin, as Keynes (1930) and Aristotle (2020 [N.D]) suggest, is to view automation and the overtaking of labor by robots as a liberation of humans. Automation could signify a shift in the structure of society where we allow ourselves as humans to explore other activities and hobbies in pursuit of new ways to create meaning separate from labor. Art, politics, and science are all important components of 'the good life' as described by Aristotle (2020). Making humans less important or even obsolete in the world of labor does not necessarily lead to the annihilation of humanity but an annihilation of our ontological understanding of what a human *is* (Richardson 2015). Automation enables a shift towards a post-capitalist world with reduced (paid, unpaid, and reproductive) labor.

The implementation of universal basic income or citizen income, a government funded guaranteed income for all citizens, has been tested out in projects in Iran, Finland, Namibia, India and the state of Alaska (Kildal and Thomassen 2020). This type of government funded income-guarantee is often emphasized as a strategy to minimize economic inequality and to aid an increasing number of people who risk losing their jobs to automation (Kildal and Thomassen 2020). During the Covid-19 pandemic, countries like the US tested out a rebate system with similarities to Universal Basic Income. All taxpayers, unemployed or not, became eligible for a stimulus check, a set amount of money given to spur economic activity during a recession (Halton 2021). At its height in April of 2020 the

US unemployment rate hit a staggering 14.8% (Falk et al. 2021). In New Zealand unemployment peaked in the September 2020 quarter as the figures rose from 4.0 to 5.3% an increase of 32.5% from the June 2020 quarter. The New Zealand government issued a 12-week income relief plan for those who lost their jobs to Covid-19.

This chapter has gone through some of the extensive topics that are relevant in order to contextualize the field. Many of the topics layed out here will be revisited again at later points in the text. Annihilation anxiety, which was discussed in the final part of this chapter, is a precursor to discussions in the following chapter where I talk more about the technological substitution of humans.

Chapter Two – Automation

This chapter deals with one of the primary tasks of automation: shifting the responsibility of certain tasks from humans over to machines. In order to best describe the automation of care, I begin by recounting changes to the family structure that have generated an outsourcing of labor over to the state. Following that shift, I look at the role of technology in outsourcing labor to an increasingly self-managed healthcare system putting the responsibility back at the individual and families. An overarching topic to these discussions is the impact of principles of growth, efficiency, and profit in the creation and implementation of technology. These production-centered principles are embedded (see Polanyi 2001) within technology and automation, skewing its impact. I show this by building on the work of Andersen and Sørensen (1992) and looking at some of the specifics within the Health Strategy Plan in New Zealand. Should the robots qualify as social agents they could signify an increase in human replacement. However, as I engage in conversations with staff and researchers in Auckland, I am introduced to the ways in which robots can contribute different services to the ones staff provide.

Household Economy

Traditionally, women have been at the center of a household economy consisting of managing the household. Close to the original meaning of the word 'economy' from Greek '*oikonomia*' (household management, see Leshem 2016), women are often responsible for overseeing the resources of the household, buying supplies and groceries, cooking, cleaning, taking care of children and the elders. Even though men are taking on more of the responsibility today, women are still overrepresented globally in the amount of hours spent weekly on informal labor within the household and specifically undertaking informal care-labor (McKinsey Global Institute 2015). As women are becoming a larger part of the general workforce of paid labor, the household has gone through a set of changes. The 'male-bread-winner' no longer holds the same dominating force (Esping-Andersen 1999, 51), and the tight-knit nuclear family has become the norm in many households. As a part of the process Gøsta Esping-Andersen calls *de-familialization,* responsibility over the wellbeing of the family, including certain tasks like childcare and eldercare, have fallen onto welfare state-provision or market provision (1999, 51). In other words – in a welfare state the

government is responsible for providing services like eldercare, while in a free-market state those same services will be provided by private companies. The creation of kindergartens, schools, and retirement villages accelerated this shift in responsibility by introducing institutions for families where all family-providers were working outside of the home.

When the responsibility of somebody's wellbeing is assigned to their family members, we are dealing with what sociologist Gøsta Esping-Andersen describes as a *familialistic* (ibid.) system. In contrast, de-familialization describes the lack of dependency on networks of kinship to adhere to the responsibility of wellbeing within the household. By removing the reliance on family members (women in particular) to provide care and wellbeing the de-familialistic system promotes individual economic independence by introducing subsidies provided by a welfare state. In the Nordic countries, Esping-Andersen argues, the de-familialistic structure embedded in social policy seeks to maximize women's economic independence. In the article "Informal Care and Health Care Use of Older Adults", Courtney Van Houtven and Edward Norton (2004) explain how the most common form of long-term care of the elderly is the informal care provided by their adult children. By including women in the formal economy and commodifying their labor, women are given economic independence, while eldercare has become less dependent on kinship networks. With the increase of the aging population, this will put a lot of pressure and demand on both informal and formal care. Van Houtven and Norton (2004) explain how the number of people over the age of 65 in the United States will have doubled as we get to the year 2030. All the while, the number of informal caregivers is likely to shrink due to changes within family structures – smaller families, more women working, and families living further apart (Van Houtven and Norton 2004, 1160). There are 432,000 unpaid caregivers in New Zealand (how many of these care for seniors is unclear), 65% of which are also working in paid employment (Alpass et al. 2017). These numbers suggest that a lot of pressure is put on family members who are balancing employment and caregiving responsibilities.

Weakened kinship networks of care providers combined with a growing population of older adults implies that aged care will continue to be outsourced to government and private companies. With the use of automation and technology, self-management of individuals is expected to increase (Minister of Health 2016a; 2016b; New Zealand Health IT 2020), taking pressure off other care providers. The process of outsourcing responsibility of care is a topic relevant in later discussion about technological development taking on social labor.

Automation

As you get ready to go to bed at night, you might use an alarm clock or your phone to set an alarm. Living in Norway, a place that during winter will get remarkably dark, I have had to buy an alarm clock that will slowly light up the room half an hour before the alarm goes off, to simulate a sunrise gradually waking you up. However, if you lived in a place like London during the industrial revolution and had to get up early to work in a factory, you might want to get yourself a knocker-upper – a person who would come to your house in the morning and knock at your door or your window using a stick or baton (Peek 2016). This job is only one of the many jobs that have gone extinct with time. With the industrial revolution a wave of technological automation was set in motion. The jobs that were coming to an end were often the ones that could be performed better or cheaper by a machine. Automation is the process of outsourcing activity to automatic equipment. During the industrial revolution, factories started using machine labor together with human labor to increase production and decrease the cost of production; machines do not require wages and can work nonstop.

Although the machines used have evolved drastically since the industrial times, they are often used for the same purpose as before: increasing production and reducing cost. Today's warehouses of companies like Amazon are among those who have invested in robots that work alongside humans. In a New York Times article from 2019, Noam Scheiber talked with current and former employees at Amazon's Staten Island center. One of the former employees, Justin Rashad Long, had been fired from his job for speaking out about the working conditions at Amazon. He was one of the people who told Scheiber about how the robots raised the productivity of the pickers, those who gather products for orders, from around 100 items per hour to a target of around 300 or 400 items an hour (these numbers vary from teams and facilities) (Scheiber 2019).

> The difficulty of automating pickers puts pressure on the humans to become more productive. "We try to eliminate any wasted movement," LeVar Kellogg, a picker who trains other pickers at an Amazon facility near Chicago, told me. "If you have one second that's adding to the process, it doesn't seem like a lot. But if you do that 1,000 times a day, that's when it starts adding up." (Scheiber 2019)

Principles of measuring and increasing productivity, a core value in neoliberal economic-policy, affected working conditions of laborers like the Amazon pickers. The introduction of automated robots accelerated the impact of these capitalist principles that structure the workplace for people like Long. One of the remarkable consequences the introduction of robots had in the Amazon warehouse, Scheiber (2019) noted, was not so much the risk of human replacement but that employees were being made to resemble the robots. This example from Scheiber (ibid.) illustrates the dehumanizing effect robots can have on humans as they are pressured to increase their own level of productivity. The Amazon robots operate according to New Public Management[12] (NPM) principles of measuring productivity down to the second, which increased the pickers number of hourly items to the target number of 300-400 items an hour. The impact of the robot is dehumanizing in a literal sense as the pickers describe how they are being made to resemble the robots.

This effect of increased use of robots is far from the prospect of technological unemployment John Maynard Keynes wrote about in the essay 'Economic Possibilities for our Grandchildren' (1930) mentioned in chapter one. He was right in his prediction of increasing technological development, however, he was not right about his Aristotle inspired prediction of automation leading to increased leisure time that humans can use on more fulfilling and meaningful tasks (Aristotele 2017 [N.D.]; Keynes 1930). For one, we are not running out of jobs, we keep coming up with new ones. During Keynes time, neoliberalism did not have the global influence it has today. The New Yorker article 'No Time: How Did We Get so Busy" (Kolbert 2014), re-investigates Keynes' projection of the future, and suggests that one of the reasons Keynes was so right about technology but so wrong about leisure was that he did not account for peoples own capitalistic goals of working towards the maximization of wealth. Although there is a massive wealth gap in the US, this does not account for why leisure time is so uncommon. In fact, the article shows the lowest-wage earners have more leisure time, while the high earners report experiencing a lack of leisure.

High pay is highly rewarding, which presents another possible explanation. Suppose that a Walmart clerk and a hedge-fund manager both decide to take the afternoon off to attend their kids' baseball game. For the clerk, a half-day's forfeited pay could come to less than forty dollars. For the hedge-fund manager, an afternoon's worth of lost trades may cost millions, which is a lot to give up to watch little Billy

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[12] a wave of reforms that seek to enhance efficiency and model public government agencies after private agencies. See theoretical framework for more details.

strike out looking. And what goes for the baseball diamond also applies to the school play, the anniversary dinner, even the annual family skiing trip to Vail; the disproportionately compensated have a disproportionate motive to keep on working. (Kolbert 2014)

In his future prediction, Keynes might have been inattentive to the influence of ideals of profit maximization and economic growth integral to the free-market economy. The market inspired way of thinking (*markedslogikk* – logic of the market) has since the 80s has been influential in welfare states in the form of New Public Management. This is relevant to note as the steadily growing speed of technological development since Keynes' time has reached a point where the threat of automation has expanded beyond that of physical labor. As automation is taking on social labor, like Paro is in eldercare, does the marked inspired way of thinking (growth, increased production, cost reduction etc.) influence its use, or, does it operate on other principles? Talking with Selwyn staff members and researchers at CARES, I tried to find out more about the role of technology in healthcare, and how people can find comfort in objects. It should be noted that while the Amazon warehouse-machines attempted to 'eliminate every wasted movement' – a reductionist process of behavior welcomed for the use of physical industrial labor – these same processes of reductionism might not be advantageous in a robot used for companionship. Attempts to automate care is still a new field of study with much left to be discovered, however the following examples illustrate ways in which automation and mechanics can be included in relationships of care.

A study done on infant monkeys by Harry Harlow (1959) investigates the development of a mother and child relationship in monkeys raised with mechanical-surrogates. His study describes an experience of love and companionship (in monkeys) that includes objects and machines. Harlow automates reproductive care labor in monkeys using two different surrogate mothers, the first was a mother made out of wood, covered in sponge rubber and cloth and a single breast for feeding.

> The result was a mother, soft, warm, and tender, a mother with infinite patience, a mother available twenty-four hours a day, a mother that never scolded her infant and never struck or bit her baby in anger. (H. F. Harlow 2013 [1958])

The second surrogate mother was made out of wire, it did not have the soft touch or the heating. Harlow found that the monkeys developed a strong relationship with the

cloth-mother, similar to that of a monkey raised with its biological mother. While the monkeys developed little to no relationship with the wire-mother (1959).
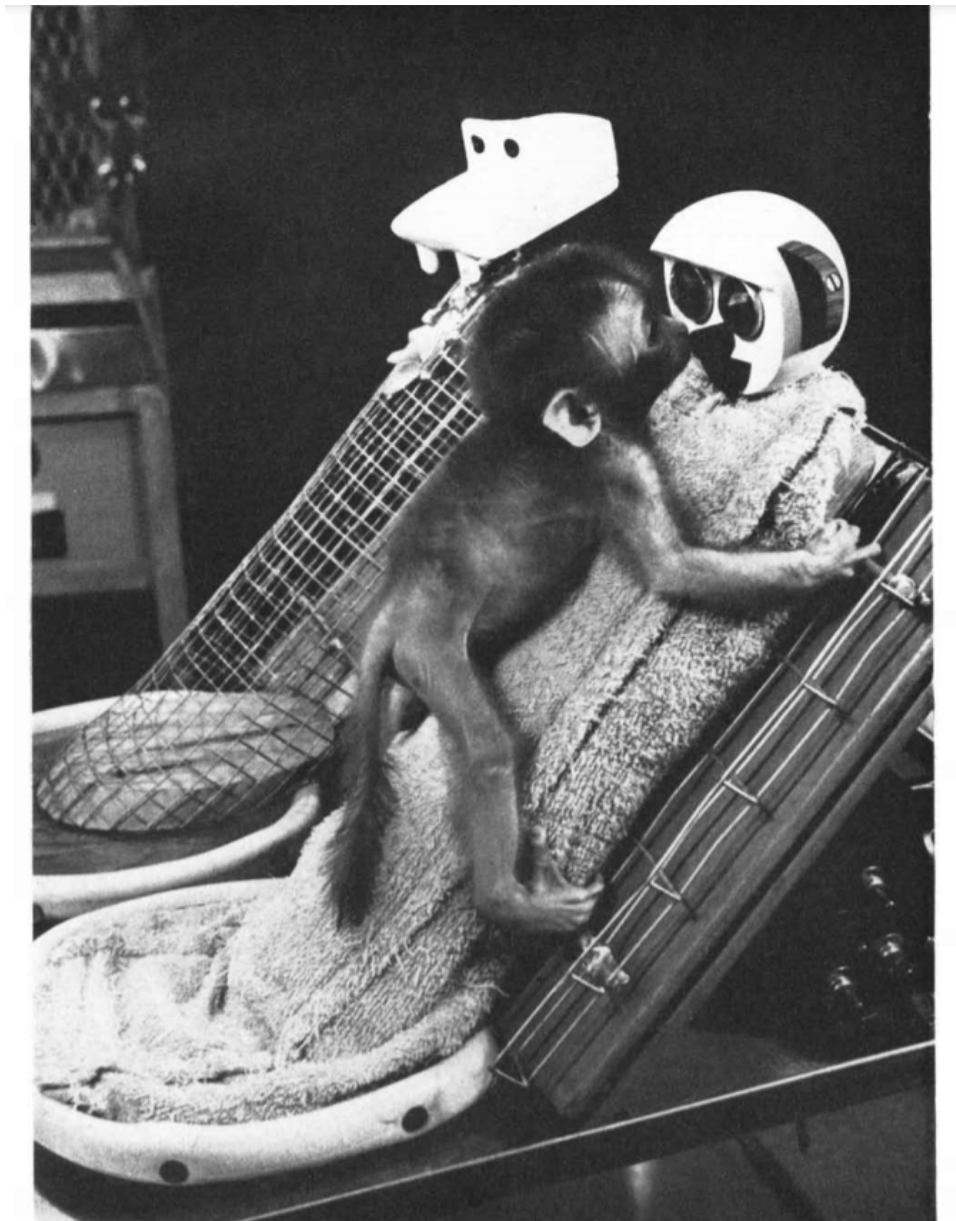
Picture from "Love in Infant Monkeys" by Harry F. Harlow (1959)

The study suggests that the deep psychological relationship between the infant monkey and mother derives from bodily-contact, and is affected by components such as a smooth surface of contact. The artificial production of love in a relationship between an infant monkey and its surrogate mother is similar to that of the authentic love in relationships between an infant monkey and its biological mother. Due to the unethical nature of the study

it would prove difficult, if not impossible, to apply the same structure of design to a study with infant humans and mothers.

Instead, I consider pet ownership – a relationship that also involves care. When a dear pet dies the people who care for it will experience a sense of loss and grief. This is also true for virtual pet ownership – the Tamagochi, a digital pet popular in the 90s, gave rise to both physical (Cherrell 2021) and online graveyards[13] for those grieving pet owners whose beloved Tamagochi had passed. This example suggests a real emotional connection to the Tamagochi pet, the passing of which requires grieving customs that resemble the ones we might practice in the passing of a human or animal.

In terms of companionship and care, these two short examples of humans and animals connecting to digital pets and surrogate mothers suggests that machines could play a larger role as social actors than they have been credited to, as people and animals connect with and find comfort in them. It indicates an empathic relationship with machines that operate on principles different to robots that impose efficiency in the workplace. Therefore, I want to understand the role of technology in care labor, because as I describe below, technology is not always a neutral component in the workplace – it can for example work towards goals of growth and the acceleration of productivity like the Amazon robots do.

Neutral Technology?

In the last century, the use of technology has skyrocketed. Technology has become integral to society, people have come to depend on it in schools, hospitals, and in the workplace. With technology being so important to our lives there are few institutions to govern the ethical use and integration of technology into our society. These are some of the themes discussed in *Frankensteins Dilemma* (1992). The book written by Håkon With Andersen and Knut Holtan Sørensen, critically engages with the power dynamics inherent in technological development. The authors argue that even though technological development has a great impact on society and social life, there is a lack of ethical involvement from the side of developers and engineers.

They use examples from the The Norwegian Institute of Technology (NTH) which was later merged together with The University of Trondheim to create what today is the Norwegian University of Science and Technology (NTNU). Engineers graduating from the

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[13] https://shesdevilish.tripod.com/grave.html an online obituary site for deceased Tamagotchi pets.

former NTH made little progress in public administration compared to industry and private companies. Andersen and Sørensen (1992) suspect as many as two thirds of the graduating civil engineers were employed in the private sector. Although a significant part of engineers have been employed in the public sector as well, Andersen and Sørensen (1992) argue the engineer career path is primarily associated with industry rather than state and public development.

Engineers who end up in private companies with internal and external competitive goals, develop technologies beneficial for business and industry (ibid.). Capitalistic values such as production efficiency, labor efficiency, and maximization of profits are embedded in the development of technologies, because the majority of investors are corporations and big tech companies (McKinsey Global Institute 2017). Healthcare has the potential of becoming a new profitable market for AI development – AI and digital solutions enable more accurate and faster diagnosis, tracking or forecasting the spread of disease (ex. Infection tracing apps used to track the spread of Covid-19), and customized treatments ((McKinsey Global Institute 2017).

In the discussion paper "Artificial Intelligence: The Digital Frontier" healthcare company executives were surveyed revealing their expectations to technologization:

Executives from healthcare companies that were early adopters of AI said they expect the technologies will raise operating profit margins by five percentage points within the next three years. (McKinsey Global Institute 2017)

Because the responsibility of providing welfare for citizens is tendered to private companies in New Zealand (de Bruin 1997), the increase in profit margins expected by healthcare company executives (McKinsey Global Institute 2017) could enable welfare profiteering.

As new areas of human labor, such as healthcare services, are available for technological automation, we need to be aware of the power dynamics embedded within the development and implementation of technology. Big tech corporations like Amazon, Apple, Google, and Baidu are responsible for two thirds of investments in Artificial Intelligence, amounting to $18-$27 billion dollars in 2016 (McKinsey Global Institute 2017). Daron Acemoglu, Professor in economics at Massachusetts Institute of Technology, points out how a few large-scale tech companies in North America, Europe and China dominate the field of artificial intelligence steering the development of new technologies.

The developing world needs to be at the table and have a voice in how promising new technologies will be used — not just for profits, not just for the very skilled engineers in the United States, Europe and China, but for its billions of workers around the globe. (Acemoglu 2020)

The dominance big tech companies hold on investment influences the development of technological and digital tools. With the dominance of big tech companies on investing and developing, technology becomes a tool that utilizes profit maximization and efficiency rather than a tool that could potentially benefit the working conditions of workers. This is what has happened at the Amazon warehouse. Because of the impact of big tech companies in technological development and the motivations of care providers in implementation of technology within healthcare – technology is not a neutral force. Taking into account that technology can have biases, I approach the health strategy plan of New Zealand. This is a strategy plan set to increase its reliance on technological solutions in the coming years of healthcare by emphasizing self-management.

Self-management

In 2016, a health strategy was put forward by the New Zealand Ministry of Health. The health strategy is divided in two parts 'The Future Direction' and 'A Roadmap of Action'. The first comprises the future strategy for the next ten years through five strategic themes: People Powered, Closer to Home, Value and High Performance, One Team and Smart System (Minister of Health 2016a). The Smart System (He atamai te whakaraupapa), is a governmental plan to improve efficiency and improve healthcare services using new technology such as digital solutions but also robotics and automated services. The strategy emphasizes the significant role new technologies will have in health systems. The Smart System will take advantage of technological solutions to raise the quality and efficiency of the New Zealand health system (Ministry of Health 2017, 16), seek improvements and innovations, and establish a standardized system of health through collaborations across the whole health systems (Minister of Health 2016b, 33–35)

'Telehealth' is used as an example of a technological innovation that can improve efficiency of the New Zealand health care services. The Telehealth service was at the time of the publication of the strategic plan used by 17 of the 20 District Health Boards and functions

as communication service between health professionals and patients who are not in the same physical location (Minister of Health 2017). Time and cost-efficient communication between patient and the care provider is delivered with the Telehealth services through for example video conference. Centralization and the development of a standardized health system is in high demand as this will cut cost and improve efficiency through better cooperation throughout the health system. Telehealth and other virtual health solutions are a response to the growing demand on health care, different to the 'headcount' solution. This latter solution is one that suggests the increase in individuals who need healthcare services should be met with an equal increase in the individuals who provide healthcare services. However, this solution has been regarded as non-sustainable, as these services already are undermanned (New Zealand Health IT 2020). The increase in the older population presents a huge shift in the demographic where the number of working adults for every retired adult is going to fall.

Cost- and time efficiency are the main proponents of technological development that are up for debate as a part of the health strategy. Andersen and Sørensen (1992) argue that engineers responsible for technological developments should be more engaged in discussions about the possible future consequences technology has on society and how to plan for this. By having these ethical discussions and allocating some of the responsibility on to the developers, Andersen and Sørensen (1992) hope to open up for more democratic decision making and planning around technology and society.

Another aspect of the Health Strategy plan, which I look at below, recognizes the role of technology in the shift towards an increase in self-management – a form of individualization encouraged within NPM. With self-management the responsibility of care is shifted from the state over to the individual, their families, and whānau. Self-management has also been encouraged in rhetoric by neoliberal politician, Margaret Thatcher:

I think we've been through a period where too many people have been given to understand that if they have a problem, it's the government's job to cope with it. 'I have a problem, I'll get a grant.' 'I'm homeless, the government must house me.' They're casting their problem on society. And, you know, there is no such thing as society. There are individual men and women, and there are families. And no government can do anything except through people, and people must look to themselves first. It's our duty to look after ourselves and then, also to look after our neighbour. People have got the entitlements too much in mind, without the obligations. There's no such thing as entitlement, unless someone has first met an obligation. (Keay 1987)

This quote, provides an illustration of the emphasis on self-management and withdrawal of state responsibility within neoliberal philosophy. Similar emphasis is put on the role of technology in shifting the responsibility of wellbeing in the second part of the health strategy, 'A Roadmap of Action'. The roadmap lays out 27 areas of actions over the following five years (2016-2020) as a guide for District Health Boards (DHBs), Public Health Officers (PHOs), and Non-Government Organizations (NGOs). The roadmap of action is divided into two sections, A and B, where section A lays out five themes of action over the next five years and section B describes how the plan will be put into action. Underneath is a figure showing the five themes and some of the actions that substantiate the theme.
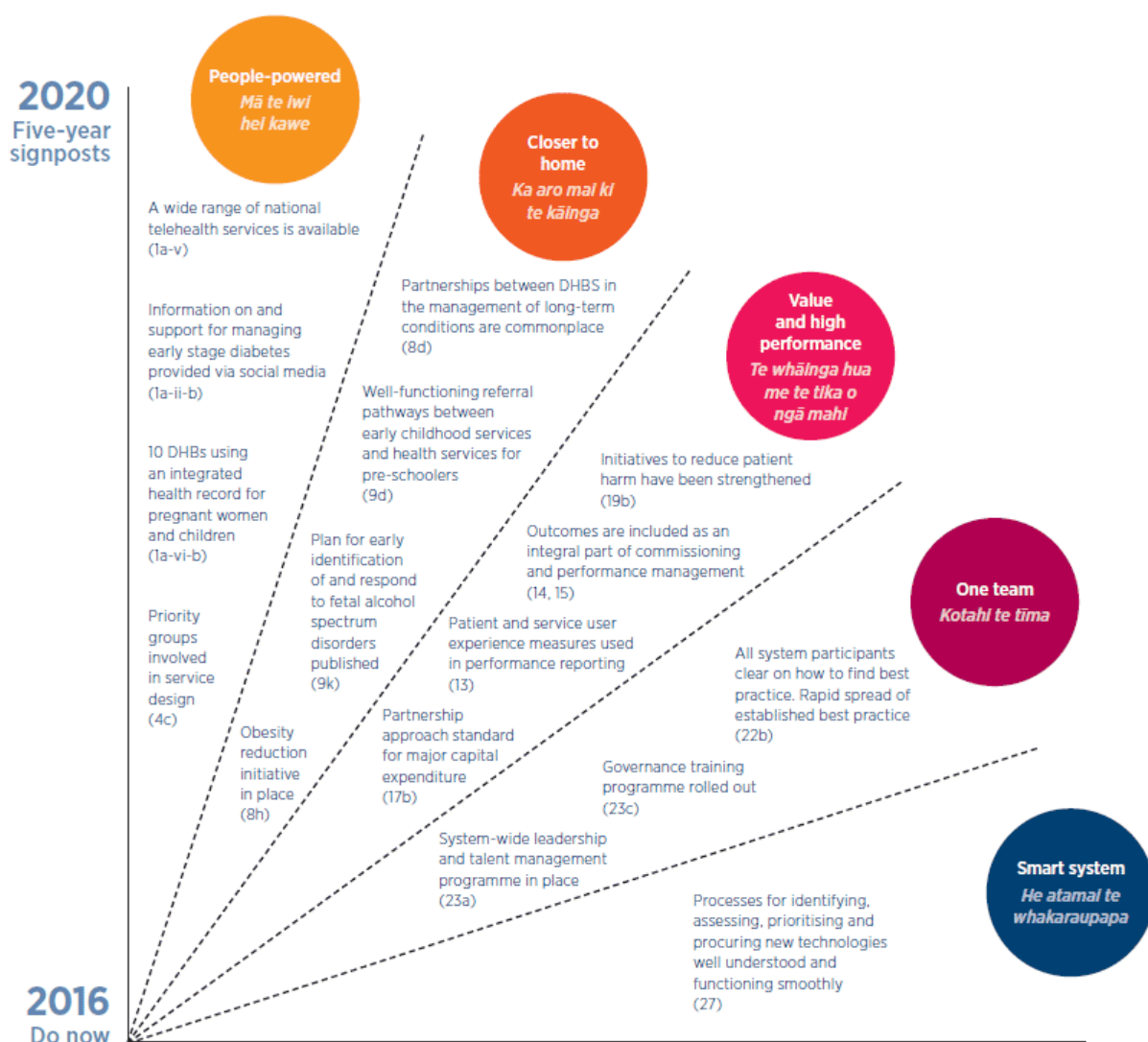
The Illustration "Possible results from implementing the Roadmap of Actions over time" is from the New Zealand Health Strategy: Roadmap of Actions (Minister of Health 2016d)

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Of the five themes outlined in the roadmap, Article 1-5 under the theme 'People powered' seeks the involvement of the public in designing healthcare services. However, the theme also describes an emphasis on self-management and supporting the consumer movement.

Article 1. a. Improve coordination and oversight and expand delivery of information to support **self-management of health** through a range of **digital technologies**. (Minister of Health 2016b, 6)

The use of technology as described throughout the roadmap is in large part to do with system efficiency, cost saving, and improving self-management (Minister of Health 2016b). Similar wording is used to describe the introduction of new technologies in the fifth theme of the roadmap, the Smart System (as mentioned before):

Action 27: Develop capability for effectively identifying, developing, prioritising, regulating and introducing knowledge and technologies. This action area seeks to improve the health system's service efficiency, reduce cost, improve engagement with people who access health services, promote healthy behaviors and self-management, and aid people-led design. It includes use of new technologies (medicines, medical devices from dressings to robotics, cell and tissue therapies), service design/models of care and information technology. (Minister of Health 2016b, 23)

To manage some of the expected pressure on healthcare providers, the health strategy described in the Ministry of Health's 'A Roadmap of Action' and 'The Future Direction' emphasize an increase in self-management as I have illustrated by pointing to some of the proposed articles and actions. The emphasis on greater individual responsibility of wellbeing is one of the arguments Anne Marguerite de Bruin (1997) put forward as influential in transforming the New Zealand government to a wellbeing-enabling state. Because the shift in responsibility of wellbeing, that in a de-familialistic state (Esping-Andersen 1999) was taken on by the government, is pushed back to the individual and their families. de Bruin (1997) also notes how this push for a re-acceptance of family responsibility comes at a time when economic, social, and demographic changes put a lot of pressure on family life (de Bruin 1997, 21). Although de Bruin wrote on this topic back in 1997, her arguments hold true today

with 65% of unpaid caregivers also working in paid employment (Alpass et al. 2017), which, as I mentioned earlier, makes it difficult to balance unpaid caregiving and paid employment.

While the health strategy invites the public to assess their health services, the political intentions of technological development, for example technology that seeks to improve self-management, are rarely discussed. Neoliberal politics emphasizes the importance of a free-market economy untouched by the interference and regulation of government (Ganti 2014). Free-market ideology treats the economy as though separate from culture and society (Polanyi 2001 [1944]), and in *Frankensteins Dilemma* (1992)*,* the same laissez-faire behavior is transferred to technological development – we develop technologies that are disembedded from society because it operates strictly on economic principles such as increasing productivity, reducing time, and increasing profit. The Amazon warehouses are an example of this: the robots they invest in and use improve productivity which increases their profit margin. These robots are created to be disembedded from society, their use value is growth, but what is more is that the human workers at Amazon experience themselves becoming increasingly similar to these mechanical robots in the workplace. In order to understand how Paro fits into this picture and learn more about the role of technology in care I try to establish whether the companion robot is intended for the supplementation or substitution of human care.

Substituting Social Relations or Supplementing Them?

Substituting and supplementing humans with social robots are two wildly different tactics of integrating technology. Social theorist Sherry Turkle (2015a) argues that using machines as a medium for human-to-human interaction is the first, and dangerous, step towards the normalization of human-to-machine interaction. Turkle finds this worrying because she argues this shift will imply that we lose out on the empathic connection that we usually get through human to human interaction. I discuss Turkle's objections further in chapter three.

One of the key worries about using robots to interact with humans is that this will signify a shift where human to human interaction is substituted and phased out in favor of human to robot interaction (Automation Anxiety: Richardson 2015; The Robotic Moment: Turkle 2015b; 2015a). This is certainly possible in the type of jobs where technology is significantly cheaper than human labor – the Norwegian Labour and Welfare Administration (NAV), has found that it costs them 180% more to assist the clients who contact the NAV

offices to be assisted by employees compared to when clients find the same information on their own on the NAV websites (Dybedahl et al. 2020, 39). In this example technology is utilized to enable increased self-management and independence in users. There are huge economic incentives for certain industries to automate their services. With an aging population that is becoming increasingly dependent on health services, retirement villages might eventually feel the pressure to automate any services they can.

Anxieties about the prospect of job replacement now also includes caregiving where a significant part of the job concerns human interaction and connection, for example working as a carer in a retirement village. A fully automated retirement home would be undesirable – even the infant monkeys from Henry Harlow's studies required playtime with other monkeys in order to develop social behavior similar to their peers, a surrogate mother was insufficient in raising the monkeys on their own (H. F. Harlow and Harlow 1962).

The use of the Paro robot at retirement villages in New Zealand, however, involves thoughtful and well managed interaction with residents – two of the caregivers working at Skyside retirement village stressed that Paro was always used with much consideration and suprervision from the carers. The robot was never simply left with a resident, instead carers would use Paro in such a way that would be most beneficial to each resident and their specific health needs. Lorane, one of two Skyside staff members explained:

> One couldn't assume to activate the robot, place it with the resident and walk away. It requires person centered facilitation, knowing how much time spent is actually enough for them. One also needs to be present to observe the interactions, for accurate reporting of its benefits. (Lorane, Skyside Village)

She saw Paro as a supplement to human interaction and not a substitution. This became apparent to her during the Covid-19 pandemic when Paro could no longer be used due to the strict guidelines of hygiene that were not compatible with the robot's fur coating. Before the pandemic, Lorane would use Paro about once a week with her residents. Paro, or Andy as the robot was named at Skyside, had previously been used both in one-on-one sessions with residents as well as in group settings (as described in chapter one). When New Zealand found local cases of Covid, they adjusted the alert levels and restrictions accordingly. All the while, the retirement villages stayed one level higher than the national alert levels due to the residents' high risk of serious illness if infected. Throughout the year of 2020 there

were periods of time when the retirement villages went into complete lockdown, and residents were isolated as much as possible.

> An observation during Covid lockdowns and the absence of connection to family, revealed great psychosocial stress on our elders. For the loneliness and disconnect induced, they did not want the robot seal, they wanted their families and friends. They needed to look into the eyes of their loved ones, and hear dialogue from them, and be held by them. This is my personal opinion, but I observed Paro truly as a supplement and definitely not a substitute for human/organic animal contact. (Lorane, Skyside Village)

When the residents experienced periods of isolation and loneliness during lockdown they expressed a need for human contact, something the Paro robot was incapable of replacing. It is conceivable that a social robot *could* be used to substitute human interaction, however, this is not what the retirement village's staff members use the robot for due to their appreciation and value of human connection. When used as a supplement for human interaction, a social robot can be utilized as a tool that potentially increases the level of care. In the podcast episode "Kan Chatboter Hjelpe Ungdom?" (Trinh 2019), guest and psychologist Svein Øverland, uses the term *warm technology* to describe the use of technological tools that are made to work as an amplifier of human connection. The example he uses to describe the concept is a computer program or app for patients to use in-between therapy sessions. By giving the patient something to work on and 'someone' to talk to in-between therapy sessions, he argues, the services offered in therapy are no longer restricted to the therapy sessions, but becomes an extended therapeutic regimen that you can take home with you. Similarly, the use of Paro in Skyside is a tool for the carers to provide additional care for the residents that find this type of care beneficial.

Amiyah, a diversional therapist at Sunny House, had a similar sentiment that Paro would not be sufficient in replacing human contact. Due to the robot's limited abilities, the care services of the robot can be compared to that of a diversional activity that will help a person calm down, ease their anxiety, and make them feel better. At Sunny House day center, Paro has been used to get people comfortable with social interaction and to regain social competence so that the elderly would feel motivated to interact more with people.

Our goal with using Paro is to make the clients more social and to boost their self-confidence in talking to other people after being trained with Paro. Most of the people with dementia have lost some of their communication skills, especially when their loved ones don't talk to them at home because they are repetitive and talk nonsense so their loved ones often don't talk to them at all. If people don't talk to them at home they will lose their communication skills, and that is what we want to regain when they come to our facility. We want to regain their communication skills, their self esteem, their independence and confidence in talking with people. If they do not have this confidence, we start out with Paro. (Amiyah, Sunny House)

On the path towards increasing their social skills, seniors can use Paro in a one-on-one setting to become more comfortable. Amiyah told me about one client in particular who was unwilling to engage with people everytime she came to Sunny House. She would stay outside in the garden, Amiyah told me, not even entering the facilities. The staff tried different strategies to ease her anxiety, but with no luck. One day, Amiyah took Paro out with her to the garden where the client was sitting. They connected, the client started talking with Paro as though it was one of her grandchildren. Amiyah continued to bring Paro out to see the client for about two weeks, until one day, Paro was waiting for her inside due to rain. Eventually, the client started getting comfortable having her tea inside with Paro, and with time, she was able to sit together with other people at Sunny House with Paro next to her for comfort. Paro made her feel comfortable and was used to encourage her to connect and engage with other people. In this example the client who engaged with Paro started to see the robot as something other than a seal, which is common for people who interact with Paro and something I will talk about to a greater extent in the fourth chapter. Amiyah told me how some of the clients would create stories around Paro and use this as a starting point for social interactions with other people.

Yes, and as I mentioned earlier, Paro can be anything and a new thing every day. So if one day Paro is a baby, we put it in a carriage or a baby's basket and they stroll around the facilities with Paro and they will tell other people 'oh this is my baby!'. It is a tool for them to engage with people. (Amiyah, Sunny House).

Almost like an icebreaker Paro becomes something through which the elders can relate to one another. Amiyahs example illustrates how the use of Paro does not take away

from the social interaction between people, but rather it encourages it by lowering the threshold for social interaction for those people who are not feeling confident in social situations.

Because staff members at Selwyn did not find evidence to prove that Paro replaced human labor, I asked Lorane a hypothetical question about the *possibility* of a competent social robot doing a task such as dispensing medication rather than a registered nurse. The reason why I had picked this particular task was because I was under the impression that dispensing medication was a practical task more than a care-centered task. The use of a robot to dispense medication, I thought, might free up some time for staff members to focus instead on health services with a social focus. In theory, Lorane told me, this is true. However, she suggested that even the short interactions that the residents have with staff, for example during their time of medication, are not easily exchanged for that of robotic interaction.

> The act of dispensing medication is included in the holistic model, requiring the dispenser to 'know their resident on a personal level'. It is an interactive process. A robot would not know the person, could not respond to a smile or speak with them empathetically. In the holistic model of care, the medication dispenser would most likely have checked the residents profile on the computer for the day. They may also have talked to the family that day, and been handed on important information, or made decisions for the resident. Some of our residents are vision or hearing impaired, it could be almost psychologically damaging to be presented with a robot, unless they cognitively understood that. Or perhaps the resident wants to chat about their day while receiving medication, or ask the nurse for advice on something that bothers them. I do not see robots fulfilling all these needs. (Lorane, Skyside Village)

Having misjudged the act of dispensing medicine, thinking it to be a practical task more than anything else, Lorane corrected my misunderstanding by emphasizing the social aspect of dispensing medication. What is clear from this example is that the use of a robot would have to work with their holistic model of care rather than against it. Because of that, robots intended to increase productivity are not always suitable in care labor because it automates activities that are important to the overall care services between staff members and residents, including even those small interactions between a resident and a nurse dispensing medicine.

Even though there is an impending issue with an increasingly aging population in New Zealand, none of the participants working at the retirement villages I talked with thought a care-robot would be the solution to this crisis. Rather, a few of them mentioned that they would like to see an increase in the ratio of staff members to residents. I had asked Lorane if she felt they were understaffed at work, she replied 'yes' and added:

> This is a big subject that goes beyond the frames of our organization. In ANY organization, or service provider agency, the higher the ratio of servers, the better the service a client receives. (Lorane, Skyside Village)

Lorane further explained that the current ratio at Skyside was approximately one staff to eight residents, "Having one staff to three residents would enable more time and more person centered interaction. This is just my personal opinion," she added.

A similar observation was made by Graduate student Agnete Petersen (2017), who did her fieldwork looking at the use of social robots in healthcare in the UK. During her fieldwork, one staff member stated that only some of the residents were really interested in Paro, and in the staff member's opinion she would have preferred to be able to spend more time with each of the residents. When Paro is used as a tool to directly fill a gap created by staff shortage the robot is experienced as insufficient (Petersen 2017).

One concern with automation is that the introduction of robotics will not give caregivers more time to socialize with the elders, but rather it will provide an opportunity for care institutions to cut down on staff members (Parks 2010). Petersen (2017) reports that the facility she was doing her fieldwork in was hoping that Paro would enhance social interaction, however they found that it made sense to sometimes use Paro in situations where the resident was alone. In those cases, Paro was not enhancing interaction *between* people, but was keeping a resident company when staff were too busy to spend a lot of time with them.

> Here, it seems to be converse ideas of the normative ideals of what kind of interaction Paro is supposed to give and the care staff's use of Paro to provide the possibility of hour-long contact which is currently not possible in such a flexible manner because the care staff do not have time for that. Rather than substituting, Paro appears as a solution to staff shortage. (Petersen 2017, 50–51)

There is no room for the carers to spend long hours with every single resident – technology on the other hand offers no time restraint and thereby reintroduces a level of care and companionship that staff members, who are pressed for time and oftentimes overworked, cannot provide. Petersen's observation speaks to an experience of staff shortage, which is likely to become an issue in retirement villages in New Zealand as well due to the country's increasing older population. Using Paro as a solution to staff shortage, as described by Peterson, provided the residents with a 'better than nothing' alternative to care. Ideally, the automation of physical labor would leave staff with more time on their hands to focus on spending quality time with residents. Below, I investigate whether the application of Paro is related to an increase in efficiency.

Improving the Efficiency of Care Services

During my interviews, I asked the staff members at Skyside retirement village and the Sunny House activity center if Paro was used as a tool to improve efficiency. Their answers could help determine if Paro was associated with some of the traditional operating principles of automation talked about earlier, such as increasing productivity and reducing cost. I asked the three staff members how Paro affected their workload and their answers were divided. Dave and Lorane, who work at Skyside retirement village, both said that the robot did not cause more efficient care services, due to the fact that the interactions between Paro and the residents requires supervision from the staff members.

> There is more work, because you have to be there with the person and Andy [Paro]. It is like a one-on-one. It is not something you can just leave and walk away from. We cannot leave it unsupervised. Because you have to know how to use it. (Dave, Skyside Village)

The interactions between residents and Andy did not make the care services more efficient because the staff were always present and engaged. Lorane had a similar observation:

> Its use does require work. Effective handling of Paro is facilitation and observation. A carer would not be doing a resident justice, to think it were some kind of babysitter while they attend to other jobs. Also, there are protocols to observe, such

as a before and after cleaning of both Paro and the residents hands, especially if the toy is used communally. As an additional service we provide, there is always work involved. (Lorane, Skyside Village)

Loranes answer points out that Paro is an additional service, not one that is provided as a substitute to other services. Amiyah on the other hand said that Paro did make the job easier for the employees because the robot helps divert the users away from anxiousness. However, she did not express that Paro made the overall job of the carer more efficient or time saving, it just made the job easier. None of them expressed that Paro was used in a way to replace staff members or social interaction with other peoples. Instead, the service that Paro provided helped calm the user down and divert their attention.

Additionally, Amiyah at Sunny House day center described how Paro was used to increase the independence of users and to get them comfortable with socializing. This was done by making them feel confident in social interactions with humans. As previously mentioned, Amiyah explained how residents walked around with Paro, and as they encountered other users at the activity center she noticed that the seniors found it easy to approach and engage with each other with Paro by their side. While in chapter four, Lisa, a previous staff member at Selwyn and family member of a deceased resident, shares how Paro was able to mediate interaction between three generations of family members. All ages were captivated by the robot, which contributed to making the (at times dull) visits to see a grandparent an engaging experience. The way interaction between Paro and residents was presented to me, Paro enhanced the social life of the resident and did not replace social interaction. This is also the impression journalist Naomi Arnold got when she visited one of the Selwyn retirement villages in 2018.

As with Paro, staff noticed the robots created more chances for the elderly to interact. Residents were talking more, discussing the robots, looking forward to their medication times. A robot hanging out in the lounge meant more talking for everyone. (Arnold 2018)

Journalist Naomi Arnold from New Zealand Geographic spoke with one of the researchers frequently mentioned in this thesis – Elizabeth Broadbent, who has contributed extensively to the study of healthcare robots in aged care in New Zealand. Broadbent told the journal:

There are some people out there who are concerned about the ethics of it, and it is quite a fast-paced, changing environment. Some people worry about robots replacing people or replacing human contact, but it's not our aim. So far, we've found that robots actually increase human contact. (Arnold 2018)

Throughout my research I did not find that Paro made a notable difference in terms of time management, several staff members expressed that they were pressed for time at work regardless of whether Paro was used or not. Neither did I find evidence that Paro was currently used as a tool to automate the workplace at Selwyn or to substitute staff, or rather, I was not told about this underlying motivation for using Paro. Instead, the use of Paro I was presented with was an addition to the care services already in place.

Hilda Johnson-Bogaerts, who was working as general manager of the Selwyn Institute of Ageing and Spirituality in 2018, at the time when New Zealand Geographic was running their story looking at social robots in health care, gave a statement to journalist Naomi Arnold addressing the issue of robotic replacement:

"I definitely believe that technology will support aged care in the future, because there's not the workforce there to look after all the people we have. Technology can support, but it can never replace the human touch," she says. "But I would quite like to see robots doing some lifting work." (Arnold 2018)

As Hilda Johnson-Bogaerts confirms in this statement, the aging population is going to pose a real challenge to the capacity of the workforce in aged care. What the robot *can* do in this situation is supplement the care services provided by staff. As with the robots used in the Amazon warehouses, they did not necessarily replace staff, however, the robot had an impact on the work environment by putting pressure on staff to improve productivity. Paro on the other hand has a humanizing effect, because it is used in such a way as to maximize social interaction, for example by providing the elderly with more chances to interact. Paro, as well as other sociable robots, provide services different to the ones staff do.

Not Better, but Different

I asked Dewi, one of the students involved in previous studies at one of the retirement villages, how a companion robot compares to a human carer at the retirement village. He had been working on integrating robots at the retirement village and drawing from his experiences working with the social robots and speaking directly with the residents who used the robots, he was able to reflect on how a robot can provide care to support the care services already in place.

> I think it's different. Rather than saying a robot can do something better or do something worse or not as good as a human, I think it's different. So I think robots offer the opportunity to be available 24/7, so if you have a robot that is in your house the whole time you can possibly feel more of a relationship with it, rather than a staff member who is there you know five or six hours a day or who's only popping in and out to help with a shower, or help with cleaning the apartment, so I think having a robot there the whole time does give people the opportunity to engage with it on a level that they don't with a staff member. A robot is always going to have time to sit there and listen, or at least give off the idea that it's listening to someone. So for [the residents], they can build a deeper relationship with [the robots]. They can sit and talk about their daily lives and there's no limit for when a robot needs to leave, it's going to be there the whole time. Even in the middle of the night, when they experience something and they need someone to talk to or they need someone to help them out a robot can be available, whereas a human, you know, you're going to have to contact that human, wake them up and get them to come to the retirement village. And if it is for something that– you know, maybe someone is just a little bit scared and they just need some reassurance having a robot there I think is more beneficial than trying to get a human to have a chat in the middle of the night when they're also tired. So yeah, I think that's probably the main benefit, the robot is not going to leave. (Dewi, student)

Dewi recognizes that residents at the retirement villages do have certain needs that are currently difficult for carers to fulfill, such as being available at any point and having the time to stay with each resident for long amounts of time. This is a service that no human, whether

it be a family member or carer would be able to provide. Social robots provide residents with the possibility of claiming an additional level of care that cannot be delivered by a human. This falls in line with the way Svein Øverland (Trinh 2019) uses the concept of warm technology, as an adaptation of technological tools in a way that supplements care services provided by humans. By using social robots as a supplement in the retirement villages, the residents are given the opportunity to fully maximize the level of care they receive. Social robots are useful in areas of care where human support is not available around the clock, for example in therapy, as Øverland suggests. It would not be possible for every single person who sees a therapist to have said therapist readily available at all times, but an AI system or a social robot could provide care and guidance in moments where the patient is feeling vulnerable.

There are qualities to Paro that substantiates the care services at the retirement villages. In conversations I have had with employees at Skyside retirement village and Sunny House day center, I have been told of interactions with Paro that involve physical touch and snuggling, not just conversation. The elders enjoy snuggling and petting the robot, similar to how they would treat an animal used in animal therapy programs. Paro can contribute to a type of care where the users themselves control what acts of care they receive – whether they require to vent about their feelings or they need a snuggle buddy. The social robots open the door towards acknowledging a more diverse range of care-needs that different people have, for example people with dementia or people with autism. Social robots pave the way for the development and utilization of technology with socially enhancing intent.

It is expected that the use of robotics and technological solutions will reduce the cost of providing health care services. However, conversations with researchers and staff indicate that this is not the role of Paro – he is used in ways that do not reduce cost or time, but for purposes that increase the wellbeing of seniors. Throughout this chapter I have discussed the economic and political relevance of automation. And while this is still an important perspective to emphasize in discussions about technology, I argue that we might be ready for robots to take on new social roles that operate on ideals of increasing care rather than increasing production and growth. I explore the social interactions with robots further in the following chapter.

Chapter Three – Interactions with Machines

As robots and technological solutions are becoming more common, I investigate how we are adapting to interactions with and through machines. This chapter looks at the reductionist processes that take place when conversation is mediated by and through technology, and how humans are reshaping their language in order to negate these limitations. Sherry Turkle, who is prominent in the field of studying human interaction with technology, looks at the potential losses to conversation with the mixing of technology and social spaces. Towards the end of the chapter, I look at how mobility between the categories of human and machine have been restricted, particularly within the naturalistic discourse.

Novel Experiences of Interaction

When I was around ten years old there was absolutely nothing I wanted more for Christmas than a robotic toy dinosaur. The toy dinosaur I had set my heart on was a T-rex that could be steered using a remote, and it could even growl! However, the toy was quite expensive and there was no telling if my parents would be able to get me the robotic T-rex when it came time for the holidays. To my surprise I did end up getting the dinosaur. I was in absolute ecstasy playing with the robot all night until I was forced to go to bed. Interestingly for a toy that I had been dreaming about for so long, it turns out it took an incredibly short amount of time for the novelty of the robotic dinosaur to wear off. I did enjoy using the robot to try and chase the dog, yet after just a couple of weeks I had grown impatient with the slow speed of the dinosaur, and annoyed at the lack of mobility and the repetitive sounds it made.

I have not given my robotic dinosaur much thought since then, but I was reminded of my old toy when I started hearing from some of the participants about the 'novelty' of Paro. Out of the seven participants I talked with, three of them mentioned 'novelty' as one of the robot's qualities that seemed to draw its users in. For most of us robots are still unusual to come across in our daily lives, so when people actually meet a robot for the first time in their lives they might not have a lot of expectations for the robot and are easily impressed. With Paro people might not expect the robot to give off body heat the way real life animals do, or they might not expect it to respond to sounds and movements. They might just be impressed that Paro is a seal, because few people have met a seal up close prior to their encounter with Paro. Lorane at Skyside told me about a group of ladies who she says 'absolutely adore Paro',

the ladies would say things like 'Oh! There he is', 'Can I have a turn?'. If their adoration was not due to a deep emotional bond that they had with the robot, Lorane suggests, then it was due to its novelty.

Lisa, whose grandmother (Anna) had been a resident at one of the retirement villages before she passed, had also found that the novelty of Paro would engage her grandma, as well as her own children.

> And so when I got to see the village where my grandma was, and she was having a bit of a poor day I said 'oh let's go get this thing' and I brought Paro and handed it to grandma and she lit up because it was something novel. It had these black eyes and whiskers and it makes noises and it vibrates, and it's warm and fluffy. All those attributes were really good, she looked at its cute face, and she was definitely engaging with it. (Lisa)

Lisa was excited to see her children and grandmother engaged and bonding over the robot, but the experiences with Paro at the retirement village also made her wonder how a cheaper, less advanced FurReal Friend or a fluffy dog would compare used in the same setting.

> Was it the fact that we had some object that we could all come around and look at or was it because it was Paro? So I really liked the robot, I really liked Paro, but in the back of my mind I am a little skeptical as to whether it was the novelty of any new thing or something about Paro that was particularly engaging. Paro is evidence based, it has academic studies behind it. So if you're weighing up this and this, Paro has a peer review paper on it and that other FurReal pet does not. (Lisa)

The FurReal Friend mechanical toys retail at around 30 USD on amazon.com compared to a whopping 6,400 USD for Paro in 2017 (Crist 2017)**.** Lisa noted that her grandma had also been engaged when she was introduced to Snapchat filters[14], which does pose the question of whether her enthusiasm had less to do with Paro being Paro and more to

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[14] Snapchat is a popular social media platform where you interact with others by sending text, pictures, or video clips. Snapchat filters are a type of lens program you can use to make live alterations to whatever is in frame, for example by giving funny ears to the person in frame.

do with Paro being a novel item and that she was in fact connecting with her great grandchildren.

> The other really fun time we had with grandma was when my kids showed her Snapchat filters. And they showed her the cellphone, the picture of it and then put puppy dog ears on her, and when she opened her mouth a tongue flopped out like a puppy dog. And that was hilarious for everybody, including grandma and the girls, so they had a heap of fun playing with the Snapchat filters and their great grandmother. So it was that novelty and piece of technology, and showing grandma a new thing. The kids really enjoyed that. No robots involved, but the same level of engagement together. (Lisa, former employee and family member of a deceased Selwyn resident)

The student Sadie, who had been working on a study using a different robot, the humanoid robot Nao used in the role of a receptionist during one study, had made a similar observation on the power of the novelty of the robot.

Picture of "NAO Evolution Academic Edition, Programmable humanoid robot in blue" from the website Génération Robots (n.d.)

In the study, participants would interact with the Nao robot, but the robot would display different behaviors – one was neutral, in another group of participants the robot used a forward lean, one used self-disclosure, and one used voice pitch changes. Remarkably enough they found no difference between the groups in regard to participants' perceptions, Sadie wondered if this had something to do with the robot being a novel item.

So they all gave the robot really high marks on every measure even in the neutral condition where it didn't do anything they were like 'it's fantastic! ten out of ten!'. I think it was such a novelty and the robot was so cute that they were like 'It's wonderful' and they just gave it high marks – so all the results were skewed over to the positive side for every group, and the only differences we saw were actually in the video. (Sadie, student)

When watching the recordings of the interactions, they noticed differences in how people responded to the behaviors by looking at the participants' body language. Yet all the robots were marked high, suggesting that participants were impressed regardless of the different behaviors of the robot. The potential issue is that as soon as the novelty of the robot wears off, the robot risks losing its charm.

When the novelty of the robot wears off, if it ever does, what remains is the function of the robot. Phil, who I got in contact with through the CARES research center, was a nurse working on implementing technology in pharmacies, told me one of the biggest concerns from a pharmacist's point of view was *function*. He had noticed that the pharmacist's reaction to a robot in the pharmacy was mixed, and most of their concerns were about the robot getting the medication wrong. In order for the introduction of robots in pharmacies to actually work, Phil emphasized that the robot would have to work seamlessly so that the pharmacist would not be doing twice the work having to correct the mistakes of the robot. Robot floor-cleaners and lawnmowers are still in high demand because they keep delivering reliable and good service. Dewi, one of the health science students I talked with, had also suggested the attitudes of people who were initially hesitant to use robots would get comfortable with it when they saw that the robot was *useful*.

But I think in the future when we start using them more and when we start seeing them around and seeing that they are useful, and that it's just a bit of technology like it's not a human and a machine that's going to take over the world. Then I think that people are going to start to see them more as a companion and they will be more open to actually spending time with robots, you know, playing games with them or having them in their homes and helping them out. And I think, at that point, if you have a machine like a robot in your home that much and you are spending that much time with it and it's actually helping you maybe alleviate some of your burdens, you know, things you have to do at home, cooking, cleaning… then at

that point I think you will see it as a companion because it's something that is helping you and it's something that is going to be around a lot so I think you just sort of get used to it and at that point you would just naturally see it as a companion. (Dewi, student)

He suggested that having a robot in your home helping out with reproductive labor such as cooking and cleaning could warrant the experience of companionship. He noted that the reserved attitudes towards robots that some people had expressed decreased in some cases when they would spend more time with the robot and start 'warming up' towards them. As we become desensitized to robots, we might stop worrying about the robots taking over, and start thinking about the best ways to utilize robots.

Exposure and Adaptation

During one interview over Zoom with Sadie, one of the students working with CARES, we got to talking about how participants in their studies experienced their first interactions with robots. She had been working on a study using a robot that acted in the role of a receptionist in a doctor's office. The robot in question is the humanoid 'head robot' EveR-4. Having never heard of a 'head robot' before I was excited when she suggested sending me a picture of the robot. At first sight I have to admit I was a bit scared of what I saw – the robot looked nothing short of a decapitated head on a pillow. I politely asked her if people were put off by the 'severed-head-on-a-pillow' vibe of the robot. To my surprise Sadie told me that people actually got used to it pretty fast. She recognized that it was not unusual for people to be put off by the head robot at first. However, she explained, those who participated in this study grew accustomed to the head on the pillow during their interaction. Some of the participants who had seen the robot in previous studies were even excited to interact with the bodiless-robot again.

We are gradually getting more comfortable in the company of robots, reaching what Turkle (2015b) terms the *robotic moment*; a point in time where we have made ourselves ready for robotic companions.

Sadie explained how she had noticed a difference in participants' attitudes towards robots according to the different age groups of people who interacted with robots. She found the younger generations often had a more relaxed attitude towards robots compared to their

parents' generation. Her impression built on the experiences she had from projects with CARES using participants of all age groups, but also her own children's attitudes.

> I think when the next generation comes through, I've got four children and my youngest is just a baby, but my oldest is eleven. And they just accept robots completely, there's no concern, there's no trust issues, they're just like 'Oh look a robot, that's so great.' If I brought home one tomorrow they'd be like 'that's fantastic.' you know, and they'd wanna ask questions and be around it. There's no worry there at all. And I think as they grow up – because I think we will start seeing more and more robots, in service type positions, and I think as they grow up with that, soon it will just become their normal. You know how they talk about what one generation tolerates the next generation will accept as normal. (Sadie, student).

With increasing exposure to robotics in the media and the use of technological tools in private homes, it did not seem that the younger generations were as startled when confronted with a robot. Even if they had little real experience interacting with a robot, the participants had quickly started to warm up to the robot. I asked Dewi how the residents he had worked with had responded to the daily care robot that stayed in residents' homes for a week, and whether they got used to it over time.

> Some people definitely don't and I think those people sort of have a negative mindset from the start so when they start using it they have this expectation that they're probably not going to like it, and because of course, they're not open to having it they don't really enjoy using it. (Dewi, student)

During our conversation Dewi had also told me that there were a lot of people who had never seen a robot before and because of that, their perception of the robot was shaped by the portrayal of robots in media and film. Outside of Asia a lot of the portrayal of robots tends to be on the negative side (Robertson 2007). With the creator of Paro, Takanori Shibata, suggesting the culturally disparate attitudes towards robots could be connected to a contrast in the portrayal of robots in Europe vs. Asia (Shibata et al. 2009). For Dewi, the residents' attitudes changed towards the end of their week of interacting with the daily care robot. He noticed that people had gotten used to it and even enjoyed having it around:

But some people get really attached, so a lot of people who have never actually even used a smartphone before or don't own a computer and they've become really fluent in using the technology. And they sort of anthropomorphize with it as well, so they attribute human characteristics to the robot and they see it as a companion and they get really attached to it, they name it, and they dress it up. It's really funny, some of them even used to pet the robot, so they would pet it on the head and they would talk to it even though the robot themselves didn't speak back to them. We had one participant, she would sit down with the robot every day and she would sort of share all her problems and all her challenges with the robot, so she would just sit there beside it and talk at it. Sort of offload, but the robot couldn't respond. I think that was a good way for her to feel like she was emotionally connected to it, even though it wasn't responsive to her. (Dewi, student)

Interestingly, the robot Dewi was talking about was not a companion robot, meaning the robot that was not designed for people to connect with, it was intended to be for practical use, yet some ended up connecting with the robot in ways that was not expected. The robot was used in the participants' homes for about a week, it would remind the participants to take their medication and they could also play games with it, but Dewi explained, it wasn't intended to be a companion, "We found that most people who used it actually did end up seeing it as a companion" (Dewi).

Sherry Turkle (2015b; 2015a), whose more negative perspective on interaction with technology I will engage with in a short while, is cautious of this type of normalization of robots, and what happens when humans get used to talking with and through technology. For better or worse, as humans interact more using technology we are starting to adapt to new ways of communicating.

Fluid in Technology

As younger generations are becoming more and more used to communicating with and through machines they are also becoming more fluent in how to communicate with technology. This is a symptom of whole generations adapting to the use of technology in everyday life. Dewi and Sadie both reflected on the generational differences they saw with

the participants in their respective research projects, and they both told me of similar experiences where young people had less of a mistrust and resistance towards technology.

As mentioned in chapter one, code-switching is the adaptation of speech and language to different situations. Code-switching is often used to describe a linguistic expression ethnic identity, or affinity with a group. Similarly, people adapt their language when speaking with robots or AI programs compared to how they would normally interact with other humans. Robots or AI programs intended for service (such as customer service robots or virtual assistant programs such as Siri or Alexa) often communicate in a goal oriented way. Siri will say things like 'What can I help you with?' and 'Alright, this is what I found'. Because this is the way Siri and Alexa are intended to be used, the interaction is very much focused on delivering assistance rather than engaging in a conversation. It will be difficult of course for a mechanical or service type robot to meet our expectations in conversation because these types of robots are not designed for that. Which is why it can be funny or even frustrating when people are unable to meet the linguistic code of Siri. Misunderstandings easily occur between the different linguistic codes of the person in conversation with a virtual assistant, which can affect the outcome of the interaction.

To illustrate I will describe an interaction between an elderly woman and her Alexa that I find particularly fun. The video was uploaded to the social media platform TikTok by the user @nanatok1921 (2021). The 40 seconds long clip starts with 99 year old Marie with her walking stick standing in front of an Alexa that is loudly playing the R&B song 'Yeah!' by Usher feat. Lil Jon & Ludacris.

> *just work that out for me. She asked for one more –*
> Marie yells the command 'Alexa' and Alexa pauses the song. "That's a – That's a – a jumping song honey. I want a beautiful dancing song honey. You know the nice ones honey, the kind of suave like – you know honey. You – You play a lot of beautiful –"
> Alexa interrupts Marie in the middle of her elaborate description and resumes to play Yeah! while Marie repeatedly tells Alexa 'no'.
> *They used to be the best of homies*
> *(Yeah!) Yeah!*
> *Next thing I knew, she was all up on m-*
> "Alexa!! That's not the kind I want. That's a *jumping* song. I want a sophisticated – "
> Alexa pauses the song briefly and says "Hmm I'm not sure" and immediately goes back to playing the song, again cutting off Marie.

Hey! LUUUDA

Watch out, my outfit's ridiculous

In the club looking so conspicuous

The woman angrily points her walking stick towards Alexa as if to threaten it before she turns to the person filming the interaction with a defeated smile.

Throughout the clip the person filming, presumably her granddaughter, has been laughing hysterically. This type of interaction becomes very funny for the person filming it, aware of the linguistic code of Alexa as well as the linguistic code of the older woman. Alexa does not understand Marie and keeps falling back to a previous command that somehow has made it play the song Yeah!. From a human perspective, the constant interruptions from Alexa during Maries explanations makes it seem like Alexa is intentionally ignoring her although this behavior is beyond Alexa's programming. The interaction between Marie and her Alexa is funny in part due to the human tendency to *anthropomorphize* – to give an object human attributes; Alexa is seen as behaving in a sort of sassy or rebellious manner, even though this is not the case, Alexa is simply not understanding the commands of the older woman. Created with the intention of receiving short and direct instructions Alexa is not able to process what Marie is saying. In looking at how people adapt to the use of machines, one obvious symptom of increased communication with and through machines is the adoption of new linguistic codes that make it easier for people to be understood by the machines. The study of linguistic codes involves *semiotic* interpretation; studying social communication of meaning through signs (Svendsen 2019). These signs can be the meaning of a certain word or a certain bodily movement and with the interpretation of these signs one can better understand their function. With sociable technology the interpretation of these signs can vary along cultural and generational lines.

New Meanings Emerge

Unable to actually travel to New Zealand to complete the planned fieldwork in person I, like most people during the pandemic, was stuck in the confines of my own home. During this time I might have taken up a new hobby, learned a new language, or looked for creative ways to make an income when my job at the airport turned out to be quite unlucrative. What I did instead, like many other 20-somethings was to embark on my new lifestyle with a fresh

TikTok[15] addiction, spending hours every single day scrolling through a never ending feed of short clips. What I have become increasingly aware of during this year of social isolation where a huge part of our social interactions are happening online, is that not only do we change our behavior when we speak directly to technology, when conversation is mediated by technology we change the way we interact with one another as well. The changes that happen in human-to-human interaction will be a crucial point later when I look closer at Sherry Turkle's (2015b; 2015a) arguments.

In the move of conversation to online platforms what I have found is that we are finding new ways to express emotion through the use of pictures, videos and sound. Gifs[16] are used to express meaning in chats, usually they are used to signify an emotion or reaction to something, while memes tend to be used with a satirical pop-cultural layer of meaning. On TikTok, users are finding ingenious ways to interact with sound clips. While the emoji is used to express meaning through symbols of figures and faces in text messages and chats. The connection between culture and semiotics has been studied by anthropologists like Clifford Geertz who published the essay "Thick Description: Towards an Interpretive Theory of Culture" in 1973. To begin to explain his own argument Geertz builds on the famous sociologist Max Weber.

> Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning. (Geertz 1973)**.**

Geertz has a semiotic understanding of culture, which means signs and the meanings behind them are important to his definition. He understands culture to be the interpretation of social processes and behaviors as sign systems, and to illustrate he explains the very complex layers of meaning one simple wink can inhabit. To wink in its absolute most basic form is the contraction of the facial muscles to cause one eye to close, that is one layer of meaning. A second layer of meaning is the interpretation of the wink to mean that the person who is winking actually has got something in their eye and that the wink is not a wink but a reaction to the alien object that is interfering with their eyesight. A third layer of meaning is the

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[15] TikTok is one of the worlds biggest social media platforms, where people upload short videos.
[16] Gifs are short muted videos that play on a loop, their meaning is often quite literal.

interpretation of the wink to mean that the person winking is communicating some hidden message to another person.

The complex understanding of symbols adds layers of meaning best understood by those who are insiders to the specific culture inhabited by these symbols. By moving interaction to platforms where it takes place through or with technology, the social interaction goes through a process of reduction. In the example of 99 year old Marie and her Alexa, the technology did not understand the significance of the words Marie chose, such as a 'jumping' song, or a 'sophisticated' song. Marie's choice in words are subjective to her understanding and preference in music, another human might have picked up on this but a machine like Alexa can not. Alexa has trouble understanding some of the more complex layers of meaning that are exchanged during conversation. This difference in interaction is significant when we start to open up for robotic companions. Sherry Turkle (2015b; 2015a) argues that in the process of talking more with machines we move away from some of the emotional layers that are inherent to conversation between humans. A robot is not going to be angry or disappointed with you, so when you have a robot as a companion you risk developing unhealthy expectations of companionship. This is even put forth as the selling point in advertisement for the sex robots mentioned in the first chapter "The real humanoid AI Robot Sex Doll will never say NO to your fantasies and will never dare to accuse you of sexual harassment." While in interactions through machines using text messaging you are unable to see the other person, and emotional connection is disrupted by the reductionist form of interaction.

However, because of the reductionist effect machines have on conversation, humans adapt and find new ways to move around these challenges. Online, people are forming communities and interacting with one another using different social media platforms, where they can cultivate new understandings of sounds, pictures, and symbols. A cultural development of communication is happening online. As an example, one of the most basic emojis, the smiley face, is also one of the most controversial emojis out there. The smiley face has different layers of meanings depending primarily, to my understanding, on your generational affiliation. If someone sends you a text with the emoji '🙂' how would you interpret the symbol? Some of us would probably think the person who sent the text is trying to communicate that they are happy. This is one layer of meaning that the symbol holds. To me there are two ways this emoji can be used, and none of them are happy: 1. It can be used to express passive aggressiveness, a smile but not really a smile. Example: I just cleaned the bathroom for the fifth time in a row 🙂. And 2. It can be used to express irony. Example: I

love working in customer service 🙂. Something in the lifeless expression of the emoji compared to other smiling emojis like '😊' which utilizes the eyes in the smile, has made people interpret the symbol to mean not only something different but in fact almost the opposite of the original meaning. In order to make technology imitate social behaviour using *iconic* communication, non-verbal communication using symbols, it goes through a process of reductionism. Restoring the original meaning of the smiley-emoji, we add certain features like closed eyes and red cheeks that work against some of the reductionist process of communication through technology.

The '🙂' smiley is an ambiguous symbol, it has several meanings attributed to it making it a multivocal symbol (Turner 1967), it is more complex than it might look at first glance. This is true for memes and TikTok sounds as well – memes are symbolic pictures that speak to a specific topic, usually it will reflect a current theme in popular culture. TikTok sounds are in many ways the audible version of a meme. Communities of people are interacting with each other using sounds, videos, pictures, and symbols enriching the form of communication with layers of meaning that are not easily translated to face to face interaction. Cultural development is impacted by the semiotic ways of communication that arise when we interact with and through technology. I have described some of the new layers of meaning that are contributed to pictures, sounds, symbols through the use of memes and emojis, and I turn to Sherry Turkle who engages more critically with the shifts that are happening with our social behavior when conversation is taking place with or through technology. Early on in the book *Reclaiming Conversation: The Power of Talk in a Digital Age* (2015a), Turkle explains that her stance is not anti-technology but it is pro-conversation.

The Robotic Moment – What Do We Forget?

The pandemic that hit the world in 2020 introduced strict measures of social distancing. Older adults were identified as one of the most vulnerable groups if infected by the COVID-19 virus and the security measures at eldercare facilities in New Zealand were, for the most part, one level higher than the rest of the country to protect vulnerable groups resulting in weeks of isolation for the elders in periods of strict lockdowns. This pandemic and future ones that lead to self-isolation are examples of times where it could be advantageous to fully utilize robots' social abilities to help people who are experiencing difficulties in isolation. When human-to-human contact is impossible the use of a robot for companionship or as mediators of companionship might prove to be more important than

initially expected. This argument is closely related to the argument that establishes robots as a supplement for care. If the robot's care is only an added bonus on top of the care received from humans then it must be better than the alternative of no added care. The argument is also used to defend the use of robots in healthcare in situations where staff members are so pressed for time that the use of robots would not replace staff but would be the alternative of little to no human interaction. As Dewi put it: "A robot is always going to have time to sit there and listen, or at least give off the idea that it's listening to someone." With the rise of the older population and the pressing issue of staff shortage there is a big market for robots that can potentially fill a future gap of human-to-human care in healthcare. Sherry Turkle (2015b) is critical towards this argument that the robot is the better alternative in situations when there is no alternative because it is a short way from the acceptance and appreciation of the artificial over the real.

Building on years of experience looking at human-to-machine interaction, Turkle formulates what she has found to be lost in these interactions. With a critical perspective on the idea of machines for companionship, Turkle asks herself and the reader 'what do we forget when we talk to machines?'. To kick off her argument she uses the Turing test; can a machine that simulates intelligence, be confused with real intelligence? The Turing test argument, she writes, justifies the replacement of a person for a machine if the difference between the real thing and the simulation of the real thing is unnoticeable. The question that follows is; if a simulation can be confused with authenticity, is simulation the equivalent of authenticity, or is something sacrificed in the simulated version? During her speech at The Aspen Institute conference (Turkle 2015b), she establishes two main objects are lost in interactions with robots, these are the lack of risk and the lack of empathy, which she also writes about in more detail in *Reclaiming Conversation: The Power of Talk in a Digital Age* (Turkle 2015a). Turkle argues that authenticity *does* matter because people draw empathy from one another in interactions. Authenticity of conversations establishes layers of meaning that a simulated version is unable to recreate. The empathetic connection we get from interacting with each other, Turkle argues, is important for human development. The lack of empathy in interactions with or through machines (for example text messaging) therefore becomes problematic for Turkle. Tara, a ten year old girl Sherry Turkle talked with to understand her interactions with the virtual assistant program Siri is described as being a perfectionist and always the 'good girl', Turkle is worried about the consequences interactions with Siri will have on the young girl who is still at an age where her social skills are developing (Turkle 2015a, 346). The interactions Tara has with Siri are described as a sort

of 'venting', and Turkle worries the young girl who wants to be the 'perfect child', will censor her feelings in the company of friends or family. Tara is confusing relations between humans with relations between things, she has imposed upon Siri the role of a communication partner. Care and companionship which humans are so familiar with, Turkle argues, is being outsourced on the expense of real empathy. Both risk and empathy are important parts of an interaction, and these things are lost when we interact with machines, Turkle argues.

> What Tara is doing is not training for relating to people. For that, Tara needs to learn that you can attach to people with trust, you have to make some mistakes, you have to risk an open conversation, you have to get a little hurt, you have to learn how to rebound, you have to be with somebody gentle – that's how you learn that kind of stuff. Her talks with the inanimate is taking her in a completely different direction. She is being taken into a world without risk and without care. (Turkle 2015b, pt. 26:45-27:17).

When connecting with people *through* technology, for example texting rather than face to face interaction, we allow ourselves to escape uncomfortable situations that are easier to face through the wall of technology. For example breaking up over the phone or apologizing to someone over text. In her opinion, the authenticity of these interactions bring about some of the more uncomfortable or ugly moments of life, which are important. To illustrate this point, she points to the skills people learn by apologizing and seeing other people's pain. This, she argues, teaches humans something about empathy (Turkle 2015b). She breaks down conversation to mean – not just an exchange of words and information – but a process of learning and developing one's social behavior, a wisdom that in her opinion is not easily retrieved from technology and machines. Robots are not human, and emulating human social behavior is not an easy task for robots, another reason why substituting human interaction with robots is difficult.

Sadie, one of the student researchers at the University of Auckland who had been involved in projects looking at the use of social robots in health care, had observed that participants would prefer the robot to smile at them even though the smile is inauthentic; the robot is not actually experiencing the emotions that in humans would present as a smile. "Which is interesting again because it's a robot, what does it matter if it smiles or not? It's not genuine. But people like it, they want it to do the things that we do," (Sadie, student). People

appreciate technology to show positive social behavior during interaction despite inauthenticity. The smiling robot is not actually experiencing happiness – it does not care *about* you, but its behavior can provide care *for* you – as participants might feel less anxious when the robot presents you with a smile. This suggests that, for some, authenticity is less important than our experience of the care-services provided for by the robot.

It should also be noted that the issue Turkle (2015b) has with reductionism of the robot when emulating a human conversation partner could be massively improved upon with the use of robots that are designed with social interaction in mind compared to Tara's experience talking to Siri, a virtual assistant that is not intended for companionship. From Turkle's arguments about the impact of technology, we take with us her emphasis on the purity of human conversation and the contaminating effects of technology, to focus more on how machines are categorized.

Putting Technology in Its Place

Critical to the impact of technology on social interaction, Turkle (2015a) argues that technology needs to be 'put in its place', a sort of categorization of technology where we identify where technology does and does not belong. She does recognize that technology can bring about good things in general, but she describes technology as a polluting force on conversation. Her stance is marked by the desire to create and uphold certain domains that are fit for technology and others where technology may eventually do more damage than good.

'The robotic moment', the time period Turkle argues we are in right now, is marked by people declaring themselves as ready for robot companionship. She notes that these types of robots have not necessarily hit the market yet, maybe they haven't even been designed. Even so the robotic moment marks not the coming of, but our acceptance of these anticipated robots (Turkle 2015b). In chapter two, I discussed how Andersen and Sørensen (1992) make note of the influence of private companies on technological development. Agreeing with Turkle (2015b; 2015a) who is cautious of free ranging technological development, they call for a curated path for the use of technology where technology is tailored to benefit society and individuals. Yet Turkle (2015a) goes further by establishing borders between technology and social spaces:

We can design technology that demands that we use it with greater intention. And in our families, we can create sacred spaces – the living room, the dining room, the kitchen, the car – that are device-free. We can do the same thing at work – for certain meeting spaces and classes. We can plan for a future in which the design of our tools and our social surroundings encourages us to be our best. As consumers of digital media, our goal should be to partner with an industry that commits to our using their products, of course, but also to our health and emotional well-being. (Turkle 2015a, 44).

During the pandemic however, we have seen the use of technology exploding in some of Turkle's more sacred social spaces. People work from home, study from home, and keep in touch with friends and family all mediated through our phones and computers. What has also been made clear during the pandemic is that even though many of us interact using technology more now than ever before, the need and want for more face-to face human interaction is not ebbing away, for many it has increased by far.

By framing technology as a pathogen to conversation, Sherry Turkle argues for boundaries between the machines and humans so as to stop the negative interference of technology in our social spaces. As technology is gaining social intelligence this separation is increasingly difficult to adhere to. In order to understand the desire for separation between humans and machines the nature/culture divide described in social sciences provides a good analogy; ontologically humans, language, and art are categorized to belong to the pole of culture, while non-humans such as animals, trees, and water are synonymous with the pole of nature (Bruno Latour 1993). Culture is usually regarded as the counterpoint of nature, and vice versa. The nature/culture separation was fundamental for Claude Lévi-Strauss, the founder of *structuralism* in anthropology. Structuralism is a school of thought concerned with understanding and describing how the human mind operates, and Lévi-Strauss (1964; 1963) argued the human mind uses binary oppositions to make sense of the world we perceive around us. He further argued that people who adhere to 'Western' science structure and organize reality using the same pattern of thought (binary opposition) as those who do not submit to 'Western' science. What differs, in his opinion, is instead their *resources*. He extrapolates this argument to claim that the *way* people think and organize the world around them is universally the same. Lévi-Strauss has been criticized for overgeneralizing the universality of his analysis, with later social theorists arguing that the binary divide of

organization, and particularly that of the nature/culture divide, is not at all universal but specific to the 'West' (Latour 1993; Descola 2013).

Social scientist Bruno Latour (1993), describes and criticises how the nature/culture divide has been thought to be a characteristic of "modern society". In the influential book *We Have Never Been Modern* (1993)*,* Latour describes the differentiation between nature and culture as an ideology practiced under the illusion that it is modern – in a modern society, cultural practices such as politics are thought to be separate from nature, yet Latour (ibid.) points to the climate debate to make a point that nature is integral to our cultural practices such as politics despite the historical denial of hybridity (between nature and culture).

Within this tradition, non-humans are kept separate from (and subordinate to) humans. Social robots similarly belong to a category of non-humans separate from the human category. In common with the two systems of organization: the human/machine divide and the nature/culture divide is the ontological centering of the human species, this philosophical perspective is also referred to as *humanism.* René Descartes, the philosopher most famous for the line *cogito ergo sum* (I think therefore I am), has been influential to 'Western' philosophy and the development of the Cartesian method of thinking that builds on a dualistic ontology separating mind from body, along those lines he compared animals to advanced machines due to their inability to think (Shugg 1968). This separation between machine and human is blurred with the constant developments in tech – AI systems can learn, which means that robots can respond to input rather than simply behaving according to a coded manuscript. This process is very similar to the human process of thinking.

Companion robots, such as Paro, belong to a new frontier of technology that exceed the imagined boundaries of robotics and their use. Donna Haraway (2006 [1985]) who wrote *The Cyborg Manifesto* long before companion robots were a reality, describes how epistemological desires to keep seperate that of human and machine is generating a border war, where hybridity should not exist. She uses the word cyborg to describe the hybrid mixes that exist between these boundaries of man (or organism) and machine. The cyborgs exist in automated labor, reproductive technology, artificial intelligence, and modern medicine (Haraway 2006 [1985]).

With Haraway's definition, a social robot can be considered a cyborg, but so could a human with mechanical prosthetics or other medical equipment as a part of their body. The separation between machine and human is therefore increasingly difficult to define; in *Appenes Verden* (2021), Thomas Hylland Eriksen describes the power and influence of the smartphone which for some people has started to feel like an extension of the body. Cyborgs

like Paro challenge epistemological conceptualizations that seperate machine and organism (Haraway 2006 [1985]), because he is understood as something of a mix between animal and machine:

> It's really bizzare holding him [Paro], because he just feels so animal-like. Even just the fur that they've used… It's so bizarre. You've seen pictures of him, and you see him sort of move and he makes his weird sort of robotic noise and at the start you kind of go 'oh that's still a robot though' but then when you actually hold him that's just – everything is just so different. (Dewi, student),

Dewi, one of the student researchers from CARES research center, described how the robot would seem to somehow exist almost like an animal but also like a machine. While in chapter two, Amiyah told me about Paro being understood by some of the older adults as a baby, again crossing between organism and machine. In the fourth chapter I will discuss further how Paro exists between categories, where I use the concept of anomaly from Mary Douglas. Dewi points out some of the features of Paro that attribute to the animal resemblance:

> [...] He feels warm to touch. You don't really notice it, but then when you think about it, I think that contributes to the experience of making it more animal-like. So like when you hold a cat, or when you have a cat sitting on your lap, they're so warm but you don't think about the fact that they're warm. It's just [an attribute] something that is alive *has* I guess. It just sets them apart from just another toy. (Dewi, Student)

Dewi associates body temperature with things that are alive, however, Paro is technically not. Paro is a cyborg between different categories – he is warm, he responds to hearing his name, he gets sleepy at night, he enjoys being cuddled. But he also has an on and off button, his batteries need to charge, and his volume can be adjusted.

French Anthropologist Philippe Descola (2013), revisits the relationship between nature and culture, and argues with Bruno Latour (1993) that this separation of categories is both new and particular to the 'Western' world. Descola (ibid.) introduces four ontological perspectives that he argues humans use to relate to the world around them, these are:

animism, totemism, naturalism, and analogism. Naturalism finds that all things share the same external experience – we all have to obey the law of nature. However, in this ontological perspective the insides of things differ – humans and trees (or machine and human) are not thought to share the same internal existence, which Descartes would agree to. Within this perspective, non-humans (trees, water, animals) are seen as resources for human production – humans take nature and create culture[17]. The same is true in the case of robots – humans interact with robots on the principle that they enable human production (automation). Robots are not social agents in and of themselves (just like any other non-human), rather they are 'good to produce with'[18]. Animism on the other hand, is the understanding that all things share similar insides, water might have something of a 'life-energy' similar to that of a human, however there are external physical differences to our existence.

While naturalism is popular in Europe, North America, New Zealand, and Australia, the concept of animism can also be a useful analytical tool in understanding the acceptance of robots in Japanese society, with one theory suggesting the influence of animism found in Japanese Shinto can help explain the difference in attitudes towards the robot. Japanese Shinto is an indigenous religious belief that attributes personhood to humans, animals, certain parts of nature, and possibly machines. In Japan, there exists a cultural narrative of robots as friends, a narrative that according to Kathleen Richardson (2016) might benefit from Shintoism and Japanese Buddhism because this epistemology provides non-humans with personhood without threatening the annihilation of human personhood (2016, 121). The strict ontological borders we have created between the different species are challenged by the introduction of artificial lifeforms, in an earlier publication Richardson uses the term 'annihilation anxiety' to talk about the anxieties we experience when the robots move into new spheres of our lives, a central agent to this experience is the fear of a human reduction to nothingness, "'To reduce to nothing' is also about the erasing of differences between humans and non-humans," (2015, 4). 'Western' epistemology surrounding personhood is challenged with the introduction of social robots in ways that personhood in Japan is not, because personhood in Japan is not unique to humans. In Japan relations of friendship or companionship can exist between humans and machines while in the 'West' the same relationship sets off a border war. The creator of Paro, Dr. Takanori Shibata, released a study

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[17] The acclaimed American cultural anthropologist Sherry Ortner (1972) uses the nature and culture divide to describe the near-universal subordination of women as the simile to nature, while man is regarded as the cultivated superior similar to that which belongs to the pole of culture.

[18] Lévi-Strauss (Lévi-Strauss 1964 [1962]) explains how Totemic animals are not good to eat but 'good to think' – the meaning of Totemic animals lies beyond food. In the Naturalistic philosophy, robots are not social actors, they are a resource to enhance production i.e. they are good to produce with.

in 2009 where he discusses the possible cultural differences between European and Japanese reactions to Paro. Shibata notes how robots are often portrayed positively in Japanese culture, while in Europe robots are oftentimes portrayed as 'slaves' or 'enemies' (Shibata et al. 2009, 453). Shibata suggests people's attitudes towards robots and our willingness to interact with them might be affected by these culturally different portrayals of robots. In the United States, Richardson (2016) found that researchers in technology were working against attitudes towards robots that involve human annihilation, this perspective is thought to be influenced by Hollywood's negative representation of robots in movies. Some of the researchers I talked with described similar attitudes towards robots in New Zealand, with Dewi suggesting hesitancy towards robots was one of the biggest challenges in robotic research.

This discussion has provided some context as to why some prefer to keep the machine separate from our sacred social spaces; the robot might reduce empathy in conversation, or, the robot will begin to challenge the ontological existence of humans as unique thinking creatures. However, this discussion has also shed light on the use of attributing personhood in order to engage with non-humans as social actors. This final discovery will be useful in the next and final chapter, where I illustrate how the robot's identity begins to take shape. For better or worse, this chapter has been devoted to showing how humans adapt to robotic interaction.

Chapter Four – More Than a Machine

This chapter looks closer at the creation of Paro's identity as a companion. Paro, much like the emoji from the previous chapter, does not communicate with words, it uses iconic communication; it makes sounds, produces heat, and moves. The identity of Paro is established as an additional layer of meaning that contextualizes this iconic communication and gives life to the robot. I show how Paro's design enables the elderly to create their own idea of who Paro is and how older adults, encouraged by staff, attribute Paro with personhood.

Seeking Companionship

The SARS-CoV-2 (Covid-19) pandemic has left many of us with first-hand experiences with feelings of loneliness and isolation as a result of social distancing, limiting the number of social relations with people outside of the household. The 2020 pandemic has also highlighted the creative ways humans look for companionship, to the extent of interacting with inanimate objects. One touch-deprived Norwegian woman made the news during the pandemic after she had started cuddling up to her old Teddy bear in an attempt to help soothe the need she felt for human contact (Vollan 2020)**.** Humans naturally seek companionship and closeness to others, this has become plainly obvious in light of the pandemic when many of us have been forced to stay away from each other to a point of discomfort and loneliness.

With our abilities as humans to seek out and easily form companionship, we develop attachments. Our need for attachment and companionship is more obvious now during the pandemic when maintaining social relationships can be a challenge. Yet even before the pandemic people in retirement villages in New Zealand were forming attachments to their robotic health assistants. This came as a surprise for Kathy Peri, a senior lecturer in nursing at the University of Auckland who was working on a project at Selwyn Village using the healthcare robot iRobi. In an interview with the New Zealand Geographic she explained how when the study had ended and it came time to return the iRobis a few of the residents had become upset at the prospect of returning the iRobi.

"Don't put that robot in the box! That's my friend," they'd say, as the
researchers came to take them away. They had to carry him out and box him up in the

hallway. "That was a surprise for me, and I've worked with older people for most of my life," says Peri. "One of the things that a lot of the other health professionals will say is, 'Why are you wanting to put robots into older people's houses? It's not a nice thing to do, they need human people to talk to, not robots'. "I was thinking that myself at that point. When they said, 'Don't put it in the box!' I thought, 'My God. They've actually got an attachment to it'." Surprise at the residents' fondness for robots perhaps says more about society's perceptions and expectations of elderly people than it does about robots. Peri remembers how, before the study began, she told her kids about it, and they were dubious. "They were like, 'Mum, what are you doing? Old people don't need robots. They're for young people'. But why should they be?" She told her disbelieving kids: "Watch this space." (Arnold 2018)

Kathy Peri used to have the same attitude that many other health professionals did towards the use of robots in eldercare – the older people needed actual humans to talk with, not robots. However, she found that the elders had connected with the robots in ways they did not expect. The article explains how the robot was used for reminding people to take their medication, measure their blood pressure, play games, and to connect the user to friends and family. iRobi was not intended for companionship, but for many of the older adults the robot was more than just a machine.

The Ambiguous Identity of Paro

Having lived in a tiny shoebox apartment with an excessive desire for houseplants I have occasionally found myself knocking over, stepping on, and waking into my precious greenery. Mainly my monstera plant has fallen victim to my poor spatial awareness, and feeling guilty for my lack of respect for my plants I have found myself in situations where I am profusely apologizing to the plant as if somehow the violated plant is upset with me and that it will be able to hear and understand me when I apologize to it. This behavior of attributing human traits to objects or non-humans is called *anthropomorphism* (Guthrie n.d.) and it is, thankfully, not just a weird thing I do but a pretty common human behavior.

In cartoons, objects and animals might talk or even wear human clothes. We project our own understanding and experience of the world onto the objects around us. It is common to do this with the animals we keep as pets – maybe you have thought of your cat as being

sassy or your dog lazy. There are many different theories as to why we do this, perhaps we find the objects relatable, maybe we are prone to recognizing shapes and patterns, or maybe we have a self-centered worldview; the concept of anthropomorphism has been through some criticism within anthropology; Kathleen Richardson (2016) points out that the concept of anthropomorphism takes 'human' to be the centerpoint as it interprets and compares non-human behavior with human behavior. Epistemologies that build on animism on the other hand, as mentioned in chapter three, attribute non-humans with personhood without necessarily centering humans as the baseline. Therefore, Richardson suggests the concept of animism holds greater analytical value to the field of anthropology, and in the case of attributing personhood to robots Richardson uses the term techno-animism, which might better describe the methods of which people interpret personhood in Paro.

The Paro robot is designed to look like a baby seal because, unlike a cat or a dog, few people have any experience with a real seal and therefore do not know what to expect from interactions with them (Shibata and Wada 2011). Unable to compare Paro to an actual seal, people will not be disappointed by any lack of similarity between the real life and the robot. With a robotic cat or a dog, the lack of similarity between the two might break the illusion of the robot being a living creature. The Uncanny Valley theory by Masahiro Mori (2012c), inspired by Sigmund Frued (2003 [1919]) who wrote about the 'uncanny' feeling people experience when seeing dead bodies, identifies similar feelings of discomfort when seeing objects that look just off of being real and alive. In 2012 IEEE Spectrum published the first English translation of The Uncanny Valley to be authorized by Mori himself (Mori 2012c).
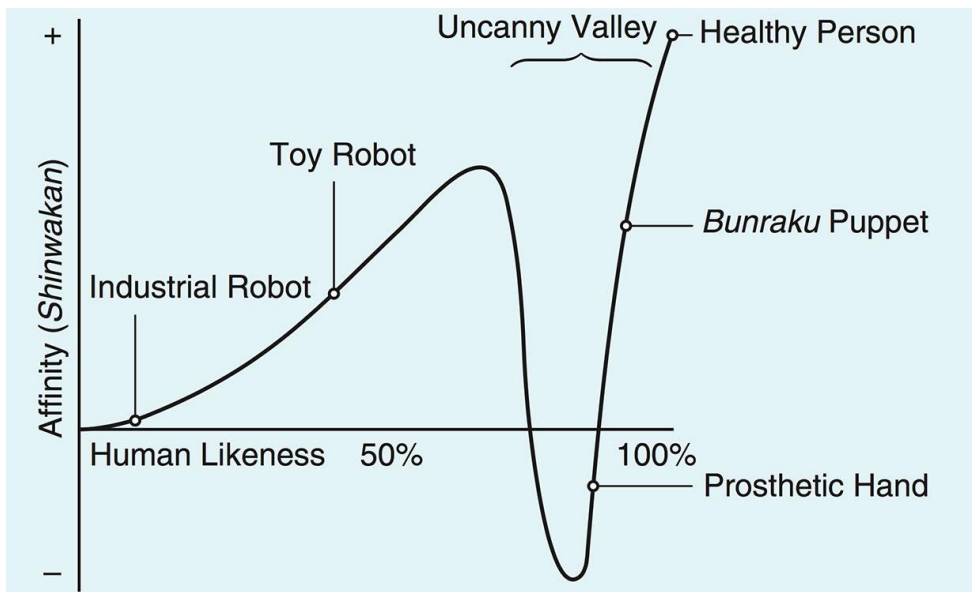
Illustration called "Figure 1" by Masahiro Mori (2012a [1970]) appears in the article "The Uncanny Valley: The Original Essay by Masahiro Mori"

Mori explains how an industrial robot is designed with a practical and mechanical look in mind, and because of this people do not experience any affinity to the industrial robot. On the graph above, the industrial robot is shown to have little human likeness and not much affinity.

A toy robot is designed not with industrial practicality in mind, but will take a more recognizable shape. The toy robot will likely have arms, legs, torso, and a head. Mori (2012c) concludes that people will have more affinity towards this kind of robot, which is represented on the graph by an increase in human likeness and affinity.

Although mechanical, a prosthetic hand that had been covered in artificial skin with nails, veins, wrinkles, and body hair is going to have a high score in human likeness and affinity, but as Mori explains, when we shake the the prosthetic hand we will notice the hand is limp and cold to the touch. This new discovery will replace our affinity of the hand with eerienes, and the hand will become uncanny even though it has a high score in human likeness, as seen on the graph.

Moving upwards on human likeness and affinity we find the *Bunraku* puppet; a puppet used in traditional Japanese puppet shows. While the Bunraku puppet seen up close is not as realistic looking as the prosthetic hand, the distance created between the puppet and the audience allows the viewer to focus instead on the likeness of movement of the puppet including the eye movement and hand movement. Mori notes that the art of the puppet show will draw the audience in, and they likely develop an affinity for the puppet. The Bunraku

puppet therefore scores much higher on the affinity scale despite its low increase in human likeness compared to the prosthetic hand. Scoring highest on both human likeness and affinity is a living healthy person. While the dip in affinity seen on the graph is what Mori terms the Uncanny valley.

Interestingly, Phil, the nurse who had worked on the introduction of robots in pharmacies, had noticed that trust is incredibly important in interactions with a medical professional. If a doctor is seen as untrustworthy, the patient might have some restrictions in following the doctor's orders. Phil tells me, "If you have a robot in healthcare services, you are missing out on its full potential when you do not program it to be likeable and friendly." I asked him what characteristics he thought were trustworthy and likeable, and he told me the big eyes, a smile, and the voice plays a big part. The smile, he says, would have to be genuine. But can a robot smile a genuine smile? Phil brings attention to the details of a genuine smile, if a person is smiling at you but not 'smiling with their eyes', you feel like the smile is disingenuous. What Phil is getting at is a familiar experience, one I illustrated in chapter three using the '🙂'-emoji. Similarly, the emoji does not squint its eyes or have red cheeks like the '😊'-emoji, making it seem more disingenuous.

With a humanoid robot that looks very human it can be difficult to achieve genuine social behaviors because the errors stand out and become very noticeable. One of the robots used in studies by the University of Auckland, the 'head robot' from the previous chapter, had hundreds of motors underneath the silicone skin on its face to stimulate those same muscle movements of an actual human. Sadie, who worked with this robot, informed me about some of the reactions from the participants who met with the humanoid robot that was in short a realistic-looking human robotic-head. Sadie told me that the thing people tended to like the least about this humanoid robot was the mechanical sounds she (the robot) made when she moved her head around.

People were saying 'Ugh I can hear the motors working, 'I don't like that' and I think that might come down to the uncanny valley where she looks quite human but then things are happening that are constantly reminding you that she's not human and I think people didn't like that as much. (Sadie, student).
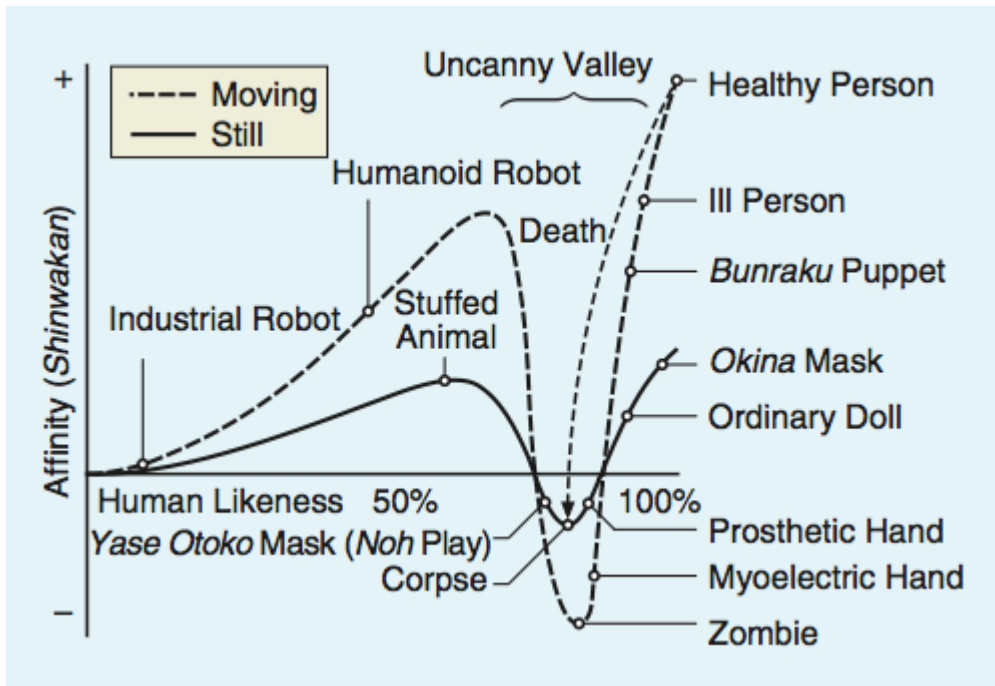
The illustration"Figure 2" by Masahiro Mori (2012b [1970])

The illustration above shows the effect movement has on how we experience human likeness and in turn affinity. Without explaining this graph in detail, I will just point out how the prosthetic hand loses affinity when it gains animation. Having got movement and slightly increased its human likeness, the Myoelectric hand has dropped significantly in affinity compared to the non-animated prosthetic hand. And while the healthy person scores high on both likeness and affinity, Mori (2012c) recounts Freud's (2003 [1919]) findings and gives the corpse a low score in affinity. The lack of animation of dead bodies is enough to make them seem creepy and unreal. Personally I have had this experience seeing the incredibly realistic wax dolls at Madame Tussauds. Some of the wax dolls even had mechanics that created the illusion of breathing, adding movement to the otherwise still wax doll. In my own experience, seeing the slow expansion and retraction of wax-doll-Bitney Spears' chest improved her human likeness only slightly, but made her look much more creepy.

The design of the robot is important when it comes to making the robot applicable for companionship. The people who design robots will try to improve human likeness and affinity as much as possible, while avoiding the uncanny valley. Mori (2012c) notes that the best strategy is to reach for a peak in affinity and a medium score in human likeness rather than a high level of human likeness which might endanger the experience of affinity. This entails that robots designed as non-humans hit a sort of sweet spot in robotic design scoring mid range in human likeness while still pretty high in affinity.

In the case of Paro, the design helps establish the robot as more than just a mechanical replica of an animal. Ideally Paro is not treated as an industrial machine but as a living thing, and it is important that the design is not a constant reminder of inauthenticity. Paro, it seems, was designed to be familiar enough that people recognize the robot as something they have seen before, yet the unfamiliar species of animal does not remind people it is a machine.

However, the design of the robot does not set its identity in stone. Because people are both familiar and unfamiliar with the design, the elders might recognize it as a 'being', but they do not necessarily identify it as a seal. Sometimes they attribute personhood to the robot, entirely unrelated to the seal design. Amiyah at the activity center Sunny House told me that the clients (the elderly at the activity center) would differ in how they see Paro. So far only four people have identified the robot as a seal, she told me.

> Everytime they talked with Paro they thought that Paro was alive. Of course they don't think of Paro as a seal, they think of it as a dog or cat because it is furry and they have dementia so it is quite hard for them to identify Paro as a seal. Sometimes they even identify Paro as a baby. (Amiyah, Sunny House)

Paro, who is used in a similar way to therapy animals, is modeled after an animal, yet it is up to the user to attribute Paro with an identity and a personhood. Due in part perhaps to their unfamiliarity with baby seals, the elders recognize Paro as other species of companions, cats, dogs and even babies. The reality of Paro's identity is constructed by the user, and the staff members were happy to go along with it.

Beyond Imaginary

During her fieldwork at a retirement village in the UK, Agnete Petersen (2017) noticed that the carers would rarely correct residents when they told stories about Paro that were not entirely true. Petersen met with one resident, Heather, who in her younger years had spent some time sailing. Heather explained how she one day had found Paro lying next to her boat. At that time, Heather explained, Paro had been a lost baby seal looking for its mother, and now Heather was taking care of Paro, which was now *her* seal.

This story, although not factual, was nevertheless real for the resident, and the carers did not object or correct her. The resident seemed content with the story, and correcting her would only serve to strip the resident of her reality. Petersen explains that the carers are

offering no resistance to the reality of the resident with dementia so that they can create an interaction with Paro that is meaningful to them (2017, 40). Paro offers a connection and companionship that does not resist the reality of the resident, and thereby the robot meets the person where they are, rather than forcing on them a different level of engagement and care. Like Peterson, I heard similar stories from the staff members that I talked with who emphasized the importance of letting the elders connect with Paro how they wanted:

> Their reality is quite different from our reality. Whatever they think of Paro is fine, as long as they engage with Paro. For example a client who is highly anxious, you sit them down with Paro after five to ten minutes they will be talking to Paro like a normal conversation and they forget about their anxiousness. That's how Paro works in our group. (Amiyah, Sunny House)

Amiyah found that Paro was a good tool to use to help calm the client down, and she let them personify Paro how they wished during this process. Similarly, Lorane told me that staff members at Skyside village are encouraged to enter into the world of the resident, and go where the robot seal takes them. It is important for her and her staff members to avoid correcting a resident's perception of their own reality in this matter. Staff members speak of Andy (their nickname for Paro) the same way residents do, "If the robot seal is their dog from 10 years ago, then that is how it is."

Lorane describes to me a relationship between one resident and Andy. In her account of the interaction, the resident was having a unique connection with Andy and was behaving as if the robot was a real animal.

> Frank was living with advanced vision impairment through severe macular degeneration, and he could not see properly. He also had short term memory loss, but was never diagnosed with any level of dementia. (Lorane, Skyside Village)

Frank's psychosocial needs were not being met the way he desired, Lorane tells me, and he was having difficulty 'making real connection' with others partly due to his vision impairment. He had slowly become introverted and had started to 'give up on life', choosing to stay in his room and isolate himself. Lorane notes how his behaviour had changed over time – in the past Frank used to involve himself in activities.

He felt the separation from family, living in a rest home environment. He used to come out into the communal household setting, but found that his vision impacted on making real connections with others. He also found the common everyday noises too loud for his liking. Noises like dishes being done, vacuum cleaners going and other groups talking loudly. (Lorane, Skyside Village)

Lorane adds that Frank would often be found in a foetal position on his bed, and he would refuse to respond to human interaction. Frank had used to live on a farm, and he had loved animals, particularly cats. The carers knew that Frank would be an ideal candidate to try their robot seal. Paro is designed in a way that makes it easy for people to recognize the robot as something that is 'alive', he moves, he has body heat, he makes sounds and he responds differently to different stimuli, forming a connection with Paro happens fairly easily for some of the elders.

Upon hearing the mechanical vocalizations coming from Andy the robot seal, the resident opened his eyes and began to engage as if the robot was a real animal. The resident sat up on his bed and reached for the robot seal, uttering connective words like 'aaaw' 'come here' 'tell me all about it' and would then motion as if they were about to get up. (Lorane, Skyside Village)

At one point Frank had expressed that he wanted to go to the kitchen to get some food for Andy in case he was hungry as though it was a real animal. Due to the lifelike behavior of Paro people start to understand and treat it as though it is a real animal that experiences sensations like being hungry. Andy was able to reach Frank in a way that the carers could not. Frank had opened up from a disconnect and foetal position, Lorane explained, and was now engaged and caring for something outside of himself.

The older adults who are starting to see Paro as something more than a robot are personifying him and giving him a personhood despite the fact that he is a machine. In order to describe how the residents are experiencing Paro as having a personhood, techno-animism becomes a good analytical tool, it legitimizes their experience of Paro's personhood. They understand Paro as real and so he is. In the previous chapter I talked about how social robots are cyborgs (Haraway 2006 [1985]) with flows across the categories of organism and machine. Below I describe some of the processes that enable Paro to transcend the machine identity and establish himself as a social agent.

Between Categories

During my conversation with Amiyah, she told me about a doll they have at Sunny House, which according to her is less effective than Paro in engaging the elders, "We have a doll, but it is not very effective to our clients most of the time, they thought it was childish, they think of the doll as a toy for their grandchildren." When I asked Amiyah why Paro was perceived as real but the doll was perceived as a 'childish toy', she suggested that it had to do with the fact that Paro was more interactive. She [Paro] was able to respond to the movement and behavior of the client. Paro has many layers of animation, she moves, she responds, she produces body heat, she makes sound, while the doll lacks any form of animation. In addition to that, the dolls are for many people associated with toys because we are used to seeing dolls in the environment of childrens toys, while Paro is unfamiliar yet familiar enough to be recognized as an animal as is the purpose of the design. Although Paro might resemble a stuffed animal, the added animation and other features that make Paro seem alive challenges our expectations of how a toy is supposed to behave. Thereby dolls are toys, while Paro is something more than that.

In the publication "Retirement Home Staff and Residents' Preferences for Healthcare Robots", Broadbent et al. (2009) found that participants given the choice between two different looking robots would prefer the robots used for practical tasks such as setting reminders to have a more mechanical look, and for companionship they preferred the robot that was designed like a soft toy with a friendly face. These findings could suggest the robot needs to be remade in our own image of a social creature, washing away the mechanical attributes of the machine in order to make the social use of the robot acceptable. Paro has fluffy fur, a round face, and black eyes with little eyelashes, while the social robot iRobi has a round face with big blue eyes, and pink cheeks (Broadbent 2017), making both robots appear more 'cute' and suitable for companionship. As discussed in chapter two, machines have been integral for large scale production and manufacture of commodities ever since the industrial revolution, however, the social uses of robots are for many still a foreign concept. Moving beyond the naturalistic view of non-humans as a resource for production (Descola 2013; Haraway 2006), requires a process of actively making it into a companion. This is similar to the process of 'kinning', used by anthropologist Signe Howell (2006) to describe the ways in which Norwgian adoptive parents make "foreigners" (transnationally adopted children) into kin (family) in a place where there is a strong cultural emphasis on biology within kinship relations. Howell (2006), uses examples of how adoptive parents tend to give

their adoptive children traditional Norwegian names, thereby constructing a new Norwegian identity. Because these children do not share the genealogical connection to Norway through ancestors, many families feel the need to take their adoptive children with them to see landmarks and experience traditional Norwegian culture. Similarly non-humans are foreigners within our social circles, and in the process of making them belong, we make sure their design is similar to how we think a companion should look.

In 'Animals in Lele Religious Symbolism' (1957), Douglas looks at the classification system of the Lele. Much like the concept of the cyborg form Donna Haraway (2006 [1985]) the classification system used by the Lele identifies certain persons or creatures that cross between categories, these are known as *anomalies*. The pangolin for example falls outside of a number of classificatory groups. It is a land animal, yet it has scales like creatures of water do. It is an animal yet it gives birth to only one baby at a time like a human does. Paro is used similarly to how an animal in pet therapy programs is used, and it is designed to resemble an animal with soft fur and docile attitude affirming its role as a therapeutic tool on the line with pets. Paro is anomalous because it operates socially the way humans or animals do, however it is neither human nor animal; it is a machine but it looks and behaves like a seal. The robot does not entirely fit any of the overarching categories. As discussed in chapter three, the epistemological tradition particular to the 'West' makes distinctions between categories: nature/culture, human/machine, organism/object. Along these lines of categorization certain things are social agents while others are not. Scientific naturalism invites humans, and in later years even animals (although the Cartesians would disagree), to exist as social agents, an invitation not extended to machines. In order to appropriate the robot into our social sphere the design of the robot tries to erase its mechanical past and emphasizes its social significance. The companion identity of the robot is communicated to the user iconically (using symbols); Paro has fluffy fur, a round face and big eyes, it has body heat, it moves, it is responsive, it gets sleepy at night. The user continues the process of integrating the anomaly by affirming Paro's role as a social agent through attributing personhood.

Yet still the affirmation of Paro's role as a social agent is not always successful, he is at times considered a toy on the line with the doll Amiyah talked about. The features that are considered 'cute' in Paro, and that contribute to increased affinity, also appear in teddy bears and for some the experience of seeing parents or grandparents interacting with this type of artifact, even in a clinical setting, can become an overwhelming experience. Graduate student Agnete Petersen (2017) who studied the use of Paro in a retirement home in England found that the seal robot did indeed bridge relationships between some people with dementia and

their family members, but she also described instances where Paro had the opposite effect. Paro had done a remarkable job of connecting with Eric, one of the residents with dementia. However, Eric seemed to be so distracted that did not pay much attention to his daughter who had come to see him. When Petersen asked the daughter what she thought of the robot she became teary-eyed, although she was happy her father was enjoying the robot, Paro was in her opinion just a toy.

> Seeing her father 'playing with a toy' which he remembers better and talks more with, than with her, only seemed to amplify her experience of not being able to reach her father. (Petersen 2017, 35)

Although Paro connected with Eric, his daughter felt at odds with the fact that her father was connecting well with a robot but not with her. This is an example of Paro fulfilling the task of connecting with the user, but not mediating a connection between the resident and his family. On top of this, Eric's daughter did not view Paro as a companion, nor as a complex and intelligent robot designed for the purpose of connecting with people, instead she perceived Paro as a 'toy'. Her association with toys became an obstacle for her to understand her fathers unique care needs, and made it difficult for her to come to terms with him connecting with Paro. In this example the daughter saw the robot as an anomaly in interactions with Eric, while Eric himself saw Paro as a companion.

I asked Dave, who was working at Skyside together with Lorane, if he had experienced similar comparisons between Paro and toys from his experience working with the robot. Dave confirmed this but stressed the properties of using Paro that are beneficial when used in healthcare, "It is therapeutic, some people think it is a toy but it is very therapeutic, which I can see." The design of Paro is just one step towards making it a companion. The robot might look and behave like a companion, but our perception of Paro seems to depend on our attitudes towards the robot existing as a social agent as well.

Technology That Mediates Care

Technology is often framed as a force that disrupts social life, something of a social pathogen. Of course, certain people do have an unhealthy relationship with technology, yet interactions with people who encounter companion robots in their workplaces suggests that mindful use of social robots can enhance social interaction. The technology in and of itself is

not inherently toxic to social interaction, but rather it needs to be utilized in a way that is beneficial for interaction and companionship. Flowing through the boundaries between nature and culture is a new hybrid model of care, where technology is not kept from entering into our sacred human spaces of companionship. Lisa, a previous employee at the retirement village and a family member of a now-deceased resident, told me how they would reap the social benefits of the robot. She told me about one of her visits to the retirement village and how Paro had mediated the interaction between her family. Lisa, her children and her mother had traveled to the retirement village to see Lisa's grandmother and the kid's great grandmother Anna. During the visit, Lisa had asked one of the carers about meeting the social robot Paro, whom she had heard about at a conference some time in advance. Lisa had recorded this meeting between her family and Paro, and she sent me the footage.

In the video, Anna is surrounded by her three smiling great grandchildren. Anna is in the center of the frame holding a white fluffy seal robot, as she touches its whiskers the robot squeals softly. "He's kind of cute ey?" says one of the children as they all start pointing out the details on the robot to their great grandmother. One of the children moves Paro over to their lap and as she strokes the seal's head the robot stretches its neck to move even closer to the hand stroking it. They tell their great grandmother that she can pet the robot if she wants and as they demonstrate by gently petting the seal, Paro slowly closes his eyes as if to communicate that he is enjoying the attention.

When Lisa talks about this she points out the excitement in the room that day when Paro was introduced. The children were interested in showing their great-grandma the robot's features and this, Lisa said, was one of the magical things that happened when they used Paro,

> My kids, they don't really love seeing grandma, it's a bit boring, but as soon as we pulled out this robot they were showing grandma the different details of the robot; 'look at its eyes', 'look at its face', 'look at its nose grandma', 'look at its tail'. So they had a common bond through this object that they didn't have without Paro. It brought them an object to focus on, they had something to do to engage with grandma. (Lisa, former Selwyn staff member and family member of a deceased resident)

Lisa and her partner found enjoyment in observing the interaction because they got to watch as their children and their great grandmother were engaging with each other. It was a

special moment that Lisa got to share with her grandmother, her mother, and her children, "Four generations all gravitating around an object which is fun. We really enjoyed that, and that was the first encounter, and then pretty much we repeated that." The use of technology in this interaction made it easy for the family members with a big generational gap to connect with each other. This is a good example of what contemporary care services look like at a retirement home in New Zealand, where technology embedded within human interaction creates a hybrid system of care that in some cases is contributing to the wellbeing of residents and their family members. Robots are showing their use value in care, which is proving to be significant beyond the monetary value of cost efficiency caused by automation and self-management. Paro's ability to provide companionship is evident from the experiences of staff members, researchers and family members; he has a soothing effect, people appreciate cuddling and petting the robot, and for some people he encourages and mediates social interaction between people. Companion robots are available at all hours of the day, which is important for those who might feel uneasy at some point during the night. The concept of warm technology used by psychologist Svein Øvelrand (Trinh 2019) introduces us to an understanding of technology that emphasizes the ability to maximize and supplement care services rather than substituting care. In this chapter I have demonstrated how robots are designed in ways that legitimize them as social actors. I have also shown how the people who connect with these robots do so by personifying the robot and integrating it into their social world, a process that is encouraged by staff. The use of Paro in eldercare is proving to contribute to the experience of care: Paro encourages social interaction between people as demonstrated by Amiyah who described Paro's ability to 'break the ice' and feel confident in social interaction, Paro is also used to calm and divert the attention of users who are experiencing stress, in addition to this Paro or other sociable robots can, in the future, be used to keep people company at times when human care is unavailable - for example if a senior should wake up in the middle of night feeling agitated. Paro and other social robots could of course be implemented in ways that resemble the more traditional uses of automation - to increase productivity, replace human workers, increase profit - however, a mindful approach (as demonstrated by the Selwyn staff) to care services that take use of both human and machine enables the humanizing abilities of the robot as a social agent.

Concluding Remarks

The robots we were first introduced to, Karel Čapek's *robota,* were slaves to industrial automation and production. Since then the robot has evolved drastically, the incredible speed of development of robots has introduced us to robots that exist outside of a mechanical purpose. As the robots are evolving to take on social labor, some of our ideas about the robot identity are having to adapt.

Made evident in the ethnographic study of robots in eldercare in New Zealand, is that there exists a disparity between the practical use of companion robots and the attitudes towards robotic companions. The introduction of robots in healthcare is in line with ideals of increased efficiency and increased productivity (New Public Management), however, what is surprising with the introduction of Paro in eldercare is that the robot contributes to humanization. In the retirement villages and the activity center some of the older adults are forming real emotional connections to the robot. People like Frank who are opening up and starting to care and pay attention to something outside of himself. Or like the people at the Sunny House activity center where Amiyah works, who are using Paro as a tool to engage in conversations with other people. This effect is surprising because it is the opposite of the dehumanizing effect associated with robots that improve efficiency and productivity; the Amazon robots are great examples of the dehumanizing effect of robots. These robots track the efficiency of the workers and put pressure on them to work more efficiently by eliminating any surplus movements.

I have looked at some of the arguments that pose sociable technology as a threat, these arguments stress the potential loss of human interaction and care. By ethnographically investigating the use of Paro for companionship in eldercare in New Zealand, I have found that the use of this particular robot is a supplement to human care, and that the use of Paro together with staff, family, and friends can enhance the overall social interactions. By designing these robots with companionship in mind (soft, cute etc.), and integrating them into care as social agents, the humanizing effect of the robot contributes to an assemblage of care that operates on warm technology as well as human care.

Supplementing the care services between humans with warm technology, like the companion robot Paro, adds and extends the experience of care provided for by humans. Some of the social robots discussed here contribute to wellbeing, at least for those older adults who are more open to interacting with the robots. I have shown how the assemblage of

robotic and human care enables a personalized level of care for seniors who for example benefit from pet therapy programs but for some reason are unable to care for animals, or people who gain confidence in social interactions with Paro by their side. The presence of the seal robot can lower the threshold for conversation between people, and create space for people to bond over the shared experience of interacting with it. Paro communicates with humans, much like the emojis, *iconically* using signs such as sounds, movements and heat. However, the user interprets a personhood (similar to techno-animism) to the robot, making it *more* than a machine. Anthropologic study needs to engage more with what lies beyond the boundaries between humans and machines, as this can reveal more about the multivocal identity of the robots. The nature/culture divide and the human/machine divide have in common that they both establish borders to the identity of subjects. Technology enables care and companionship to be extended beyond the physical body of subjects. These interfaces should be devoted more space within anthropology.

In the last chapter I looked at the ways humans have taken the machine and made it into a social agent – a companion, through careful design and by developing life stories around the identity of the robots. By allowing the robots to operate as social agents they have proven to increase the wellbeing of seniors. The synonymization of automation and capitalism emphasizes automation as profit-maximizing, but excludes the conceptualization of automation as humanity-enhancing. The concept of the robot as a force of capitalist automation is useful in discussions about the role that technology plays in privatization and the spreading of market structures even in healthcare. However, we should also take note of the ways in which technology contributes to enhancing care and companionship. As journalist Naomi Arnold from New Zealand Geographic, suggested "Surprise at the residents' fondness for robots perhaps says more about society's perceptions and expectations of elderly people than it does about robots," (Arnold 2018). Examining the relationships between human and machine allows us to explore the boundaries created around these categories and uncover social lives extended beyond the human.

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