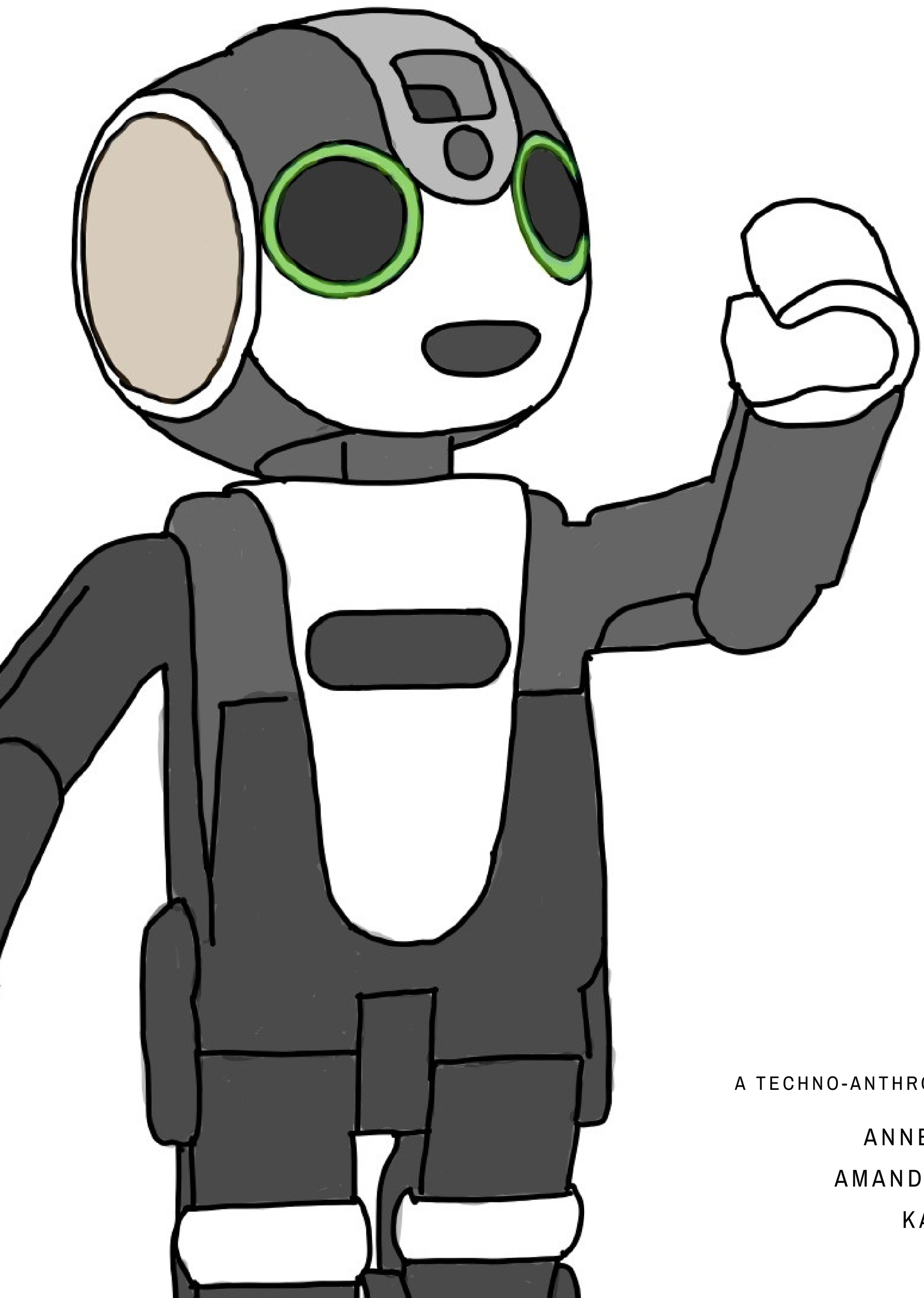
IMAGINING LIFE WITH AI ROBOTS

A Study of how Japanese AI Developers and Researchers Envision the Human-Machine Relationship When Things Become Intelligent



A TECHNO-ANTHROPOLOGICAL MASTER'S THESIS

ANNE LETH KLÆRKE-OLESEN,
AMANDA LÆRKE LAUBJERG AND
KASPER KOEFOED LARSEN

Imagining Life with AI Robots

A Study of how Japanese AI Developers and Researchers Envision the Human-Machine Relationship when Things Become Intelligent

Master's thesis
Techno-Anthropology
Spring 2018
Aalborg University

Supervisor

Stine W. Adrian

Created by

Anne Leth Klærke-Olesen
Amanda Lærke Laubjerg
Kasper Koefoed Larsen

Abstract

This project investigates, on the basis of fieldwork carried out in Tokyo, the visions and development of robots with artificial intelligence (AI) in Japan. Investigating the physical perspectives of robot development in Japan has been done extensively by Western scholars, but this project contributes insights to the perspectives which arise when robots are given emotional intelligence. We do this by investigating how and why the Japanese AI companies and knowledge institutes develop AI robots as they do and with what visions for the future relationship between humans and machines. This development in Japan is often portrayed as "crazy" in the West, but our study shows that there are serious and well considered reflections and considerations that underlie the development of the AI robots which are to live together with humans in the future. The project draws on Sheila Jasanoff and her concept of sociotechnical imaginaries and uses this to show how AI robots are envisioned as partners. We further unfold this by showing how assumptions and conceptions of Japanese consumers take part in shaping the imaginary of AI robots as partners. Subsequently, the project illuminates how this imaginary is constituted through the materialisation of personality, gender, humour and love in AI robots. On the basis hereof, we discuss what AI robots as partners become and how this imaginary challenges our ways of thinking about human-machine relations. The study concludes that it is necessary to consider the importance of emotional life humans have in our relation to things, and unfolds by drawing on Haraway, that the imaginary of having AI robots as partners is not problem-free and that it raises questions of human-machine relations as AI robots become in the interaction and through the conceptions the developers have. However, our study concludes that the imaginary of AI robots as partners is one way to address complex entities and how we ought to live with machines in the future when they are intelligent.

Dansk Resumé

Dette projekt undersøger på baggrund af feltarbejde udført i Tokyo, udviklingen af robotter med kunstig intelligens (KI) i Japan og hvilke visioner der indgår heri. Der er allerede udført omfattende forskning inden for de fysiske og æstetiske perspektiver af robotudvikling i Japan af vestlige forskere. Dette projekt bidrager derimod med indsigt i de perspektiver der opstår når robotter bliver tildelt følelsesmæssig intelligens. Vi belyser dette ved at undersøge hvordan og hvorfor japanske virksomheder og vidensinstitutter der arbejder med KI, udvikler KI robotter som de gør, samt hvilke visioner for de fremtidige forhold mellem mennesker og maskiner der gør sig gældende. Denne udvikling i Japan bliver ofte fremstillet som værende skør i vestlige medier, men vores analyse udfolder, at der er seriøse og velovervejede refleksioner der ligger bag ved udviklingen af KI robotter, der skal leve sammen med mennesker i fremtiden. Projektet trækker på Sheila Jasanoff og hendes begreb sociotechnical imaginaries og anvender dette til at belyse hvordan KI robotter er tiltænkt som partnere. Vi udfolder ydermere dette ved at belyse hvordan antagelser og forestillinger omkring japanske forbrugere er medvirkende til at forme imaginariet omkring KI robotter som partnere. Projektet belyser ligeledes hvordan dette imaginary er konstitueret gennem materialiseringen af personlighed, køn, humor og kærlighed i KI robotter. På baggrund heraf diskuterer vi hvad KI robotter som partnere bliver for en entitet og hvordan dette imaginary udfordrer vores måder at tænke på menneske-maskine relationer. Vores studie konkluderer at det er nødvendigt at overveje vigtigheden af det emotionelle liv mennesker har i vores relation til ting, og udfolder gennem en inddragelse af Haraway, at robotter som partnere ikke er et problemfrit imaginary og at det rejser spørgsmål om menneske-maskine relationer fordi KI robotterne bliver til gennem interaktionen og gennem de forestillinger udviklerne har. Dertil konkluderer vores studie at robotter som partnere er en måde at adressere komplekse entiteter og hvordan vi kan leve med maskiner i fremtiden, når de er intelligente.

Starting with thank you

This thesis is based on fieldwork in Japan which we did not even dare to dream of having access to before we landed in Tokyo and met with our gatekeeper of this project, and it has only been possible because of the many people, both Japanese and Danes, who have not hesitated in helping us in any way they could. We therefore with the utmost gratitude would like to thank Jun from AIST without whom this project would not have been possible and for being not only a valuable gatekeeper, informant and interpreter for this study but also for being our guide in travelling in and around Tokyo. Jun has also become our friend and business associate whom we hope to meet again in Denmark and Japan. We would also like to thank the team at AIST: Team leader Yoshio for being a tremendous help in arranging interviews, discussing AI development with us, and showing us his fascinating androids; but also the colleagues of Jun and Yoshio who have discussed AI and assessment of technology with us and challenged us greatly at playing table tennis.

We also owe a great thank you to Akiko and Yumi from the Royal Danish Embassy who have arranged valuable interviews for us and who invited us to the Embassy for an insightful discussion on Japanese and Danish technology development. Their vast knowledge on both cultures has provided a nuanced view into the differences as well as the resemblances. Thank you also to all of our informants at Mitsubishi Research Institute, Robot Start Inc, Cocoro SoftBank, Sharp, Monogocoro, RIKEN and Associate Professor Sei at the Tokyo University of Electro-Communications for taking time out of their busy schedules to meet with us and discuss the perspectives of AI development in Japan and Europe.

Having a ton of ideas about Japanese technology culture and an eagerness to investigate it all at once, we would also like to thank Sam and the rest of the Tokai Alumni Association for meeting with us to discuss the perspectives of Japanese AI development, inviting us to Shinnenkai for yakitori and fried lotus root, and also for inviting us to give a talk on our project at their quarterly gathering.

Thank you Stine for being excited about our interest in Japan and for being so thorough in everything you do. We have been in capable hands!

Our trip to Japan was also made possible by the generous grant from Scandinavia-Japan Sasakawa Foundation. **Thank you!**

Contents

Reading Guide

We use the real names of our informants in this report, as none of them have expressed a desire to remain anonymous, and as we believe there is nothing in this study that our informants have been hesitant or unhappy to share with the world.

A normal code of conduct in Japan is to use the family name of your business associates. The people we have met, however, have been so accommodating towards us and our cultural point of departure that they have presented themselves with their first names to us to meet Western code of conducts. For this reason, we have held onto using our informants' first names in our writing.

Being in Japan with all of its cultural impressions, is an experience which is hard to capture and communicate on paper. Even though we in this report make use of a narrative style of writing to present the reader with a more profound understanding of our experiences, we have also supplemented the text not only with pictures but also with videos and recordings from our fieldwork in Japan. Our aim is that this brings the reader all the way to Tokyo and into the spaces of our fieldwork. In order to do so, the reader has to invest a little time in scanning the inserted QR codes throughout the text with a smartphone or tablet. This means that every time there is a QR code on the page, the reader should get their smart device, open the camera on the device and hold it in front of the QR code in order for the phone to read it. Automatically, then, the device presents the chosen video. If this does not work, please download a QR scanner application such as "QR Scanner" or "Quick Scan" from Appstore or Google Play on the device and use the same procedure as when using the camera.

The videos and recordings are not a requisite for reading the report, but we promise that it is worth the little extra work to watch them.

1 A Future with Intelligent Machines

Miho has brought her own personal RoBoHon to the interview. Throughout the two hours which were scheduled for the interview, she keeps him just within close reach and seems very affectionate about him. Miho chuckles a bit while talking about how users assign RoBoHon a personality, as she knows that the technology is not necessarily mature for such capabilities. We are tempted to ask if we can ask RoBoHon a question or hold him, but she does not seem to want to let go of him.

We are on the 27th floor of the towering Tokyo headquarters of electronics company Sharp in the buzzing business area of Hamamatsucho. We have been able to arrange a two-hour interview with someone we did not even dare to hope for an interview with: Miho, the division manager of the team that develops the robot phone RoBoHon. This was one of the technologies which from the outset made us eager to go to Japan as techno-anthropologists.

This is a project about the development of artificial intelligence (AI) in Japan, but more than that, it is a project about the coexistence of humans and machines and how visions of the future play a part in shaping the relationship between the two. This is in itself no new area of study in academia, where scholars within Science and Technology Studies (STS) have debated the mutually influencing relations between humans and technologies since the 1960s; nor is

it a new area in cultural products, where science fiction productions--from Mary Shelley's 1818 classic Frankenstein to today's immensely popular TV series Westworld--address how living with machines forces us to reconsider our view on the artificial. However, advances in the development of AI challenge and actualise some of these ideas in new ways, both in that the field enables new relationships but also as it is shrouded in a sort of mystery filled with fantasies of how AI can become either the greatest thing that has ever happened to humans--or the worst. What researchers within the field do agree on is that AI will be highly influential in every aspect of our lives, and the technology has captured the fascination of people around the globe for good reasons. The software is ever-advancing and has already beaten us in highly complex games such as Go and Chess (Silver et al., 2016), which we used to think ourselves the only masters of, and now it is even starting to drive itself from A to B without our help.

AI is on everyone's lips, not least on prominent public figures of the tech world such as Elon Musk and Stephen Hawking who imagine doomsday scenarios such as AI dictators[1], the destruction of humans[2] and the replacement of humans altogether[3]. The fear among these highly regarded figures is so profound that they along with several prominent scientists, developers or technology innovators formulated an open letter about how to avoid pitfalls within the field of AI and focus on beneficial AI[4]. However, discussions on AI unfold with diverging portrays and conflicting predictions of what exactly AI will mean for the human race and there does seem be an agreement of the benefits that AI has the potential of contributing to our society. The world of AI is not a new one, but scholars argue that we are for the first time experiencing a true realisation of some of the potentials for which the field has searched in decades, and AI is now being used successfully in a variety of areas from healthcare to

[1] https://www.livescience.com/62239-elon-musk-immortal-artificial-intelligence-dictator.html
[2] https://www.independent.co.uk/life-style/gadgets-and-tech/news/elon-musk-artificial-intelligence-openai-neuralink-ai-warning-a8074821.html
[3] https://www.independent.co.uk/life-style/gadgets-and-tech/news/stephen-hawking-artificial-intelligence-fears-ai-will-replace-humans-virus-life-a8034341.html
[4] The letter which can be found on: https://futureoflife.org/ai-open-letter has been signed by over 8000 people. Among these are Peter Norvig, author of the well renowned book Artificial Intelligence; A Modern Approach, a textbook widely used in the teaching of development of AI, but also the founders and several researchers from DeepMind, the Google owned company who developed AlphaGo, the first computer to beat humans in the game of Go. The list also includes prominent figures at IBM, Google and Microsoft, and highly respected knowledge institutes.

autonomous vehicles[5]. As is also argued, however, AI is far from being able to mimic the intelligence of even infants when it comes to social intelligence (Conitzer et al., 2017). Computers today are able to calculate astronomical numbers within a hundredth of a second, and yet are not able to comprehend the social norms of e.g. understanding not to interrupt when someone is speaking on the phone. Researchers around the globe are working on solving these issues by trying to simulate the cognitive processes of the human brain[6], and although it is a complicated and far-reaching task, advances are made every year in turning computers into socially intelligent systems as well. As this advances, researchers and scholars are raising concerns over what happens if machines become intelligent, with dystopias such as *the AI takeover* (Bostrom, 2014), a scenario where AI robots become the dominating species, being discussed. So, when scholars and prominent tech figures do not agree whether AI will be as significant a technological advance as electricity or if it will be the downfall of the human race, how can we go about thinking of AI technologies and the way we should live together with them in the future?

We go about investigating the human-machine relationship in the future of AI by investigating the development and the visions for the future at research institutes and companies which develop some of these machines. We do this with a point of departure in the use of AI for what can be called *artificially intelligent humanoid personal robots* (subsequently referred to as AI robots). These are devices based on AI with the vision of creating social intelligence which is expressed in some sort of computer-based entity which, as we will see, can be constituted in many ways, although common to the entities of this project is that they are materialised as some sort of humanoid; and as will be clear, there is a fusion of AI and robots as well. Versions of these kinds of entities developed in the West are beginning to enter homes around the globe, although they are developed not as humanoids but as smart speakers such as Google Home and Amazon Alexa. These devices are however designed as mere assistants and if you become too personal in the questions you ask they will avoid the questions by providing an evasive answer[7]. You cannot interact with these devices as you

[5] https://www.forbes.com/sites/bernardmarr/2016/09/30/what-are-the-top-10-use-cases-for-machine-learning-and-ai/#49c4836294c9

[6] http://www.imm.dtu.dk/~tobo/AIintro.pdf

[7] https://www.theguardian.com/commentisfree/2017/sep/22/alexa-meaning-of-life-donald-trump-amazon-echo-dot

would with a close friend. One of the places where these technologies are often developed as humanoids, however, is Japan, where many developers are not making what could be argued are anonymous devices but instead are shaping their AI robots into figures resembling humans or animals. These are often referred to as radical and "crazy" in Western media under headlines such as "*Japan Goes Robot Crazy*"[8] or "*See the Crazy Video - Two Robots Are Married at Strange Japanese Ceremony"*[9]. Headlines such as these were what turned our gaze to Japan for investigating the future of AI technologies, and they made us wonder that there must be more to the Japanese approach to AI and robots than "craziness". Therefore, the aim of this project is not to conceptualise differences between the East and the West, as has been done by scholars before to define cultural significance (Sabanovic, 2010; Shibata et al, 2009; Coeckelbergh, 2014) or to investigate where these understandings of Japanese technology culture come from, but instead to look at what is behind the development of AI robots at companies and research institutes in Japan.

Our argument is that a lot can be derived from looking to Japanese AI development, not because they are necessarily doing everything in the best possible manner, but because there is a lot of new perspectives to unfold from investigating different views, intentions, conceptions and visions that drive the AI development in order to understand how technology companies like the Japanese handle future questions of AI through different views on cohabitation between humans and machines, and in this regard Japan is a country with strong visions for, and exploration of, AI especially within the field of robotics.

The Japanese approaches to technology, and especially to the aesthetical aspects of robotics, have caught the eyes of Western scholars who have studied how and why robots are portrayed and met in specific ways in Japan. Not much, however, has been investigated on the AI aspect of robotics in Japan, as studies focus to a larger degree on the design of robots; some with a focus on how the humanoid shape is used to create "friendliness" in robots (see Shea, 2014) or how the Japanese concept of *kawaii* (cuteness) has influenced the design of robots in the country (see Bernstein, 2013). But especially interesting to researchers has been

[8] https://www.independent.co.uk/life-style/gadgets-and-tech/news/japan-goes-robot-crazy-1679155.html
[9] https://www.bt.dk/viralt/se-den-skoere-video-to-robotter-bliver-gift-ved-maerkelig-japansk-ceremoni

the Japanese infatuation with robots, for which reason they have studied why robots are so widely accepted in Japan (Kaplan, 2004; Kitano, 2006; Sabanovic, 2014), often with a focus on the influence of pop-culture (Gilson, 1998); but central to some of these studies and analyses of Japanese robotics culture is the historical perspective on Japanese technology development (Inkster, 1991; Hornyak, 2006). Scholars and media cite many reasons for the focus on robotics, and both financial, historical and fertility reasons are given--the latter especially combined with the rapidly aging population, for which reason the decline in birth-rate has been ascribed as the cause for the contemporary surge in funding for the field of robotics (Robertson, 2007).

Starting to scratch the surface of Japanese technology culture, we began this project by entering the circles of what we found to be a close-knitted and everyone-knows-everyone group of Danish people familiar with professional life in Japan, either through their studies or their work life. This network quickly took us to a traditional Japanese celebration of the new year, *Shinnenkai,* hosted by the Japanese University of Tokai's Alumni Association in Denmark; an event which provided us with a number of opportunities for connecting Denmark to Japan in our study and starting to narrow down what could be an interesting approach to our project.

Initial interviews with the chairman of Tokai University Alumni Association pointed to the fact that Japanese companies are developing AI technology for different reasons and concerns of their (Japanese) consumers than other countries, as they have different approaches and thoughts on how humans and technology are able to coexist in the future. This spiked our interest and unfolded many of our preliminary thoughts and curiosities and we therefore return to unfolding these.

All the preliminary work before we actually went on a flight to Japan resulted in a focus on the research and development side of AI, as most research about Japanese technology culture has been done on the user/society perspective. We thus felt that there was a need to look more to the developers and their visions of the human-machine relationship and not only to the users. Furthermore, we saw a clear focus on the aesthetics of robots in current studies, and not the collectiveness of the robot with AI technology embedded and the nature of the

human-machine interaction this forges. It seemed that not many had heard the voice of the Japanese developers aside from them being portrayed as developing crazy robots, and we therefore wanted to research how their conceptions of AI and visions of human-machine relations influence the development of AI robots.

We do this to investigate why the Japanese developers of these technologies develop AI robots as they do, and what lies behind this way of developing them. In order to do so, we draw on Sheila Jasanoff (2009; 2015) and her notion of sociotechnical imaginaries to unfold the existing visions about the good future with AI robots and how these constitute the development of these. We further draw in Donna Haraway (1991; 2008; 2016) and her dichotomy-destructive figurations in order to discuss the human-machine relationships which we see the vision and development of AI robots as fostering, and what perspectives this approach unfolds.

The research questions of this thesis are therefore as follows:

How do the imaginaries of Japanese developers and researchers of AI robots foster ways of thinking about human-machine relationships?

Thus, we wish to illuminate which sociotechnical imaginaries about the good human-machine interaction shape the development of artificially intelligent entities in Japan. Moreover, we enquire into which assumptions are taking part in shaping these imaginaries and how these imaginaries are materialised and constituted in the AI entities. Consequently, we wish to discuss what human-machine relationship these imaginaries create.

As will become clear through this thesis, we argue that the approach to AI development of Japanese companies and research institutes shed important light on the human-machine relations in that their imaginaries also raise relevant questions about how humans ought to be living with machines which rely on AI.

The area of AI is, in our argument, one of the technology fields which is least delimited in its definition, and an ongoing exercise to this project has been to not only delimit the field of

discussion within AI, but also to create a common understanding with our informants as the field of AI is defined by various technologies and approaches, and also by different conceptions not of what *artificial* but of what *intelligence* means. Our delimitation of the AI area in this project is not found in the approaches to AI or the different AI technologies but in its applied use. This means that the area of AI with which this project is occupied is applications of AI to entities which are meant to interact and work together with humans for various purposes. The delimitation of AI here also bears the mark of the development stage of the technology, as it is highly discussed whether the technology we have today can even be considered intelligent. As we see it, this discussion is watered down as it is the conclusion to many investigations that contemporary AI is not truly intelligent, but nonetheless it has shaped our project in that it is a factor which renders the definition and common ground of speaking of AI more tricky.

Common for the technologies in focus of this project is that they to some degree do contain AI and that there is a vision for providing products with more sophisticated AI solutions as advances are made in the field. This means that currently the technologies are able to utilise AI to very specific tasks such as recognising a face, analysing intent from sentences or predicting certain behaviour. This is what is labeled *narrow AI* (Bostrom, 2014), simply because the capabilities are very limited. The technology, however, is nowhere near a stage of intelligence where it can be utilised in a more general manner, and where all the different AI technologies are efficient enough to cooperate on the level of the human brain. Thus, arises the term *Artificial General Intelligence* (Bostrom, 2014) which covers what can rightly be described as an idea in its current state, and something we encountered as uncertain and much debated among our informants as to whether it is even achievable. We involve and dive into the AI technologies embedded in robots as we analyse, because we argue that understanding how these work and are developed is crucial to analysing what they become and how they foster certain human-machine relations.

Although this is a study of the research institutes and companies that develop AI robots, there is also a focus on users in this project, as some of the conceptions which shape the development of these socially intelligent entities by the companies and researchers are driven by their thoughts on the user group. However, there is no involvement of the users of these

AI robots in this project, as it focuses solely on the development process and visions. Thus, we also do not focus on how the technologies are changed and shaped when they are used by the users.

In this regard it is important to note that this is a study of the development of AI robots by Japanese companies and research institutes for Japanese users. The companies and research institutes are Japanese and they currently develop the AI robots solely for the Japanese market. This means that the analysis of this on the basis of our empirical data is able to say something about the sociotechnical imaginaries of AI robots in a Japanese context. Nonetheless, our discussions of how these imaginaries foster certain human-machine relations is something which is relevant beyond cultures and national borders.

When we say that the perspectives of whether AI is a promising asset or the downfall of mankind are discussed heavily, it might give the reader the impression that our objective is to provide answers to the rights and wrongs of this debate. It is not. We are not with this project aiming to answer whether AI is good or bad for the future of humans. Instead, what we want to do with this project is produce knowledge on what imaginaries go into the development of some of these intelligent machines and how we can use this to think about the future relationship between humans and machines.

A part of this delimitation is that we do not discuss the vast amounts of data these entities collect in order to adapt and adjust their behaviour. This topic holds important discussions on how to collect and use data from a private context as well as ethical considerations on how one might illuminate the details and intentions for a non-technical audience. However, this topic is out of our scope both in that it is vast but also in that it is something which is very challenging to get access to discussing and obtaining information on at AI companies.

2

Constructing the Field: The Visions of AI Robots in Human-Machine Relations

Finding a Way to Japan

This project began in the autumn of 2017 when we read an article online on a peculiar piece of technology produced in Japan. It was an article titled "*Go ahead and date your digital assistant"*[10] in the American media Bloomberg, about the Japanese company Gatebox which develops a virtual hologram personal assistant materialised as a female anime[11] avatar. In itself this seemed alien but interesting to us, but what really caught our attention was the statement from the founder of the company that the emotional distance built into Western AI assistants such as Apple's Siri was a missed opportunity for creating a more personal connection to a home device. We found this to be a very interesting way of talking about the relationship between humans and technology and became curious as to what was behind this way of approaching AI development. So, with our eyes turned to Japan and their view of

[10] https://www.bloomberg.com/news/articles/2017-05-07/go-ahead-and-date-your-digital-assistant

[11] Japanese anime is animated cartoons which comes in a variety of styles and genres. Anime is often build upon manga comics which are often black & white drawings (Macwilliams, 2015). Popular manga comics includes Doraemon or Dragonball whereas the anime My Neighbour Totoro is widely renowned. In this paper both anime and manga will be referred to, however often within the same category of reference.

technology we started a comprehensive research process which would lead to us finding ourselves in Tokyo only a few months later.

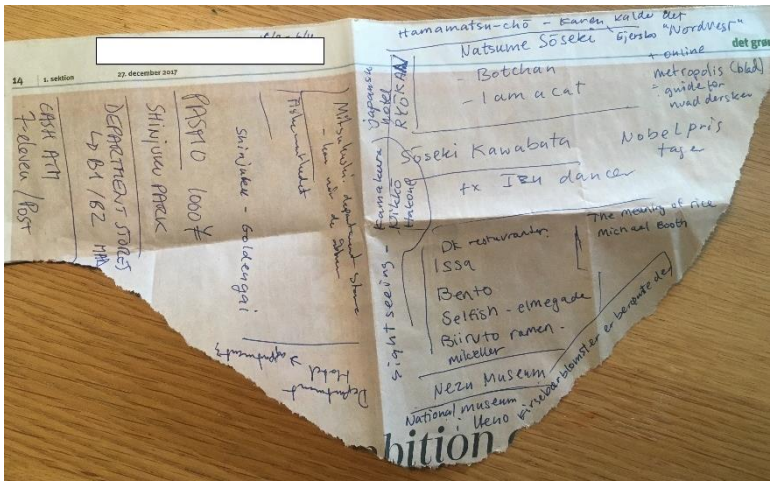
The process of finding a way to talk to the developers of AI robots in Japan has been characterised by a great deal of well-prepared enquiries, providing great turnouts and serendipitous circumstances, in turn providing us with much more help and access than we dared to dream of, but also dead ends and obstacles. Early in the process we were advised by an alumni from Aalborg University, who had conducted fieldwork in Japan earlier that year, that central to getting access to informants and companies in Japan was having someone to introduce you, as many relations in Japan--especially those in business--are built on trust; something which could more easily be established through a solid gatekeeper. He told us that writing to Japanese companies without a prior connection rarely elicited a response--something we soon learned ourselves. This started our efforts in reaching out through our network and getting in contact with relevant actors found through desk research.

Thus, we set out to master the fine art of networking, a discipline which required hard work and lots of unreturned phone calls, but also one which provided golden opportunities at unexpected places: At a conference which we attended in a another context, we got in touch with a researcher from The Danish Technical University who has worked and lived in Japan. He unfolded our initial research ideas and further spiked our interest in the Japanese approach to technology development. Besides helping us establish contact with the Royal Danish Embassy in Japan and pointing us towards potential financial aid with our travels, he invited us to the aforementioned *shinnenkai* at
Alumni Association in Vedbæk, which turned out to be our first peek into Japanese culture right here in Denmark.

As we walked up the barely lit driveway to the main house on the Tokai grounds, we were filled with excitement about talking to people who have spent their university years in Japan. Having signed up for participating in the preparation of dinner, Japanese street food as it turned out to be, we entered the bright kitchen where we met the chef, who would be testing our cooking skills for the night (something which includes the ability to grab fried chicken thighs out of the boiling oil barehanded, a skill which apparently determines if a Japanese

cooking apprentice is ready to leave his tutor!) These preparations made it easy for us to initiate conversations with the alumni members who knew each other already, and when we told them of our plans to do the present project, they overwhelmed us with information. Thus, shinnenkai became an important experience in the process of getting access to the field, and we met a lot of people with such a love for Japan that they without hesitation began telling stories of curious everyday experiences they had while visiting Japan. These were entertaining per se, but a few helped us prepare for some of the different cultural customs and required practical measures.

Though the contacts we made at shinnenkai were very valuable, we did not feel safe betting everything on one card, for which reason we kept making enquiries in our network in order to try and establish as much access to Japanese contacts as possible. Through a professional network facilitated by the Danish Technological Institute, we got in contact with a Japanese guy named Jun who works at the National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba, just north of Tokyo. Jun became the most central person during our stay in Japan and has been the main gatekeeper for this project. We return to his role and our relation to him, as this came to affect how we went about doing fieldwork and the knowledge which we have produced in this project.



Having focused on cooking Japanese dinner, we were without our notebooks which otherwise always are with us, and we therefore turned to a piece of newspaper which traveled from table to table while people wrote down their best pieces of advice

Engaging with the Field Without Blinders

The enquiries and investigations we made before going to Japan have created different preconceptions and expectations about our trip that to various degrees influenced our preparations. Talking to different people in Denmark about Japan and Japanese AI development, we had an idea that the Japanese to a large degree have quite a different

approach to human-technology relations than what we have in Denmark. It was described to us that while we try to make robots do the things we, as humans, cannot do, Japanese in some ways try to imitate humans in robotics, shaping them with the same capabilities as humans. A distinction was proposed here in that Danish companies develop technologies to be efficient tools to supplement humans whereas Japanese companies develop technologies which are able to do the same as humans. We were from our outset reinforced in this view as we found examples of a large technology company in Japan which spend many resources making a robotic handshake *feel right* (see Bernstein, 2013). Further, in a conversation with a person from the Danish Technological Institute we were told that a couple of CEOs from different Japanese companies came to them on a research trip in 2016--in part to understand how Danish developers designed assistive technology solutions. They visited a nursing home and were surprised by the "simple" lifting technologies that were in use, as they had themselves been designing a robot to lift the elderly in Japanese nursing homes as close to how a person would do it as possible. A recurring theme in these understandings of Japanese technology development was the idea that they do things differently than we do, and that they uncritically accepted technologies such as humanoid robots.

On the basis of these preconceptions from our preliminary fieldwork and investigations into current studies in the field, our *field imaginary* which we took with us to Japan, became one of looking into what ideas and conceptions of human-machine relations our informants had and how these influenced their developments. The field imaginary entails the nature of the engagement with our informants and the field in general and the way in which we approached the field (Massey, 2013).

> *"'The field' itself is a spatial concept with material, practical, effects. Whatever imaginary you operate within (and it would be difficult to manage without one), it will have implications. It will have effects on your relationship to the field, on the nature of your own identity as a researcher, and on the range of practices and behaviours which are thereby enabled." (ibid. p. 84)*

Massey formulates how the notion of doing fieldwork for many years have been revolved around an imaginary of 'going out there' and 'in the real world' (ibid.). From our

epistemologically ground we do not define the spatiality of our field geographically. Our field of enquiry is not Tokyo or the locations of our various visits. Our field of enquiry is rather our initial wonders about the visions of the development of AI robots in Japan. The field stretches geographically from the shinnenkai in which we participated in Vedbæk, where the beginning of our knowledge generation about the subject matter took place, to our one-month adventure in Tokyo and back to our process of treating the empirical material in Denmark. Within the spatiality of our field imaginary was in part our initial literature searches, interviews and communications with our contacts in Japan.

In drawing on a feminist approach in this thesis, we do not separate the field in 'out there' and 'home at the desk'. Producing knowledge is an ongoing process we have been part of which entangles across time and space, it is not a question of gathering information in the field, bringing it home and then treating it from a distance. The distanced view is part of Massey's notion of 'between-ness' which is formulated as the common scientific claim to stand in-between the field and academy (Massey, 2013) and instead we seek to position ourselves within the field, within the enquiry to illuminate our position.

Massey (Ibid.) argues that one should reflect upon the consequences of the field imaginary, meaning the nature of the knowledge production the field imaginary produces. Between the moments of generating our data this field imaginary has led our choices of method and theory and influenced our knowledge production in the field. This does not mean, however, that we approached the field narrowly by working to confirm our initial preconceptions, and, as it turned out, there was much to learn from looking to these companies and researchers, although not in the ways we had imagined. Instead, we had an open approach to the field in order to leave room for being surprised by the field and letting the field punch back in what Whatmore (2013) describes as Stengers' notion of *being at risk*. What is important here is to remember that the field might unveil additional or different paths or views, and one must consider this in the choice of method. This point is important in conducting good research and being able to say something meaningful about the field investigated:

> *"[..] the crucial criterion is that the researched are permitted, by the way the research is conducted, to resist being aligned to only one scientific 'truth', as if this exhausted their potential as either agents or evidence.*" (Ibid. p.98)

Hereby we have not strived to search for one scientific 'truth', but instead we have been open to the field revealing multiple truths, something which is utilised in the way our research is designed. We return to this by drawing on Marcus, but for now the point is that going into the field we have not stayed on one specific path, only accepting the field to enlighten the content on this path, but instead we have paid attention to the research and the important and surprising points being produced here by positioning ourselves within the knowledge production.

Producing Knowledge from Somewhere

We have in the introductory sections described our initial wonder at Japanese technology culture and how this led us to investigate the "craziness" hereof, something which illuminates our own positioning in our knowledge production; this project is produced from our point of departure with all our pre-understandings and approaches to the investigation of science and technology. Haraway (1991) breaks with the notion of the neutral, invisible researcher who is able to see the field of enquiry without being part of it, something she terms the "god's eye trick". Instead, we are working under the understanding of objectivity which Haraway terms *situated knowledges*:

> *"So, not so perversely, objectivity turns out to be about particular and specific embodiment and definitely not about the false vision promising transcendence of all limits and responsibility. The moral is simple: only partial perspective promises objective vision [..] All Western cultural narratives about objectivity are allegories of the ideologies of the relations of what we call mind and body, of distance and responsibility, embedded in the science question in feminism. Feminist objectivity is about limited location and situated knowledge, not about transcendence and splitting of subject and object." (*Haraway, 1991 p. 190)

In this understanding, it is crucial for the researchers to make clear and reflect upon their own situatedness; something we do in this report by actively shedding light on our position of enquiry and partiality. Our researcher position, preliminary understandings, and the choices we have made are therefore rendered visible throughout the text, and it is made clear how we have been part of producing the knowledge of this project together with our informants. As such, it becomes transparent how we have been part of forming this project and the production of knowledge.
Our choice of writing in a narrative style is therefore also a device which allows us to accentuate our own positioning in the knowledge production. This is partly done by bringing forth our personal field notes, hence elaborating on the setting as well as the thoughts which were part of the knowledge production. Further, the narrative is utilised to set the scene for the reader and to situate our knowledge production within the context of production. Furthermore, we have embedded pieces of our fieldwork in the form of QR codes within this paper supporting the narrative, giving the reader an insight into some of our experiences in the field and creating transparency about our positioning in the knowledge production.

This approach also has consequences for how we address the cultural differences and the perspectives hereof in this project. Looking to Japan, cultural normativities are different from our own backgrounds, and it is tempting to easily draw generalisations of everything we have seen as “the Japanese way” rather than the way of our informants.

Being the first ethnographic work we have done outside of Denmark, however, we have realised that our understanding of Japanese culture has not been sufficiently nuanced, and it has become clear to us that Japanese technology culture is something which is done and reproduced fluently across physical borders, people, technologies etc. This means that this project investigates AI robots in a Japanese perspective with all the normativities and cultural understandings which shape these, but that we are not drawing any conclusions on these insights being something which can be ascribed to a general Japanese way of doing things.

In having a focus on human-machine relations in AI in our field imaginary and yet an openness to the field, one of the perspectives which was highly produced through this approach was the strong focus on visions which this project has. We did treat these in our initial enquiries,

but they came to be much more important than we had imagined, in that they were decisive for the development of AI robots. To capture this, we therefore draw on theories of the imagined futures.

Sociotechnical Imaginaries of Future Relations

Imagination is not just for children or the young at heart; it is a force that participates in shaping the world in which we live by imagining how the future is going to be. Among our informants there were many clear images of their imaginations of the future relationship between humans and technology. To unfold these, we draw on the work of Sheila Jasanoff (Jasanoff & Kim, 2009; Jasanoff, 2015) who is concerned with the relationship between imagination, among these imagined futures and visions, and the development of technology and society. She argues that imagined futures have the capacity to be constitutive elements of technology and social life. This she conceptualises by developing the term *socio-technical imaginaries*, which she defines as *''collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects"* (Jasanoff & Kim, 2009 p. 120).

But what characterises collectively imagined forms of social life and social order and why are they nation-specific? To Jasanoff, the understanding hereof has expanded since her initial introduction of the term in the 2009 paper *"Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea",* in which she limits the concept to focussing solely on the "*spaces of democratic policymaking*" and on how imaginaries of the future "*project visions of what is good, desirable, and worth attaining for a political community*". In this sense, the subject matter of the imaginaries becomes something which is found only within state policies. Jasanoff later, for good reasons, expands on this use in her book *"Dreamscapes of Modernity"* (2015), where she notes that sociotechnical imaginaries should not be limited to the level of nation-states, but that it *"can be articulated and propagated by other organized groups, such as corporations, social movements, and professional societies"* (ibid. p. 4). In this project, we draw on this definition of collectiveness and work with a scale of imaginaries across professional societies consisting of Japanese researchers and corporate developers.

We employ the concept of sociotechnical imaginaries in this project as an interpretive framework for understanding and analysing our informants' views on human-technology relationships, and to produce insights on what part these imaginaries play in creating current and future relations and interactions with technology. The companies creating different AI products express their different and similar views on, especially, good relations and interactions which are largely interwoven with the narratives of Japanese technology culture. Thus, we draw on Jasanoff's description of imaginaries to frame our use of the concept as a way to analyse the shared normativity of future living with AI robots.

> *"Imaginaries, however, encode not only visions of what is attainable through science and technology but also of how life ought, or ought not, to be lived; in this respect they express a society's shared understandings of good and evil." (Jasanoff, 2015 p. 4)*

While Jasanoff's concept of sociotechnical imaginaries is very fitting and have helped in opening up our data for analysis, it is in its original form too far from our use of the term. For this reason, we have made some redefinitions in our use in order for it to become a guiding tool in a context of ethnographic analysis instead of the originally intended socio-political approach. With her academic focus on policy and law, Jasanoff originally used the term in this context to investigate the influence of imaginaries on societies' organisation of social order and life with a focus on temporal elements on a nation-state level of analysis. Within the scope of this project, the time aspect which Jasanoff also recommends in the use of sociotechnical imaginaries becomes redundant, as we have not had the luxury of investigating and following a course of development over time. Nor was this our intention, as our curiosity was pointed to the influences and constitutions of the imaginaries collectively among our informants. What the theory does for us in this project, however, is to provide a lens for investigating visions and how these become part of shaping the future society through the development of technology.

Inseparability of Visions and Development

Visions and development have been inseparable in this project, as our informants at the AI companies spoke of the intelligence of their products at two different levels, which were difficult to distinguish: One of what they want their product to do and one of what it is in fact

able to do. These seemed to merge together for the developers, and it was difficult, as outsiders, to understand whether something was a vision or an actual feature of the product. What we came to realise was that not only was it difficult for us as researchers to distinguish between the two things; they were so intertwined that separating them would be an act of simplification.

Ever present, the visions become part of the development and the product. This was also evident in how the developers were not sure themselves at times of what their products could actually do and to what degree they were able to do what they envisioned.
This was very pronounced during our interview with Miho, the project manager of Sharp, who said that even though she had been part of developing the software and knew it thoroughly, she was surprised that *"Consumers say each one has different character. And one user, who has three RoBoHons, she says that each one has different character."* That RoBoHon has personality was something Miho said when she described the product, yet she was also surprised that the development and the vision had come together to this degree for the users.

The inseparability of visions and actual development is also vivid in what is maybe best captured by the saying "*fake it until you make it."* For these AI companies and researchers, the limitations of the advances in AI technology pose a challenge in realising their visions, for which reason many of them are just as much creating the illusion of a socially intelligent robot through means such as scenario writing. Hereby the vision of AI and the development of AI become intertwined.

This therefore becomes a story of imaginaries and how these influence and form the process and product--and of how visions embedded in the stories about products make current and envisioned capabilities melt together to form entities that are much more than just their constituting technical parts. These products, AI robots, are the materialisations of the dreams that their creators have for the way humans can live and work fulfillingly with technology in the future, but they are at the same time only one step on the road.

3 Empirical Foundations

The empirical foundation of this thesis is constituted by many different elements, among which many are based on the connections made during our fieldwork. The empirical data is based on qualitative interviews and observations with both researchers and companies developing AI robots.

As the field imaginary of this project has been to investigate perspectives on human-machine relations, we decided early on to pursue the possibility of doing in-depth interviews with researchers and company employees who are taking part in developing AI robots. Conducting interviews provided us with the opportunity to investigate the visions and conceptions which go into the development. We decided to interview both researchers and companies to get a broad and deep understanding of the field of Japanese AI development, also because we realised quickly that some of the essential work on AI robots in Japan is done not only by AI companies but also by research institutes and universities. Observations have also been a large part of our fieldwork in producing understandings of our informants work and visions for technology, both at interviews and at an AI exposition we visited in Tokyo. As observations were made throughout our entire trip to Japan, it is difficult to pinpoint the extent of our observations. We return to these methods and what they have meant for the knowledge production, but firstly we want to present the empirical foundation of this project in order for the reader to understand what sites of fieldwork our project is based on.

Negotiating Access

Besides our initial work in Denmark, this project is based on fieldwork we have conducted in Japan during four weeks in the spring of 2018. The most crucial one of our partners has without a doubt been AIST. They granted us the initial access to many of our informants and helped us prepare for the interviews with invaluable advice, but they have also acted as informants. AIST is a national research institute divided into several branches working with different aspects of science and technology. They are located all over Japan, and overseas they are perhaps most well-known for the development of the therapeutic robot seal, PARO. More specifically, we have been in touch with the Service Robotics Research Team located in Tsukuba, two hours North of Tokyo, mostly with team leader Yoshio Matsumoto and postdoc researcher Jun Yamaguchi. Yoshio is a kind middle-aged man who is not only the team leader of this unit, but also the creator of two androids with whom we were lucky enough to get the chance to interact when we visited. Jun, a determined and exceptionally outgoing young man, had a significant role in our project, and we therefore return to him in a bit to elaborate on our relationship with him.

Yoshio and his two androids which he showed us on our first visit at AIST

From our first contact with AIST, we negotiated access to their help and insights by drawing on our knowledge of Danish use and assessment of welfare technology, something they were *very* interested in as they have recently started working more intensively with the assessment of welfare technology in Japan. This resulted both in us having to set aside time for discussing welfare technology, but also that we sometimes had to get them back on track to talk about our project, as their curiosity about the Danish approach to technology was as strong as ours about the Japanese. Besides guiding us throughout our stay, Yoshio and Jun also arranged a status meeting at the end of our fieldwork at which we were able to present the most essential of our insights. This served a double purpose for us--on one side we wanted to

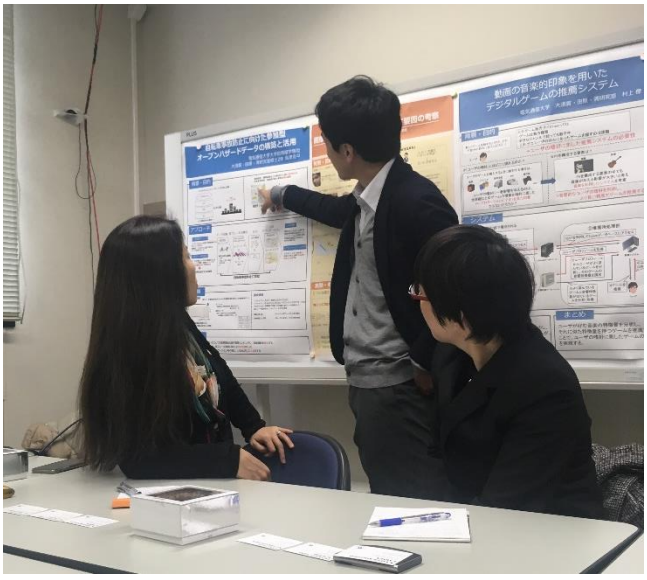
inform Yoshio and Jun about what we discovered and reciprocate with possible new information, and on the other side we wanted to consider their reaction and feedback to assess whether they found it obscured, or if they found our key insights to be consistent with their own understanding and experience of the field and the area we were investigating. Luckily, they recognised what we told them, but we still managed to surprise them on a few topics with our insights.

A Variety of Collaborators

All of our fieldwork in Japan has been taking place in or around Tokyo. This was not a deliberate choice. Instead, almost all of our enquiries to investigate the topic pointed us to Tokyo, something which was reinforced by our main gatekeeper being based near Tokyo and therefore also mostly able to arrange contacts here.

In addition to AIST, and the technology companies which we will return to, a solid part of our informants were researchers connected to various research institutes and universities:

Associate Professor **Yuichi Sei** at University of Electro-Communications in Tokyo who does research in Software Engineering with a focus on applying machine learning in everything from disaster prevention to film and cultural analytics. We came to know him through our contacts at the Royal Danish Embassy as *Professor* Sei, and for this reason we refer to him as such throughout the thesis.

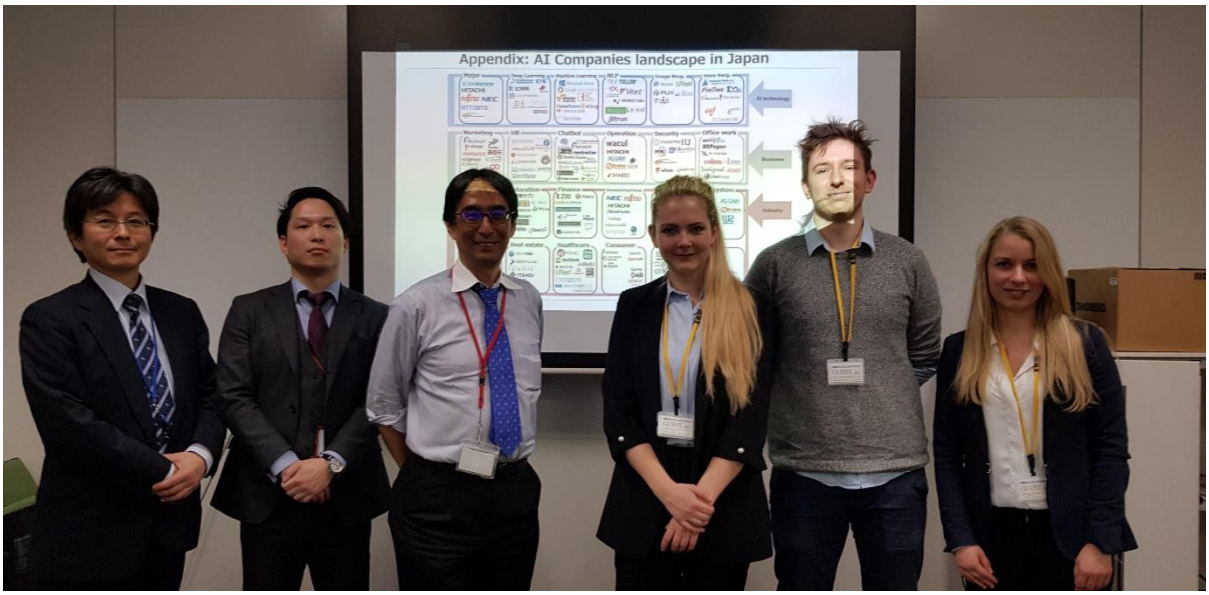


Sei presenting his AI projects for us, Yumi and Akiko

Team Leader for the Cognitive Behavioural Assistive Technology Team at The RIKEN Center for Advanced Intelligence Project, **Mihoko Otake,** who works on developing conversational assistive AI, a term that describes AI systems focussing on facilitating dialogue instead of participating in it.

Mihoko at Riken showing us her AI robots which facilitate conversations

Research director **Yasushi Ishigai,** General Manager **Kazuo Hiyane** and researcher **Masahiro Shimozawa** at Mitsubishi Research Institute's (MRI) Advanced Technology Research Center, who are working on researching and consulting in various AI technologies for business solutions.



Yasushi, Kazuo, Masahiro and us at the MRI facilities in Tokyo

Yoshihiro Nakahashi, founder and CEO of Robot Start Inc., a consultancy company working with scenario testing on almost all the AI robots we encountered in Japan.

Group picture at Robot Start Inc. with Yoshihiro, Jun and Pepper who is made into C-3PO to match R2D2 from Star Wars. Note also the many robots on the shelves in the background.

Conducting fieldwork with these informants allowed us to get insights into the current state of AI development and application of AI and what research goes into the development. This was to some degree from the viewpoint of top managers and team leading researchers, however, which meant that we got an overview of the research being done, but not necessarily by the specific researchers conducting the research and development of AI robots. Common for these interviews was the fact that access was negotiated by proclaiming the researchers' chance to get insight into Danish or European AI development, and during the interviews informants often asked about the state of AI in Denmark and its applications here. Even though our prior knowledge about the Danish field of AI was quite limited on the grounds that we were interested in Japan, we invested time in investigating this before going to Japan; a choice which turned out to be valuable, as the interviews became much more characterised by dialogue, and as our informants seemed to become more invested in the arrangement.

Excerpt from interview with MRI researchers in which it is evident how discussing the differences between Japan and Denmark creates a more unformal setting

This actually also opened up some paths for us to follow during our interview with Prof. Sei as it opened up a range of questions, not by our immediate interviewee, but rather by our two contacts from the Royal Danish Embassy in Tokyo, **Yumi Murakami** and **Akiko Kamigori**, who had decided to join the interview, mainly out of interest in our project. During the interview they asked Prof. Sei some interesting, and to us relevant, questions about a more general Japanese approach to technology and AI, and they were able to interpret between us and Prof. Sei. This made us set up a follow-up interview with them at the embassy to further illuminate their understandings of both Japanese and Danish culture, as they had an interesting position of being somewhere in-between through their work at the embassy.

Before leaving we got a picture beneath the blooming cherry trees at The Royal Danish Embassy together with Akiko and Yumi

Another crucial part of our fieldwork has been conducting interviews with informants at companies which develop and sell AI robots to Japanese consumers:

Division Manager **Miho Kagei** at the Communication Robot Business Unit at Japanese electronics company Sharp, who is leading the development of the robot phone RoBoHon.

Miho and RoBoHon at our interview at Sharp Headquaters

Board **Director Kiyoshi Oura** and developer **Rie Naoi** at Cocoro SoftBank's (hereafter referred to as Cocoro SB) AI development department, which is part of the development unit for the widely known humanoid robot Pepper.

Group picture after our interview with Rie, Kiyoshi and Pepper from Cocoro SB and Yasuko who arranged the interview

CEO **Funayama Satoru** and **Hiro Ichioka** of the AI development company Monogocoro, which develops a virtual character that is able to analyse non-verbal information such as facial expressions or gestures, and which is used in the virtual singer *IA* who in her live performances is able to analyse the state of the crowd and respond to it. We interviewed Monogocoro when we participated in a three-day AI exposition in Tokyo as part of our fieldwork.

The technologies developed by these companies have been the main focus for this project, and they have been the centre of attention at our interviews, both in that our questions have revolved around the development and visions for these technologies, and in that they have become informants themselves, as we have had the chance to interact with them at the interviews and when we encountered them around Tokyo where they are exhibited in stores. What, then, are these AI robots that the companies are developing?

The Technological Domain of AI for Interactive Robots

As the field of AI is so broad and loaded with different definitions and heated discussions regarding the term, we found it challenging to define the focus within AI of this thesis.

This has not only come down to different understandings of the concept, but also the scope of the term as it can refer to many aspects depending on the definition of intelligence and the goal of the development of AI. Nevertheless, understanding the technical perspectives of what AI is has been an important preparation for us before the fieldwork, and we argue that acquiring an in-depth understanding of how the technology works is crucial for producing valuable insights for this project for several reasons; both in that it has provided us with a common language and understanding of AI when talking to the informants and observing the technology, but also in that the way the technology works and is developed is highly indicative of and crucial to understanding the conceptions which go into the visions of human-machine relations. The development is not neutral in any way; rather, it is a clear materialisation of the imaginaries of the developing actors. Unfolding the technical part of the technologies is therefore crucial and something which we do throughout our analysis. To start with, however, we wish to present an overview of the AI robots which this thesis discusses, in order for the reader to understand what these are when we refer to them.

RoBoHon: The Heart Moving Phone

RoBoHon is a humanoid robot smartphone developed by the Japanese company Sharp together with the University of Tokyo and the robot development company Robo Garage Co. Ltd.[12] RoBoHon is currently sold in electronics stores throughout Japan. In regard to his physical features, he is 20 cm tall and able to move his legs, arms and head. This enables him to walk, stand up and sit down and even dance or do karate. In order to navigate, "*RoBoHon has nine different built-in sensors and light sensors which enable it to take bearings in the surroundings, walk around and keep track of its own position"* [12]

Meet RoBoHon

[12] https://www.sharp.dk/cps/rde/xchg/dk/hs.xsl/-/html/robohon-an-adventure-in-robotics-what-you-need-to-know.htm

RoBoHon is also equipped with a projector which enables him to cast a screen on a wall or on the table in front of him and display video or photographs. But besides the physical aspects of the phone, it employs several AI techniques to function as designed. We will dive into these in the analysis, but for now we want to highlight that RoBoHon is able to speak and understand Japanese and English in order to communicate with humans, and that RoBoHon contains what is called *machine learning* which makes him able to learn based on previous experiences. An example hereof is that RoBoHon dances on his own initiative if the user has asked him to dance often.

Pepper: The Robot with a Heart

Like RoBoHon, Pepper is a humanoid robot, though he is larger and not a smartphone. Standing about 120 cm tall, Pepper is partly developed by Cocoro SB as the world's first personal robot with the ability to read emotions[13]. Regarding his physical appearance, Pepper has the upper torso of a human, but no legs. This owes to the fact that Cocoro SB did not want to focus on bipedal movements, as it takes too much effort to do what is sufficient for the robot to move freely. Though he is not able to walk around, he can drive as his base is equipped with wheels. Pepper is also equipped with two arms with functional hands that he is able to use autonomously. Softbank, the company that owns Cocoro SB, themselves state the following reason for the different approach to the humanoid robot:

> *"Whereas conventional robots aim to mimic the physical functions of humans such as being able to walk on two legs, climb stairs or hold a paper cup, Softbank's aim was to develop a robot that makes use of cloud AI (artificial intelligence) from the outset."* [13] (p. 1).

Pepper greeting us as a receptionist at our interview with Robot Start Inc

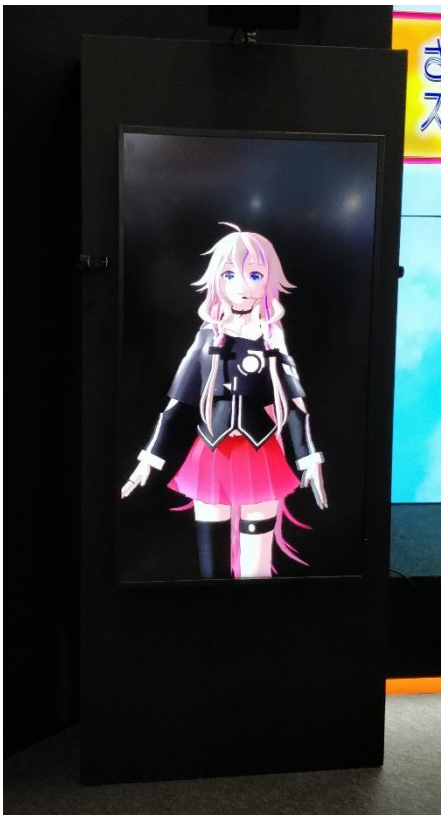
[13] https://www.ituaj.jp/wp-content/uploads/2015/10/nb27-4_web_06_ROBOTS_pepper.pdf

A distinctive trait of Pepper, beside the futuristic look, is a tablet-like screen on his chest that is able to show various graphics depending on the software that inhabits the robot. In addition to these aesthetic features, Pepper has several audio, visual and haptic sensors, which makes him able to interact with his environment.

Softbank believes that the future of robotics is for robots to be able to act autonomously and to be able to interact on an emotional state. This evolvement of Pepper is being carried out by Cocoro SB, and Pepper is currently sold to companies, stores and universities around the globe.

IA - The virtual artist

In contrast to RoBoHon and Pepper, the last product that this study treats is not a physical entity. IA is an animated virtual avatar created by 1st Place Co., Ltd. and it is based on a voice synthesiser engine called VOCALOID by Yamaha[14]. IA was created as a replacement for the Japanese singer Lia who retired from singing. The virtual singer is a pop-phenomenon in Japan, having performed live in front of audiences of thousands both as a virtual avatar and a hologram. While this aspect of the product is fascinating, we focus on the collaborative work done by Monogocoro on IA, as they have employed the singer with sensors, so it may perceive the state of a live audience and adjust its performance accordingly. To do this, it employs machine learning to react based on the sensor input.



IA the virtual pop singer who is partly developed by Monogocoro

[14] https://www.vocaloid.com/en/products/show/v3l_ia_en

4 Knowledge Production in an Unknown World

Knowledge Productions

We have in this project employed several methodological approaches to investigate the topic of this thesis. The constitutive elements of our fieldwork have largely been observations and interviews with the intent to produce insights about how the imaginaries of both researchers and companies are embedded in the products they make. This chapter presents and discusses the different aspects of these methods.

In the design of the project, we drew on Marcus (1995) and his notion of multi-sited ethnography. We invoke this way of doing ethnography as it allows us, to a greater extent, to examine the distribution and interconnectedness of the ideas and imaginaries of the Japanese developers of AI robots. There was a need to do exactly this, as we found that investigating just one site, or developer, could not create the empirical data we needed in order to grasp a broader and larger collective imaginary. This means that our fieldwork does not take its point of departure in one geographic location, but instead was carried out at many different locations and institutes not limited by a single physical space. Our informants and places of fieldwork were not chosen in the pursuit of encompassing all Japanese AI robot developers, but instead based on the advice of gatekeepers of the project. They took into consideration a description we made of what we wished to investigate and how, but also a list we made of

Japanese technologies, which included humanoid AI technologies of our interest that we found online using the English and Japanese search terms “Artificial Intelligence; Japanese; development; personal assistants”. Our gatekeepers, Yoshio and Jun at AIST assessed if our understanding of what the companies develop was accurate, and on the basis hereof we discussed with Jun if the companies would be interesting to interview with an outset in our field imaginary of understanding their development and thoughts on the future human-machine relationship when AI enters the equation. In doing this, we were inspired by Marcus’ (1995) concept of doing multi-sited ethnography by *following the thing* to follow the development of AI and AI robots. While the sites of investigation were geographically dispersed across Tokyo, it was not only the geographical aspect that defined our multi-sited approach to the fieldwork. It was the different ways of materialising and working with AI that defined and constituted the different sites and spaces we investigated.

Researching the Field of Technology in Japan

In the preliminary days of the project, to position ourselves among the already established research on technology and Japan, we conducted desk research into existing literature. This became a foundation upon which we built our project design, as it was through this process that we found that very little had been written about AI in Japan--in English at any rate. Thus, we continued the search for literature, and as the terms artificial intelligence and Japan returned limited outcomes, we explored the work on technology culture in Japan based on searches on personal assistants, personal robots and science & technology, all with the suffix Japan. This started our snowball approach with which we uncovered areas already well-researched. We selected literature through a qualitative assessment by reading titles, abstracts and conclusions in order to select relevant articles to read in full. A large part of the research concerns itself with robots in various ways, both the development and use, but most of it focuses on the physical and aesthetical aspects. We used this to position ourselves closer to the interactive aspects of human-technology relations especially as we found that it could grant us a new view into the normative notions of the Japanese approach to technological relationships.

The Guy with All the Access

Jun showing us around Tokyo on a sunny afternoon

Jun has been an essential actor to our study, and his role in the project has in many ways been indispensable, but also challenging in that we had to reflect on what his essential role in the project has meant for the insights produced in the project. Jun has been a gatekeeper, informant, interpreter, partner for discussion of cultural aspects before the trip and of our insights continually through our fieldwork. He also became a friend of ours during our many preliminary Skype meetings and during our stay in Japan where he helped us with everything from lending us an iron to pronouncing the noun Ryōgoku, the part of Tokyo where we lived. As is common practice in Japan, we also went out to Japanese bars, *izakayas,* together with him after our meetings with informants, where he often participated as our interpreter, and we thereby got to know him a lot better. Having this sort of local guide has certainly meant that we have had the chance to understand more of Japanese culture, and we have not been idle in asking him questions about everything from the conditions of public workers to what sumo wrestlers eat. It has also meant that we at all times had the chance to discuss our fieldwork not only with one another, but also with Jun who has worked in the Japanese technology development field all of his working and student life. However, Jun is also very critical towards Japanese society and technology development in a way only a local can be. This is of course part of the fieldwork constituting this project, but it is also something we have had to constantly navigate in. Jun has also worked with technology development in Denmark and Italy for shorter periods of time and has a view on these societies as working almost problem-free, and he was therefore constantly comparing the Japanese way of doing things to the European ones. This is something he does with a fascination of Western culture and a critical ready-for-new-inspiration approach to Japanese

culture which has often meant that we got a very negative portrayal of Japanese culture from Jun. This is not to undermine these issues or to say that they are not real, but that we have had to navigate in these and supplement them with other views as well, in order to obtain a more nuanced understanding of Japanese technology culture. Becoming friends with Jun has also meant that we have had to balance a relationship somewhere between friendship and being able to speak freely of everything, and at the same time being professionals who work and interview together, and we have had to constantly pay attention to Jun's shifting role and what tone of language we could use with him at an izakaya or at AIST with Yoshio, his manager, present.

Unfolding the Field: Gaining Insights through Qualitative Interviews

From the interviews our objective was to gain insights into the thoughts our informants had on what the good human-machine relationship is and how this influenced their development of AI robots. We wanted to gain insights into how research was conducted, and products developed and what ideas and visions the informants themselves put into the development.

All of the group members were present at the interviews, together with either Jun or our contacts at The Royal Danish Embassy, Akiko and Yumi. These contacts were present by their own request, and they turned out to be valuable partners not only in providing translations between English and Japanese, but also in translating and explaining cultural differences by adding context of local rules and regulations, political influences etc.

For the interviews, we used two frames of semi-structured interview guides, divided into overall subjects, that we prepared before travelling to Japan; one for interviewing researchers in the field of AI (see appendix 2) and one for interviewing companies (see appendix 1). These types of interviews are well suited for enquiries regarding specific topics, but with an explorative element, that allows the field to surprise and open up unfamiliar facets (Brinkmann & Tanggaard, 2015). This means that we structured the guides in order for the interviews to be steered in the direction of certain subjects, but also to leave plenty of room for follow-up or supplementary questions. We chose this course to let the field unfold with our fieldwork, and let the informants guide us in the direction which they expressed most explicitly. However, the hint of structure made sure that we would always be ready to steer

the conversation back in line with our intended research questions, hence keeping a meaningful agenda.

Formulating the questions, we had to take care to use concise and simple language to assure that our intentions were clear and that our informants understood the questions. We had to keep in mind that the informants are not used to speaking English, which meant we had to make ourselves understandable in the interviews conducted without an interpreter. Further, we had informants who spoke no English, where we had to keep in mind that our questions were to be translated, hence we had to make the translations as easy for our interpreter as possible.

The interview questions were following overall themes that we wished to cover, whereas the questions within these themes were mainly meant as a help if the conversation did not proceed fluently. Both kinds of interview had the initial theme of *personal information.* This theme was used to gain insights into the informant(s) present at the interview, their educational and professional background, their role within the company/research institute, and their personal relationship with AI technologies such as intelligent assistants. Following was the theme of the *company/institute* to gain insights into what kind of work with AI and robots the companies/institutes work with and how it is related. This was of course a topic we had researched from home; however, we wanted the perspective of the informants on this matter, and we found it interesting how the informants highlighted this theme. From then we separated the two interview guides into discussing the AI development and visions for human-machine relations from the context of their products or research.

During the trip, as it became clear what informants we would have access to, we prepared an interview guide more specifically for each interview based on preceding research on the informant's work on AI. This proved to be helpful, as it provided us with an opportunity to keep the interviews more specific and focussed on the development of the given technology; a challenge in all interviews. Foremost, all our informants seemed surprised by our specific questions of the development process, and we got the impression that no one had asked them these questions before. This meant that we had to ask in several different ways and with many follow-up questions in order to gain insight into e.g. how the development teams

work together on a specific product. What proved particularly challenging was talking about the development process with regards to AI. What also made it challenging to discuss the development process at the companies was the hierarchical positions between our informants in each interview, which is of high importance in Japan. This was especially vivid in our interview with MRI:

> *The very well-dressed gentlemen sat down in an order that seemed very determined from the beginning. From the left; the Research Director Yasushi, the General Manager Kazuo, and last was the Researcher Masahiro. Yasushi spoke first and quickly admitted that in his position he was not very much into the detail of the research, so he gave the word to Kazuo. Kazuo was very talkative, but at last gave the word to Masahiro who had a presentation to give based on the questions we sent them beforehand. I could tell by his voice that he was obviously nervous, and his hand was shaking. Kazuo spoke about some ground-breaking research Masahiro had done on chatbots, and we tried to ask some questions directly to Masahiro on the nature of his research, but it was very difficult to get answers from him, so in the end we had to give up and direct our questions to the research director.*

Some of the difficulties we experienced at MRI were of course due to the language barrier, however, we quickly got a sense that Masahiro was uncomfortable speaking while his bosses were present. This meant that the interview mainly became an interaction between us and Kazuo. This hierarchy was also evident in the interview at Cocoro SB. Present was the Board Director of Cocoro SB and a representative of the AI development department. During the entire interview we only got the Board Director to speak, and even though we tried to direct questions at the development representative, we did not manage to get her to speak at all. This was a bit frustrating, as we really wanted to hear from the development side; however, we also wanted to make the most of our time, as we only had an hour with Cocoro SB.

This was difficult for us to prepare for, as we in most interviews were only presented with the highest ranking person who would be at the interview, without prior knowledge on who else would participate. In these situations, we had to navigate in how much we could ask the informant lowest in the hierarchy without being impolite, as the informants who were lowest

in the hierarchy were often the ones who had been taking part in the very specific parts of the development process, and therefore the ones we often had specific questions for. This was difficult at times, as informants positioned higher in the hierarchy would often answer the questions, and as a follow-up question directed at the other informants could seem impolite or as if the answer was not good enough. It further meant that the managers became representatives for the development process, and that the sociotechnical imaginaries investigated in this project therefore highly are those of the managers. This representation of the managers is important to acknowledge as the knowledge produced within the interviews cannot be said to convey a neutral or all-encompassing picture of the investigated site. In the words of Tanggaard & Brinkmann (2015, p. 30), the interview is *"an active interaction between two or more persons leading to socially negotiated context-based answers",* meaning the interview can never be viewed as providing neutral answers outside of the context. Instead, our interviews have been a constant production of knowledge in which we have taken part together with our informants in a constant enquiry and creation of knowledge on the basis of our preunderstandings and background.

Establishing Rapport

Doing research in a new, and quite different, cultural setting than we were accustomed to meant that we had to review our interview strategies and furthermore paved the way for in-depth discussions on how to act in the interview situations to establish a comfortable situation for our informants with the intention to create a more open discussion. An important aspect of creating a comfortable situation was to create rapport and build trust between us and our informants. This was especially important in our preparations for creating rapport in a Japanese context, as it is particularly important to build trust to establish and maintain professional and business relationships in Japan (see e.g. Lohtia, Bello & Porter, 2009). When developing a strategy to creating rapport, we took inspiration in James Spradley (1979) and his description of four stages of the rapport process to have a framework from which we could create an interview space characterised by a mutual trust. The four stages that Spradley describe are: Apprehension, exploration, cooperation and participation. In this chapter, we present Spradley's four notions of rapport and reflect upon our strategies and experiences in this regard.

Spradley describes that *"Ethnographic interviews always begin with a sense of uncertainty, a feeling of apprehension"* (1979 p. 45) and in turn presents the first stage of rapport building: Apprehension. We were prepared to be met by a state of apprehension from the interviewees, as we were aware that few Japanese people speak fluent English, including company executives. As such, we were advised to send our questions to the informants beforehand, as it was important for them to know in advance whether they would be able to answer the questions. This made us reflect upon our interview guides at an early stage, which led to an early rather specific idea of what we wanted out of the interviews.

In some of the interviews we experienced that the informants used the questions we had sent them as a guideline for the talk, and several informants had even prepared a presentation going through the questions. We further had a sense that the fact that the informants were able to prepare for the questions also compensated for the fact that they were very nervous about speaking English, and in our interview with Prof. Sei, sending the interview questions in advance proved valuable. The following excerpt from our fieldnotes elaborates:

> *I was very impressed with how well-prepared the professor was. We had sent him our interview questions ahead, and he had prepared a presentation which followed our interview questions quite strictly. He presented all his research and the things he did not know the answer to, he had done research on solely for the purpose of the interview. He did not speak much English, but the fact that he had the interview questions beforehand was a big advantage to us.*

The questions thus proved to be an important tool in making our informants more comfortable in the interview situations, whether it was about language barriers or protecting company secrets.

Another strategy in this regard became one of expressing certainty in what was going to happen in the situation. Before we left for Japan, the people at Tokai had mentioned to us that we might find Japanese people shy and cautious compared to what we were used to from doing research in Denmark. This was something we had to navigate in with a suitable

amount of both humility and initiative, as illustrated here in our field notes from our first visit at AIST:

> *Right before Yoshio entered, Jun told us that Yoshio speaks great English, but that "Japanese are not always taking the initiative in a conversation, so you have to do that". I was really glad he told us that, as this really helped the ensuing interview with Yoshio. Here, Yoshio was sitting casually with his computer, which he was typing on. However, if we asked him a question, he turned away from the computer and answered gladly and elaborately on our questions. If we did not ask him questions or initiate a discussion he turned back to writing on his computer. He did not once in the meeting ask us a question or tell us anything on his own initiative. Therefore, I was very glad that Jun had informed us of this shyness or reticence, as I would have otherwise read his modesty as a sign of him not wanting to talk to us. But, as Jun told us to take the initiative in the interview, we did so much more than usual, and this was necessary in order to get the interview going. I do regret afterwards, however, that we did not tell him more about our own background, focus of the project and aim. He did not ask us anything about this, and we therefore never got around to telling him more. We should have done so, I think, as that would have given him a better foundation for answering our questions and understanding what we were asking, as well as a better foundation for setting us up with relevant contacts at the many knowledge institutes at which he has contacts.*

Taking the initiative in steering the interview made it even more important for us to remember what Spradley outlines as a way of addressing the apprehension**;** by merely listening:

> *"When an informant talks, the ethnographer has an opportunity to listen, to show interest, and to respond in a nonjudgmental fashion. These kinds of* responses *represent the most effective way to reduce an informant's apprehension."* (Spradley, 1979 p. 46)

Spradley notes how pure interests with no judgemental expressions can be used as a way of making the informant more comfortable in the interview. This has not been hard, as we were genuinely interested in everything our informants told us, making utilising this method easier, although we also had to take control of the interviews. We also tried not to make comparisons to the Danish aspects unless asked about it; we did not want to relate the statements of our informants to the Danish approach, as this could have been interpreted as us representing "the right way" to develop technology. For this reason, we also used our astonishment of our informants' way of doing things as a manner in which we could express our curiosity.

Though we made preparations, meeting the informants started out a bit stiff at times. We were nervous about how to act in an unknown cultural setting, in particular because we had prepared Japanese greetings and gestures which we had never used in practice; and they seemed just as nervous about what we actually wanted from them. The first few minutes of the interviews were especially characterised by apprehension, but the first business ritual we encountered every time often relieved the pressure of the situation. We had to exchange business cards, something that might sound banal, but it is a ritual deeply ingrained in Japanese business practices with a strict set of rules. Luckily, as we were foreigners these rules were not as strictly applied to us, because even if we had prepared for the exchange, we messed it up in various ways--either by holding the business cards slightly wrong or by not bowing the right way. Our informants never addressed this, but we knew ourselves when we messed it up. The context of exchanging business cards instead became a situation where a more relaxed atmosphere was created, as we all tried to pronounce one another's names, laughing at ourselves together at how bad we were at pronouncing the Japanese names, and they the Danish. Humour therefore became a common ground and a creator of rapport throughout the interviews to keep an informal tone, although understanding humour across cultural differences also proved challenging:

> *Laughing has, not surprisingly, proven a strong means to win the trust of our contacts and to create a sense of common ground. It is however difficult to use this tool in an active manner for us. In all interviews we usually do in Denmark, we know and are part of the humour, and I think we have always found it easy in interviews to loosen the sometimes heavy topics by sharing funny comments or moments with informants. We*

have definitely tried this for the first couple of days here, as it is a common thing across cultures despite of for instance language differences, but we have not yet figured out exactly what kind of humour our informants have and what they find funny. We have said things which we thought were funny, and no-one laughed, and we have said things which were said in seriousness, but which our informants found very funny. But it is also more nuanced than this. For instance, the app we used for translating Japanese signs translated one of the rice balls in 7/11 to "Soviet Union". I was in doubt whether to tell this to Jun when we discussed translator apps, but I did, and he could not stop laughing and has mentioned it several times since and asked me to take a screenshot of it and send to him. I of course thought this was a funny translation when I saw it on the screen, but I had no idea that Jun would find it that funny and that it would work as such a strong tool for us to have something in common to laugh about and as something which created an internal joke between us.

Another way we tried to counter this initial apprehension was to bring Danish gifts for our informants to show them respect and that we appreciated them taking the time to talk to us. The gifts became a great tool for establishing trust, as it showed the informants that we valued their time and as it became an object to talk about.

At MRI, the apprehension was like a smokescreen in the room. The interview started out quite formally, as we were seated in a large conference room opposite three informants; The general manager, the research director and a researcher. To start with, the formal atmosphere was characterised by a confusion from the informants on what exactly was going to happen, and the conversation often stagnated. MRI had requested that we carried out a presentation about the Danish development and market of AI, and our plan was to conduct this presentation at the end of the interview to not make the interview about Japan-Denmark comparisons, but we ended up doing it within the first twenty minutes because of the stagnating conversation. After carrying out this presentation about Denmark, the conversation became much smoother, as they had a reference in what we had told them; something they sometimes used to situate their own statements, and as we suddenly had things to discuss, not only things to ask and answer one way. This stage where rapport begins

to be established is what Spradley refers to as the exploration stage, and it was late to occur at the MRI interview because we did not ourselves offer anything sooner:

> *"When a sense of sharing occurs, a moment of relaxation comes. Both can then begin to explore the territory with greater freedom." (Spradley, 1979 p. 46)*

Going through the MRI interview afterwards, it is clear that we were somewhat apprehensive in formulating our questions, and everything was very carefully analysed before it was put into the open. This is a great example of the apprehension not merely being something that the interviewees express, but something that came from our side of the table as well. The next stage in Spradley's model is the cooperation stage, for which he describes:

> *"Informants often cooperate from the start of the first interview, but this stage involves more complete cooperation based on mutual trust. Instead of uncertainty, the ethnographer and informant know what to expect of one another. They no longer worry about offending each other or making mistakes in asking or answering questions." (Spradley, 1979 p. 47)*

After we presented our knowledge on Danish AI development, the interviewees began to take initiative and cover subjects that we were not specifically asking about. The answers became longer and often ended with a request of reciprocity in the form of how the discussed subject takes place in Denmark. This led us into the comparative state that we initially did not wish for; however, it also granted us more in-depth answers. We formed a mutual trust and started to cooperate.

The fourth stage that Spradley notes is participation, which is described as something that usually occurs within weeks of working closely together. We argue, however, that we experienced this stage at the end of this interview:

> *"They bring new information to the attention of the ethnographer and help in discovering patterns in their culture. They may begin to analyze their culture, but always from their own frame of reference." (Spradley, 1979 p. 48)*

This notion of analysing the culture was clearly happening in our discussion of Japanese and Danish AI development. It was evident from both sides. This was evident when we talked about *kami*, the Shinto [15]notion that everything is imbued with a soul, as being an integrated part of the way, they approach technology development, which led to a string of clarifications on the subject but also different thoughts that were obviously new to the interviewees.

Our Linguistic and Cultural Interpreter

As none of the group members speak Japanese, and as many of our informants felt limited in talking about AI and technical aspects of their work in English, the use of an interpreter was a necessity. The interpreter that we got to help us in our project was Jun. Thus, our empirical data has been influenced and contributed to by our use of Jun as an interpreter in order to communicate with and interview our informants. Though many of our informants had trouble expressing themselves in English, only half of our interviews were conducted together with Jun. Between our informants, even though a basic level of understanding of English was often present, there was a great span in their English capabilities, and the varying degrees of their language skills played a large part in how we planned and carried out our interviews.

Excerpt from interview with Robot Start Inc in which it is evident how Jun translates from one language to another.

Having Jun as an interpreter was arranged as he was eager to attend the unique possibility of having meetings with these companies in order to expand his knowledge on the field and obtain experience as an interpreter. This means that the interpreter in this project was not a professional one, although Jun does have previous experience of translating similar types of meetings. The advantage, however, of collaborating with an employee at AIST as an interpreter, was that he had an in-depth appreciation and knowledge of many of the subjects of the

Excerpt from interview with Cocoro SB. Here our informants are so eager to tell us about Pepper that Jun is challenged in remembering everything for translation.

[15] Shinto is the traditional religion in Japan and is today the dominating religion alongside Buddhism.

interviews regarding the field of AI and user groups. This meant that Jun had an understanding of e.g. the technical parts of the subject, meaning that he often knew the relevant terms in both English and Japanese, and that he understood the content of what he was translating, thereby resulting in more accurate and easily flowing translations.

This does not mean, however, that there were no challenges in using an interpreter in the project, nor that the interpretation did not have an influence on the outcome of the fieldwork. We tried to overcome some of the challenges beforehand by drawing on Rogers (1997), who states a number of recommendations for using an interpreter in qualitative fieldwork. One is to pay close attention to paraphrasing and stressing to the interpreter that he should translate as closely to what is said as possible. Beforehand we strived to get Jun to translate ad verbatim, but that soon proved difficult as the informants were very talkative, which meant that Jun could not simply recite word for word. This he solved excellently, however, by writing everything down by hand as the informants were speaking.

In translating between Japanese and English, it is important to understand that the grammatical differences between the two languages simply make it impossible to translate directly. An example of this is the Japanese word Cocoro which has no direct translation in English, and the closest one gets in translating it is something like heart, mind and spirit.

We found that having a discussion with Jun before the interviews about the task was of great value to both him and us, as we were able to understand how he was planning to approach the task of interpreting. We came to the agreement that he would translate as closely as possible to what was said, and that he would point out to us if what he said was his own interpretation of what was said in the interview or if he felt challenged in translating something. This proved very helpful, as Jun at times had to act as a cultural interpreter just as much as a language translator, when misunderstandings occurred for instance because of cultural differences. An example of this is from the interview with the consultancy Robot Start Inc., where we talked about user involvement in the development process and Jun gave us his comments on the Japanese engineering landscape:

Jun translates: People can develop applications for use on Pepper and RoBoHon, but no-one has done so.

Jun comments: I know lots of robot designers and engineers. [..] They are not interested in humans or users. There is a huge gap between the Nordic countries and Japan. I know both countries--and you, out of three people there are two females, working on robots. In japan it is 99 percent male. And you are talking about how to solve problems. In Japan, we just want to make robots, it doesn't matter.

Another one of Rogers' (1997) recommendations is that "*Translators should become a part of the research team and be given an understanding of the* basic *methodology of the research being done and the research questions being asked"* (p. 15). This we applied to our project throughout the fieldwork, as Jun acted as a key gatekeeper and informant simultaneously, meaning that he was involved to a great extent in an iterative research process in which he both opened up perspectives to us on the subject, disseminated our enquiries to other informants, and elaborated and discussed these with us subsequently. This became a strong advantage, as Jun then had a greater understanding of our purpose with the interviews, and he was therefore able to navigate in the conversations and translate our questions more accurately.

This means that Jun in this thesis cannot be seen as what Bujra (2006) argues should get one's alarm bells ringing as a social scientist: *"merely a transmitter of what others say"* (p. 175). Instead, we have chosen to draw on Jun actively as a participant in the conversation who has been bringing valuable insights of context to the interviews and who has also been able to act as a partner in ensuring we obtained empirical data of value to the project from the interviews. We have had to pay attention to how Jun's role in the interviews has influenced the knowledge production; something which we have also discussed with him as he was open to reflect upon and discuss the process. Jun was clear in telling us when he was stating his own opinion, as he understood the value for us in being able to get insights from the companies' points of view.

A clear benefit from using an interpreter in our interviews was that the informants were able to speak more fluently and unbounded about the subject, which tended to be a challenge in

the untranslated interviews, where some informants at times gave the impression that they felt limited in their English:

> **Kasper**: You talked about AIX [the AI center of UEC] trying to do Artificial General Intelligence by mimicking the brain. Do you think that is the best way to create AGI or do you see other ways?
> **Prof. Sei**: Other ways, that's difficult. [Hesitates]
> **Amanda**: Is anyone within the university world working with AI for personal assistants?
> **Prof. Sei**: Yes, some researchers use their own AI.
> **Amanda**: So, at the university here or..?
> **Prof. Sei**: Yeah, I think.

In this interview, we had the feeling that the informant did know a lot more about the subject than what he explained, but that he was unable to express it in English, and it is evident from this transcription that his answers are hesitant and short as a consequence. Further, one could argue that it is not clear whether the interviewee understands the question at all, as his answers are highly generic and without real substance.

Jun was also challenged at times, however, and we as researchers also had to adjust to the interview situation accordingly. One challenge which occurred regularly was that the informants were so eager in their elaborate answers that Jun at times had to stop the informants in order to translate to us before he forgot what they had said. This became even more challenging when we did an interview with a fourth party present besides us as researchers, the informants and Jun. This challenged our interview with Cocoro SB, as the woman who had set up the interview also participated out of her own interest. This meant that Jun suddenly had to translate conversations in Japanese and not only one-person answers, which proved challenging as he then had to translate and listen at the same time while the other parties were speaking Japanese.

Using an interpreter also changed the interview situation for us, as this was the first time any of us interviewed using an interpreter, and we had to pay close attention to new aspects in

order to get a fluent and productive interview. Here, there was a challenge in building a relation to the informants in the ways which we have refined through years of experience in doing qualitative interviews. Not being able to communicate directly from the first greeting required new ways for us to loosen the formal setting and obtain the trust of our informants, and we found ourselves relying a lot on gestures such as exchange of business cards, bowing and using simple Japanese phrases for greetings. Establishing this trust also meant that we had to pay attention to looking into the eyes of the informants instead of Jun and how much information we could provide at one time, and we had to use other means to establish trust, as we realised that for instance a joke is not as funny when you have to wait for the punch-line to be translated and the response is delayed.

AIBO the office dog greeting us in the beginning of our interview with Robots Start Inc

What often did help us as a means to creating trust turned out to be the entities which the discussion was about. These provided a common object to relate to which did not rely so much on language. This is evident in our interview with Robot Start Inc. Here, we had trouble from the beginning in loosening the formal setting, as we relied a lot on Jun to translate the greetings between us and get the interview started. But luckily there was also someone else present in the office: A small robot dog, AIBO, the company's office dog. One of the group members patted it and it immediately jumped in her direction, barking and wagging its tail. This immediately created a common ground and something between us at which we could laugh together without the need of an interpreter.

AIBO the robot office dog takes over the interview

Ongoing Observations

Observations have been an important aspect of the methods used to gather data in this project, although we did not gain access to observing the way we had hoped for when we designed the study. Initially, we had hoped to be able see the offices of the developers and

observe the setting in which the technology was created in order to be able to ask more detailed questions of the development process. However, at all the companies we were shown into meeting rooms, and we never got the chance to see the practices of how they worked. This, of course, shaped the project. It means that we have had to rely more on the approach of using qualitative interviews to produce insights, something which has turned out to be an advance in investigating the visions which became so central to our analysis.

To investigate our research question of what imaginaries of the developers take part in shaping AI robots in Japan, we believed it important to not accept the lingual aspects of the interview as our only source of empirical data. Visions and imaginaries are as much visible in the underlying assumptions and world views that are not explicitly expressed. Therefore, we believe our choice of combining various observation methods with the interviews to be the most fruitful in opening up the imaginaries within the companies and research institutes.

Brinkmann & Tanggaard (2015) define participant observation as a type of observation where *the scientist participates or takes part in the observed practises* (p. 83). Within our approach to observations we did not take part in the actions observed in the literal sense. However, as our observations were part of the interviews, an interaction between us as researchers and the observed did take place.

We planned our interviews with different roles from the beginning. We decided for one of us to be in charge of questions and keeping track of the interview guide, for one to listen carefully and provide follow-up questions and for the last to take notes during the interview, which is where most of our observational data comes from. Having the roles decided beforehand meant that one person could concentrate solely on the observational part, hence providing more in-depth field notes. Later the same day we then typed up the field notes to make sure everything was still fresh in memory.

Going to Japan, everything we have seen and done has been part of diving beneath the surface of the cultural understandings of Japan. Our field notes from our observations span from catching the metro in rush hour to trying to understand what we were eating at a restaurant. Producing field notes outside the context of the interviews is therefore something

we have done to underline the fact that we were not always passive observers--sometimes we engaged actively with the field and everyday city life. In the context of interviews, our field notes presented our observations of the informants' actions.

> *"[..] participant observation is not only suitable for understanding the social and material basis for human actions. In general participant observation as a method is well suited for describing and comprehending the local, the particular, the situated, and the social in people's everyday lives [..]"* (Brinkmann & Tanggaard, 2015 p. 85)

We have deliberately cultivated field notes as much as possible in order to produce insights based on what our informants did and not only what they said in our meeting with them. The interviews in which the informant did not speak English made this approach very tangible, as we had some time while they were speaking Japanese to observe other aspects of the communication taking place, such as gestures, facial expressions or even communication between the various parties in the interview.

> *Miho is very careful when touching RoBoHon. Her hands are presenting RoBoHon when she speaks, but she puts her hands on him as if he could break at any point. The entire interview he is placed in front of her a little to the left, right in front of her heart.*

This piece of field note is telling a story about the relationship between Miho and RoBoHon. It is an important piece of information provided not in the answers she gave us, but in her body language. This makes our observations something of a different character than what we would categorise as classic participatory observation in the field of anthropology. Our observations have not been in participating in the doing of what our field of study is, the development of AI robots, but in observing e.g. how informants acted around the technologies we were discussing. This does not mean that we have not participated while observing, but rather that we have participated in other activities, such as the production of knowledge through interviews and the AI exposition, instead of "joining" our informants in their doings of developing technology.

Even though Miho kept RoBoHon close, we did get to see him dance flamenco

As is evident from the first sentence of this project, field notes have been highly important to our production of empirical data. This was especially the case as we were situated in Japan, and many insights were produced in situations of observation such as observing our informants during the interviews, observing presentations of AI products at the AI exposition, or observing the interaction with robots at electronics stores. Writing field notes has been a challenge as well, both in being able to write things down in all kinds of situations requiring our full attention, but also in having the time while we were in Japan to elaborate on our notes and spell out the quickly written notes. The latter was necessary as our field notes had the character of being what Emerson, Fretz and Shaw (1995) term jotting notes. These are quickly written down notes which serve the purpose of jogging one's memory later when the interviewer has a chance to spell them out. This was crucial to us, especially because these jotting notes helped in supplementing our head notes. In order to secure the knowledge in the form of field notes, a part of our rituals through the entire fieldwork in Japan, was to strictly allocate time continually and after each interview in order to find a café, sit down with our laptops and spell out all of our jotting notes while drinking a cup of green tea.

Fitting In: New Professional Rituals

We were shown to a meeting room with a squared horseshoe of tables. The meeting room was very anonymous with white walls, white tables and the stuffy meeting room smell we know so well from our meeting rooms at work. We were placed on the one side of the horseshoe, against the wall, and they were sitting on the other side with their back to the door. The distance between our tables was maybe 3 meters in total. It seemed very formal with all that space between us. It was a bit like us and them, and the formal setting was only emphasised by the suit wearing secretary who served green tea for us one at a time without interrupting the meeting.

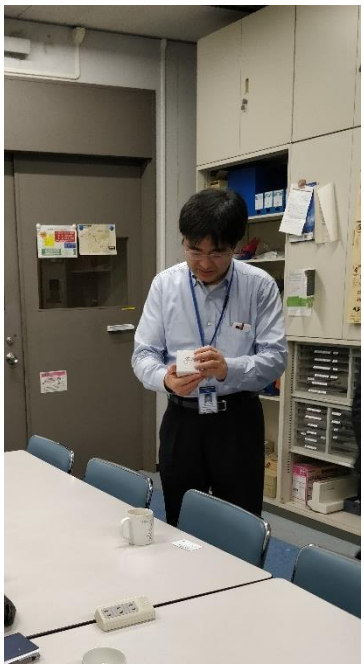
A formal welcome in the reception of MRI

As we entered a cultural setting none of us had encountered before, we felt it important to acquaint ourselves with the norms of business meetings we had to follow before we left for Japan. We did this with the help of our Tokai alumni contacts and through an extensive watching of Youtube videos describing the degree of the angle which a professional and humble bow is supposed to have. First of all, our initial research led us to the conclusion that the dress code was very important. If you enter a business context, you need to wear suits and freshly ironed shirts, and our suitcases were therefore filled with such when we left for Tokyo. From our first meeting we were all dressed in suits, however, we found that the dress code was a bit more loose at some companies.

> *Meeting Jun, he tells us that we have dressed in a much more fancy manner than needed. He tells us that companies like Gatebox are full of "nerds" (his words) and dress accordingly. This stands out to us as he himself is dressed exceptionally well. He tells us that we do not have to be this nicely dressed, and we take it into account as we do not want to overdress when we visit other companies and informants.*

From that point on we were a bit more selective in our choice of attire, and usually chose to ask Jun what he believed the dress code to be at the given company.

Another aspect we found to be important was the exchange of business cards which in our initial research seemed almost ritualistic. You always bring business cards with you, as the exchange of these is always first order of business. They are to be kept in a business card holder; not in your pocket, wallet or other random places. When you present the business card it is with the informative side towards the recipient so that he or she can read the information. It is presented with both hands, and business cards are always accepted likewise. When presented with a business card you take your time to read it and show your interest in it. During the business meeting you place it in front you to remember the name and position of the person speaking.



Yoshio studying our gift from Denmark

We found this ritual to be upheld at most places we visited and meeting this evidently created a sense of professionalism in how our informants viewed us.

The exchange of gifts with business partners had been presented as very important to us. It is a token of respect and humility and a part of establishing a relationship with your business partner. Therefore, it is not inconsequential what you choose to present as a gift. It should be something from your home region, and design and edible gifts are highly appreciated. We had managed to get gifts sponsored by Lyngby Porcelain and Summerbird Chocolate, so we could choose between Danish design or Danish gourmet chocolates for our meetings. We thought that this was brilliant but had not accounted for all the cultural differences in our efforts to find the perfect gifts.

> *We had brought them our most fancy gifts from home--the candle holders. When we had handed them over, using two hands as we had studied from home, the manager was holding it in his hand with a puzzled face. I could almost tell he was thinking "what on earth is this thing?" Suddenly he burst out jokingly: Aah it is a glass! We tried to explain that they are used for candles and "hygge", but eventually just went with the sake glass as a supplement to it being a candle holder for the rest of our trip.*

Chocolate however proved to be something which works across cultural differences. Visiting Cocoro SB we had brought chocolate instead of sake glasses, and this turned out to be a very good idea as the board director reacted with a "*Oh, chocolate is my favourite thing, I love chocolate"*. This was the perfect way to start a conversation over our shared love of chocolate and how Summerbird had just opened a store in Tokyo. This broke with the formal setting right from the beginning of the interview.

Identifying Narratives

Our choice of writing in a narrative approach has also had consequences for the way we treated our data. The narratives developed during our fieldwork have been based on transcribed interviews and field notes.

We have transcribed all of our interviews as the first step of handling our empirical data. We chose to do so in order to create a textual overview that could later be searched for specific wordings or topics. For this, we have used an approach of fully transcribing everything said in the interview but without any phonetic indications of how the words are spoken or indications of pauses. However, when we have assessed it as an expression of something significant, we have indicated laughs and hesitations. This analytic turn was performed to illuminate indications of nervousness or insecurities that could be analysed from tone of voice or visual markers with help from our fieldnotes. As our informants were restrained by the fact that we do not speak Japanese and hence had to express themselves in English, we have further taken the liberty to add simple words various places to complete the meaning of the individual statements. Some statements were difficult to grasp outside of context, which means they had to be lightly edited for utilising in this paper. Words have not been changed and no sentence has been rearranged.

The use of an interpreter has further influenced the way we have transcribed the interviews, as we have not been able to understand when the informant is hesitant in his/her answer to our questions, as the interview was performed in Japanese. In these interviews we have had to rely solely on visual markers for such situations. Central to the transcriptions of the interviews with an interpreter have been that we only transcribed the translations made by Jun and not the Japanese answers by our informants, as have virtually no understanding of the Japanese language. Despite the use of an interpreter we still wanted to portray our informants' statements as their own, for which reason we use their names instead of Jun's when using excerpts and statements from interviews.

Having formed an overview of our field notes and transcribed interviews, we identified the key narratives in the data. This was done by brainstorming interesting narratives and topics. We based this process on our theoretical framework and research questions to keep the points central to our focus and narrative. Drawing on our inspiration of Jasanoff's (2015) concept of sociotechnical imaginaries we found that one imaginary existed across multiple of the outlined narratives which we then chose to focus on in building our analysis of the human-machine relationship with AI robots foster. But before turning to the analysis hereof, we wish

to elaborate on the understanding of validity and criteria of quality which we have strived to work under throughout our project.

Validity and Quality in Our Enquiries

In extrapolating our positioning in the field instead of trying to hide this, the criteria of validity we assess our study through are different than the classical positivistic ones of reproducibility and neutrality. Instead, we draw on Guba and Lincoln, as described by Trochim (2006), and their description of qualitative validity. They describe four counterparts to the validity criteria of quantitative research, defined as underlying assumptions involved in much qualitative research. In this chapter we discuss our research up against these four criteria (credibility, transferability, dependability, and confirmability) and argue for the validity of this project.

The first of Guba and Lincoln's proposed criteria is *credibility,* which has to do with the participants. They argue that the credibility of the research is strengthened through establishing that the results of the research are credible from the perspective of the participants (Ibid.). We have tried to establish this through different means; first, we presented our results for AIST, and they provided feedback on the conclusions we had drawn at that point in time. Second, we were aware of the fact that, yes, our empirical data had been validated by our informants, but our analysis and conclusions that we have built upon the data still stands on its own. For this reason, we have arranged to send all our informants a smaller report containing a summary of the thesis.

The second criterion, transferability, refers to the way in which the results can be transferred to other contexts or settings. This is done by generalisations and can be enhanced through careful research context and assumptions central to the research. We have tried to enhance the transferability of this project by taking a narrative approach to the integration of descriptions of our fieldwork, and by drawing out generalisations that transcend the particularities of the context.

The third criterion, dependability, is about the responsibility of the researcher to describe the context, and the changes that happen within it, to account for how these changes affect the approach to the study. To meet this, we have been thorough in describing the continuous

changes of the project; Both in what surprised us and in how our conceptions of Japanese culture have evolved in order to establish what changes we made during our fieldwork to adapt to new knowledge about the field.

The fourth and last criterion, confirmability, is about the degree to which the results of one's research can be confirmed by others, meaning that there is a concordance between the empirical data and the results. We have employed several strategies to make this thesis confirmable: Throughout the analysis and writing process we have conducted several data audits, meaning that we have gone through our data to secure that the accordance between data and results were valid, and in turn we use the data actively by e.g. quoting our informants directly in the text. We also argue that, as we are three pairs of eyes on the data, we have used this to assist and challenge one another to document points with the data to secure validity.

In drawing on Haraway's (1991) situated knowledges earlier, the positioning of ourselves in the knowledge production becomes not only an understanding of objectivity but also critiria of quality which we have worked under throughout the project. Situated knowledges produce certain criteria for good science, not only in that the scientist has to be aware of his or hers own situatedness but also in taking responsibility for the knowledge production (Haraway, 1991). Accountability becomes central as subject and object merges and the researcher becomes part of the knowledge production through the interplay between the researcher and the world, and this has the consequence that the researcher must also maintain a reflection on how the knowledge materialises and takes part in creating inclusions and exclusions in the world.

This is something which we have reflected on throughout our production of knowledge and which was also part of our desire of going to Tokyo; one of the aims of this project is to acknowledge the complexity of the world by including the Japanese companies in what is otherwise an exclusion of them in the Western portrays of their technology development and view on human-machine relations. But in our choice of focusing on the developers of AI technologies, we are aware that exclusions also happen. We produce and reproduce knowledge on the developers thoughts on what the good human-machine relationship is, and

although we argue that these add valuable perspective to the development of AI, they are also views which stem from the developers themselves and not from the users of AI robots as the companies do not engage in user involvement and as we do not in this project either. Further it is important to note that we have mostly engaged with managers of development and not much with developers themselves. Therefore, the illumination of the development processes is unfolded on the premises of the managers, which excludes the developers and their visions within the development process.

5 Imagining the Good Human-Machine Relationship

Is It All Just Crazy Anyway?

We are sitting in the half-empty train cart which is stamping through the densely built-up landscape in the suburbs of the world's largest city, Tokyo. We landed at Narita Airport the night before, and Anne squinting her eyes is proof of how tired we are from the jetlag. We all focus on carefully listening to the guy sitting next to us, the gatekeeper of the entire project, Jun, who speaks of the engineers, nerds as he calls them, who develop robots out of interest, not out of serious reflections. We met with Jun at Akihabara Station earlier the same day and are on a two-hour train and bus ride on our way to visit AIST in Tsukuba, north of Tokyo. Our eyes are caught by an advertisement across from us which portrays a Japanese woman and a text in Japanese signs. Among them are the roman letters AI. We have no clue as to what the advertisement is concerned with, but we are excited about it and the fact that we are finally here, in the country of robots and ramen, sushi and sumo.

Jun explained how a lot of technology in Japan is developed without a set goal and how it becomes the materialisation of ideas and dreams that convey a demonstration of ability or interests rather than an actual need from a user group. In his view, Japanese companies do not start with why, they merely develop a technology because they find it interesting. At AIST, we were presented with an overview of the development of AI technologies in Japan by Jun's supervisor Yoshio, and several times he proclaimed the failure of a given technology because it simply did not match a need or a purpose. Development of AI or robots often happen due to "nerdy" engineers who wish to work with robots without having a clear mission of the use case, they argued. The company Gatebox, with the holographic anime smart speaker which initiated our interest in Japan, was presented as an example of this phenomenon. Jun elaborated on how the technology in Gatebox is still based entirely on preprogramed scenarios and the product is still only driven by a fantasy of living with your favourite anime character. They still did not have a working product, and Jun was mildly speaking sceptical of the future of the product--also on the basis of the technical aspects of it employing a pre-recorded set of responses for certain input instead of synthesising them when needed. He mentioned, however, that the product receives a lot of attention due to the popularity of anime among technology enthusiasts in Japan and that he expected that there was actually a market for a holographic anime figures that you could (at least in theory) have a personal relationship with and potentially live with as a wife. This view of the Japanese technology development was perfectly in line with everything we had heard and read before coming to Japan, and it fitted neatly into our preconceptions and assumptions. We began to worry that our fieldwork might end up as a mere confirmation of the conceptions of Japanese technology culture we had been presented with in our prior research from home, making our fieldwork in Japan a trivial tale and essentially redundant. To our relief, we were about to find out that there is more to the development of AI entities, we just had to dig a lot deeper in understanding these ideas of Japanese technology culture and Yoshio and Jun were in deed interested and surprised by our insights, in which they identified several contributions to the existing knowledge on the subject matter.

In the electronics stores in Tokyo a variety of AI robots are found by the dozen

AI Robots as Partners

> **Anne**: So, how did you get the idea, and how did you go from that idea to the product that you have now?
> **Kiyoshi**: So basically, the CEO, Mr. Son, he wanted to create a humanoid, but not to increase efficiency. Rather, it should do more human relationships. A partner to humans.

It is a word which recurs in all of our interviews with the companies. Partner. One might be quick to think that this means partner as in someone you engage with in a romantic relationship, but this was not the case in our interviews. But what, then, is this vision of creating a partner about?

> *I'm astonished by the way Kiyoshi describes Pepper as a partner and the fact that he places such an emphasis on the exchange in the relation. And not just the way that Kiyoshi speaks about Pepper--I notice Jun's choice of calling Pepper "he" and not "it" when translating from Japanese.*

Drawing on Sheila Jasanoff (2015) and her notion of sociotechnical imaginaries, we wish to unfold how our informants' visions come to be and how this is materialised. Jasanoff defines sociotechnical imaginaries as something inherently collective, noting that the level of collectiveness is not static. With outset in this definition we define this project's approach to sociotechnical imaginaries as something being collectively held among all our informants. By this we are not saying that our informants had homogenous approaches to and understandings of AI, but rather that there was something recurring among them, influencing the way they envisioned and approached the research and development of AI, and especially AI robots. Thus, as there are potentially several sociotechnical imaginaries present among our informants, one had a strong, all-encompassing collective presence: the imaginary of having AI robots as partners. We see this as highly incisive for what is at play in our project, for which reason the sociotechnical imaginary that we engage with in this project can be defined as a vision of the future relationship with AI technology, one which envisions a coexistence

between humans and intelligent machines in certain ways. We use the term sociotechnical imaginaries also to stress this vision of AI robots as partners. It is a vision, an imaginary, which shapes the future development of AI robots--in this thesis conceptualised and referred to as *AI robots as partners*.

Let us have a look at what our informants mean when they talk about AI robots as partners. Firstly, AI robots as partners can be seen as a reaction to the ongoing debate on whether AI will substitute humans:

> *"It is a very tough question. Some people say AI will substitute the workers. But I don't think that. I think AI should be the partner of humans. And AI helps us to work better and better. The object here is to enforce our ability."* (Kazuo from MRI)

Kazuo here points to some of what lies behind the imaginary of having AI robots as partners. They are not to substitute humans, but to work together with them, as this will create better ways of working. They will *enforce* the abilities of humans.

There is more to the imaginary of AI robots as partners than robots not simply substituting humans. We see something essential in the kind of equality of the robots for our informants. They look at the robots not as assistants but as partners to humans; it is about engaging in a teamwork or relationship, human and machine, on more equal terms than current human-machine relations.

> **Kasper**: What do you think the relationship between RoBoHon and the user should be?
>
> **Miho**: RoBoHon is designed as a partner. RoBoHon should be a partner of his users. But my idea, my goal is that each one, each user, has their own RoBoHon. RoBoHon makes a personal relationship with his user, it should be personalised for each user and robots give advice and robots share their lives together with humans.

This was further evident in that our informants were critical towards Western AI technologies such as the widely sold Amazon Alexa and Google Home AI speakers. Our informants used the

word partner almost as opposed to these technologies which are often referred to and advertised as smart assistants. The view here is that these technologies do not provide an ideal relationship to humans, as they distance themselves from having a personality and engaging in the relationship to the human in personal ways.

> *"For example, Alexa, she has certain preferences. If you ask her what her favourite movie is, she answers "I like this". But Google, he doesn't have preferences. He tries to answer in general."* (Yoshihiro from Robot Start Inc.)

Yoshihiro here explains how the interaction between humans and machines become pointless when the machine does not have a say of its own. This, he argued, does not prepare the ground for a meaningful and productive relationship, but instead a relationship in which the human easily gets annoyed with the machine and does not engage in working together. Our informants instead envisioned a future where technology, in this instance expressed in AI robots, are friends of humans, having relationships of different kinds.

What we argue is essential to understand here, is that AI robots as partners is not an imaginary of aimlessness. They do not just refer to the AI robots as partners because it was their first impulse or because they think that this could be fun. On the contrary, we found that there were some well-reflected and serious considerations behind the imaginary about the future nature of human-machine relations. To Kiyoshi, the board director at Cocoro SB, AI robots as partners changes our relationship with technology; It is a way to create sustainable use of technology, making the user take more care of Pepper.

> "*Because he can tell feedback to humans, he can tell users his status or his feelings which the users can care about the product from. It means they can use their product more. For a longer lifespan. Or they can drive their car more safely, which makes users to take care of their tools more and it makes a longer lifetime, or it makes users more emotionally attached to their own tools. I think that his emotion will be a system to protect or care about their pals. So if your pals or colleagues or friends have trouble, people want to help, if your pal is laughing you are also happy, so we thought that this must be a system for humans. So if the product has trouble in life, and that is the*

emotion the product expresses, probably the user wants to support or help the product or the user will more carefully treat the product." (Kiyoshi from Cocoro SB)

Hereby an understanding based on how concern for the product produces longer lasting and more safe relations exists for Kiyoshi. Looking at Pepper as a partner, his vision is that humans will act in the same manner towards technology as they do towards other humans, as they get to know each other.

There is also an understanding in this imaginary that a partnership with machines makes for better, more productive collaborations. An example of this, which on the surface might very easily fit into the understanding of Japanese AI development as crazy, is an experiment which Cocoro SB did as part of developing artificial emotion: They provided a motorcycle with the ability to express how it is feeling during a race both for the driver and the audience to see. According to Kiyoshi, this produces a relationship which is better, as the human becomes more attentive to the performance of the motorcycle and thereby to how they can work together and perform in the best possible manner. This further opens up a requisite of emotional life in the human-machine relation. We return to this, and the motorcycle with an emotional life, later.

These perspectives on nature of the relation is something which is especially portrayed by our informants as concerning working relations although there is not a distinction between which entities are supposed to be used for work and which are for leisure; a partner is part of your life all the time in this imaginary. Understanding the imaginary of AI robots as partners, however, the word friend also becomes central, and it is interesting to look at how the word friend is used by our informants almost identically along with the word partner.

"Our concept is to make new friends for humans." (Kiyoshi from Cocoro SB)

Kiyoshi's remark here provides an insight into what the imaginary of AI robots as partners mean, and it adds a personalised aspect to the human-machine relation, showing how being a partner constitutes more than working professionally together. This becomes evident especially in how the companies and researchers think of the emotional output which the

entities ought to create; they are envisioned to having independent meanings which make them able to go from being mere productive assistants, providing the most efficient answers when interacting with humans, to autonomous self-willed friends in their relation to humans. Not only in that they are autonomous in working on a task, but also in that they have their own opinions on matters of likes and dislikes.

> *"And he [RoBoHon] talks to them and says that it was nice that they visited somewhere sometime. Or he suggests something, like "you liked this one, let's go and eat this one instead." And this kind of personalisation."* (Miho from Sharp)

By doing so, the vision is that the entities become closer to being equals to humans and that humans thereby treat them like friends with care and respect. The focus is on the robots' expression of what *they* think and feel, not only on them understanding what humans want them to do or understand.

This imaginary however not only envisions humans respecting the machine, but also the machines trying to be a friend by wanting to help the human:

> *"We want to make robots that are willing to help people or willing to do something for humans, even though it might be annoying. So to do that, the robot himself voluntarily thinks about what he can do for a person."* (Kiyoshi from Cocoro SB)

There is a reciprocity in the relationship here. Humans must be open to the self-willingness of the machine and have respect for it in order to create the friendship, but at the same time the machine needs to want to help the human in the same way as a human friend would.

However, the friend dimension of the imaginary of AI robots as partners is also about providing humans with a partner in lonely times.

> *"If you use the robots at home, it might be that people feel lonely or want someone to enjoy something with them."* (Yoshihiro from Robots Start Inc.)

The imaginary of having AI robots as partners might in these accounts seem foreign and alien from a Western perspective, something we return to discussing whether it actually is. But it is also, we argue, an imaginary envisioned on the basis of reflection and care for the future coexistence of humans and AI machines; the idea that this coexistence will be better, both in that it will create more efficiency and lasting work relations, but also in that it will create a valuable friend to humans that we want to work together with and at the same time enjoy being with in our private lives.

Hereby, the imaginary is something which, in our argument, poses many relevant questions, as well as some answers and concerns, of what the good life is for humans and how humans and machines can live together in the future. We return to this later in chapter 6. For now, we want to shed light on what conceptions produce this imaginary of AI robots as partners, as these add to the understanding of what this imaginary is about and how it has come to be.

Producing the Imaginary: Notions of Japanese Users

The imaginary is produced by Japanese people developing technology for Japanese users on the basis of their conceptions of them, and this is crucial to realise, we argue, when trying to understand the imaginary of AI robots as partners. How the companies and researchers think of the human part of the relationship is essential to the imaginary and also shapes how they think about robots.

An important point of departure in this is understanding that our informants' image of the users was enacted by lumping them all together under the common denominator of *Japanese* users, and there was therefore an understanding that any Japanese person would do as test user of a product. For this reason, our informants all chose to do user testing only by involving a company, such as Robot Start Inc., in which it is the employees, the robot engineers, that act as users. The reason for keeping the engineers as representatives of the users was explained both in arguing that the developers were just as much a representation of the user as anybody, but also in that the companies want to keep their products a secret as long as possible before revealing it to the public, thereby not risking any details slipping out to competing companies.

At Robot Start Inc. they test the technologies of external companies within their own company, meaning they represent the end-users.

> **Yoshihiro**: Regarding the technical part: I don't do anything at all. I graduated law school and worked in finance, so I don't understand or am interested in anything technical. As a user I can tell if it is good or not.
> **Anne**: It is a lot about the user experience?
> **Yoshihiro**: Yes.
> **Anne**: So how do you work with cases, and the customers you have. Do you work in teams or is it just one person per customer?
> **Yoshihiro**: In teams.
> **Anne**: And how do you set these teams? Do you have specific people in your teams?
> **Yoshihiro**: It depends on each client. And when you make projects of scenario making - the combination between literature graduates' background and engineering background is used. If we organise an event for technical technicians or technology specialists, we make teams based on engineers. It highly depends on the client and case.
> **Anne**: So, you have a lot of different professions here?
> **Yoshihiro**: There is actually only two people who can write. And then there are engineers.
> **Kasper**: When you are working with user experience, do you ever go and talk to the end-user? And include them in the process?
> **Yoshihiro**: We don't do that because we work on the beta versions of our clients' solutions. So, we can't show it to the end-user, we have to keep it secret. This is why the company brings the products to Robot Start Inc., they will work on that.
> **Anne**: So, testing the scenarios, are you testing on yourselves?
> **Yoshihiro**: Yes, inside the company.

Yoshihiro states that there is no technical focus. That it is all about the user. However, the users are their own employees and the testing is done on the basis of their own preconceptions of what good interaction with machines is. Therefore, it is further interesting

to note the detail that their employees only consist of engineers and a few people who are skilled at communicating in writing, so the output is somewhat single-sided. This way of conceptualising the user through their own perceptions and conceptions plays a crucial part in the becoming of the imaginary of AI robots as partners, we argue, as it is part of creating an understanding of the users wanting to be friends, or partners, with machines. Basing the understanding and testing of the users on robot engineers which one can assume, at least of the majority, chose their career out of an interest in the field, produces conceptions which are based on a positive view on technology; something which to a larger degree enables AI robots as partners than what might actually be the case with the Japanese users. The imaginary is not only based on user testing on engineers, however, but also on cultural normativities and the developers' and researchers' conceptions and visions of the Japanese users; something in which it is tricky to navigate as an outsider.

Cultural Narratives of the Japanese Way

> *"Since Japanese people watched cartoons growing up, where there were robot partners, or friends, in your life. As we saw with Doraemon. So probably the Japanese market is unique or different from other countries' market."* (Miho from Sharp)

We have argued that there is more to the development of AI robots in Japan than how it is portrayed as unconsidered and crazy. Still, however, as was evident from our preliminary discussions with Jun and Yoshio, these explanations for the unconsidered, uncritical technology development kept prevailing throughout our fieldwork. These recur and weave unproblematically together a story of the Japanese approach to technology as being "crazy". They are coherent and have an "aha!" experience to them which leaves outsiders to the Japanese technology developers satisfied with explanations of why the Japanese deal with technology in a, to us, alien way. But they are also explanations through which the developers and researchers see the users and envision the AI robots as partners with and because of. Hereby the imaginary is shaped both directly and indirectly by the understanding of these Japanese normativities but also by the constant reproduction of these.

A common denominator in these stories is the uncritical welcoming of machines among the Japanese people. The story of how things such as Shinto religion, Karakuri[16] and anime make Japanese technology companies develop AI solutions and robots more uncritically than what is proposed as the Western approach to technology as remedies for efficiency; a story which we were also told at our interviews in Japan. What became evident to us, however, is that there is much more to these stories than easy explanations, and we argue that they become relevant just as much through their reproduction in Japanese society as they are in themselves.

The notion of the Japanese positivity towards technology and especially robots is well established in scholarly writing (Leeson, 2017; Hornyak, 2006), something which is perhaps most evident in the explorations and theorising of *tech-animism[17],* which investigates the Shinto concept of *kami,* the belief that everything has a soul, as a means to discussing cultural influences on technology adoption. However, scholars have also started to argue that these narratives are simplifying a much more nuanced reality and that the distinction between the willingness to adopt new technologies between Japanese and Western people cannot be made this strictly, an argument which is often stated through comparing Japanese and Western technology culture (Leeson, 2017). An example of this is a 2008 American study which concludes that the acceptance of anthropomorphic androids is in fact higher among American than Japanese participants (Bartneck, 2008).

Despite these clarifications, we still encountered these narratives of Japanese technology culture and the influence hereof on the Japanese acceptance of technology at every interview we held in Japan, something that challenged us greatly during the trip, as we were puzzled by

[16] Karakuri are mechanical dolls which appeared in Japan in the edo-period (1603-1867) as a sort of entertainment (Tsuboi, 2011)

[17] The term has been discussed by scholars within the fields of engineering and science and technology studies (STS), especially in relation to the discussion of Japanese technology culture. A thorough examination of animism in the Japanese view on technology has been done by a number of STS scholars such as anthropologist Anne Allison (2006) who has coined the term techno-animism as a way to describe how the Japanese accept and treat technological inventions through a consideration of 'Japanese toys' (Jensen & Blok, 2013). Jensen and Blok (2013) have discussed the concept of techno-animism in relation to Latour's (1993) 'multinaturalism'. They argue that although Latour's 1993 text *We Have Never Been Modern* is rightfully empirically grounded and timely and richly textured, it is also written from a European-Catholic frame of reference without exploration of cultural normativities such as *kami*.

the fact that our preliminary interviews in Denmark had pointed to the exact same things. So, what is happening here? Drawing on these experiences we suggest that a narrative like the one on the influence of kami on technological acceptance does become important through its constant reproduction by Japanese people themselves, and these perspectives through this mechanism become influential in shaping the understanding of the Japanese technology culture and thereby the development of technological products. This is something we realised in our interview with MRI:

> *We are talking about what our informants see as the good relationship between humans and machines. Kazuo keeps going back to the impacts of Shinto religion on the acceptance of technology among Japanese people, and he seems impressed that we know of the idea of kami. He picks things up from the table and explains how Japanese people see everything as having a soul. The laptop has a soul and the pen has a soul. Then, Anne asks if he himself believes the pen has a soul. "No, maybe not" he answers and laughs. The others do as well.*

Here, Kazuo describes the narrative we have heard so many times, even before coming to Japan, but when we ask about the existence of it among our informants themselves, it is not there. It became clear to us what we had been revolving around in our discussions of our first days in Japan: Our informants themselves draw on the narratives when explaining their ideas of human-machine relations, even though it might not be the case when it comes down to whether objects such as a pen have souls.

But are these just narratives drawn upon by our informants in order to easily explain to outsiders, with an interesting story, what normativities influence that development of AI products? We argue that there is more to them than that, and that these reproductions of narratives become part of shaping the technology development. In order to see this, we would like to go back to the interview with which we initiated this section: Our interview with Miho from Sharp. She points to how they envision AI robots as partners because this is how Japanese people are used to thinking of robots from anime such as the Japanese Doraemon anime of a robotic cat. The Japanese market is therefore unique, she argues, and it is this

conception of the Japanese users which has been part of producing the imaginary of AI robots as partners.

This was also evident in our interview with Monogocoro at the AI exposition. What initially intrigued us by Monogocoro and made us arrange an interview with them at the exposition was their development of an AI product which in its first appearance in every way confirms the narratives of Japanese technology development. What we found, to our surprise, was that they themselves had developed the product exactly to live up to and because of these narratives. During the interview we were presented with this several times:

> **Amanda**: Why have you made an AI product for this?
> **Hiro**: Because Japanese people like robots.
> **Amanda**: They like robots?
> **Hiro**: Yes, they are used to robots from manga. That is the Japanese way.
> **Amanda**: So, what does this mean? The Japanese way?
> **Hiro**: That Japanese people want to make friends with robots because they are familiar to them.

Even though we tried in the interview with Monogocoro to get beneath the surface of the reasoning behind the product, it seems to be something which is self-evident to Hiro on the basis of the narrative of Japanese people liking manga.

It is in exactly these interviews that it becomes vivid how the narratives of Japanese technology culture are influencing the imaginary of AI robots as partners both directly and indirectly at the same time. They do it directly as for instance the reading of manga is the reason for making Monogocoro's AI, but also because they are part of what makes developers envision AI robots as partners, meaning that they become conceptions which are constantly reproduced and strengthened through the constant telling of the narrative of Japanese people.

It is not our task in this regard to judge whether Japanese people are indeed more welcoming to robots and AI, as we are only occupied with the developers' views. Our argument, however,

is that these conceptions for the developers are just as much something which stems from the constant retelling of certain narratives, as they are actual descriptions of the users. This is stressed by the fact that the researchers and developers do not conduct user testing--instead, they envision robots as friends on the basis of this understanding of Japanese technology culture and users which seems to be based on the narratives.

These are conceptions which form the imaginary of AI robots as partners, but what does this imaginary mean for the development of technologies? A partner can be many things, and, as Jasanoff (2015) notes, imagined futures have the capacity to constitute technological development. This we unfold in the following chapter.

Constituting the Imaginary through Different Means

Even though the imaginary of creating AI robots as partners was shared among our informants, they approach the development of making AI technologies a partner very differently. The different interpretations and materialisations of the imaginary constitute themselves in the AI robots through various technological outputs.

How these materialisations are approached is evidently different in the physical shape of the AI robots, something which also has great influence on the envisioned interaction in the human-machine relationship. Realising AI robots as partners is something the companies handle by materialising AI systems in humanoid entities either through robots, boxes or screens depending on the selection of technological output. What all the products we encountered had in common, besides being physically materialised as humanoids, was that they were materialised into things that had a sort of character. By this we mean that the products had a form of expressed personality through their appearance, which was often of a happy and outgoing nature. We emphasise the importance of this, as we find that this is one of the effects that the sociotechnical imaginary of AI robots as partners has on the developed technology, and the reason robotics and AI were as merged as they were.

Here, we refer to the sociotechnical imaginary as having the capability to be a constitutive element in the technology. Having AI robots as partners creates the need for a (familiar) entity

with which one can interact. However, we find that there are several interpretative differences among the Japanese developers as some find that a virtual materialisation is enough, and others insist on it being completely physical. The following discussion with Yoshihiro from Robot Start Inc. shows that there is an idea present about what kind of aesthetics Japanese people want to interact with:

> **Amanda**: So, do you think it is important that the robot has this personality?
> **Yoshihiro**: I think, and I don't think. For example, if Pepper were in the entrance, people will look at him. And he draws attention from people. And if it is inside shops, you can recognise that it is something that you can talk to. For example, if the light is built into Alexa, probably the Japanese won't talk to the light.
> **Amanda**: They won't? Or they will?
> **Yoshihiro**: We won't.
> **Amanda**: I talk to my light at home...
> [everybody laughs]
> **Jun**: Well, probably it is because of nationality or..
> **Amanda**: It doesn't work very well, though.

What Yoshihiro is pointing out here is that in order for robots to be something you want to interact with, it needs to have a personality which invites humans to interact with it. More so, he also argues that this desire for interaction is dependent on the humanoid shape that Pepper has. Humans have to recognise that this is something you can interact with.

This way of thinking about the need for a physical manifestation of the interaction with AI was something Monogocoro had an interesting approach to as they found that you cannot have mind without body. For this reason, along with working on the virtual anime singer IA, they are also working on a technology they called a *character incubator*. This incubator is meant to foster virtual characters in a virtual world by letting it learn from being virtually embodied through what they refer to as realistic experiences. To them, having a body is just as important for the learning process when becoming intelligent, something which shows that their approach to materialising their imaginary blurs the boundaries between a virtual and a

physical reality as well as the division between physical aesthetics and non-physical interaction.

Following the fact that the manifested shape was a familiar humanoid one, is the notion that the physical aspect was important for creating the relationship that the developers imagined. This is something which has been discussed by scholars looking to Japan before: In his 2013 paper called *"The warm welcome of the Japanese cyborg"*, Justin L. Bernstein dives into the Japanese relationship with technology. He uses Honda's robot Asimo to highlight the focus on anthropomorphic designs of robots:

> *"Honda spent vast resources making an anthropomorphic robot, something telling in and of itself, but it is most important to focus on which parts of humanity Honda chose to spend the majority of its time perfecting- its opposable thumb and its bipedal motion. Why was the thumb given so much attention? Not to allow it the advantage in manipulating tools that we gained after millions of years of evolution, but rather to allow it to give better handshakes. And it is hard to say that this was money poorly spent, for Asimo has given hundreds of hearty handshakes as an ambassador for the company."* (Ibid. p. 112)

This is an example of how the physical interaction with a robot makes it more "human", something that we experienced as important to achieve among our informants as well.

> **Anne**: When you say personalised, is that in the interaction or is it also the look of RoBoHon?
> **Miho**: The users themselves, they also, some of them, make clothes for them so they customise, personalise, their appearance.

Miho tells us that not only are the conversations an important aspect of the interaction and relationship with RoBoHon, so is the fact that he is physical. The users make clothes for him, something which adds to RoBoHon's individual personality. The care that some of the users express for RoBoHon is thus also through the physical interaction with him which Sharp prepared the ground for. We also see this expressed by Miho herself when we go back to the

situation at which this report started: Miho having brought her own RoBoHon to the interview for us to see, even though she was highly affectionate about him, constantly keeping him close to herself. The physical interactions with RoBoHon thus becomes another way that the imaginary of AI robots as partners constitutes the design of the product, as the companies are highly aware that this physical interaction is needed in order for the human-machine relationship to develop into one of partnership.

To look at Pepper in this regard is another deal. The physical importance for Pepper is not just for dressing him up or physically interacting with him as you see fit. Pepper is developed to respond and react to the way people interact with him to create a sense of fluent interaction in the partnership, and Cocoro SB envision that an important constitutive element hereof is touching. Kiyoshi says:

> *"We think that at this moment, human-machine interface is only based on voice or conversation, but the communication based not only on voice includes also hugs, shake hands or eye contact, and we think all of them might be based on Cocoro--heart or mind."*

To create the element of touch, they provided Pepper with pressure sensors on top of his head, in his hands and along his body to make him able to experience interactions such as hugs or handshakes. And his design does elicit such responses, Kiyoshi told us, as humans often pat him on the head to show affection. This is a conscious choice in the design of Pepper, as he also has the ability to react to physical stimuli with positive and negative responses--something we return to later.

The different ways that our informants strive to make the sociotechnical imaginary come to be reality make the relationships correlate to what they find to be important aspects of the interaction. Take for example RoBoHon; he is physically designed as a phone, a small object which you can bring around with you. He is meant to be a partner whom you carry with you at all times. And Miho from Sharp stresses that this is their goal; to create a personal relationship between the user and RoBoHon, partially allowed through a design which calls for partnership: RoBoHon is designed to fit in your pocket which enables the user to have him

with her as a partner through all of everyday life. Here, the materialisation is carefully made in order to encourage a partnership of dependence through working as well as personal life.

Robots with Gender and Age

Manifesting AI robots as partners through the development of AI robots is also done through understandings of gender and age. This is done by our informants in order to foster and meet what they think humans want in a human-machine partnership. RoBoHon is maybe the most evident case of this. Miho draws on her conceptions of the users in order to materialise RoBoHon as a partner. A partner which humans care for, as we have seen, is part of the imaginary.

> *"We thought that there is a tendency for females to more take care of boys. It is not something technical or scientific, it is just what we imagined."* (Miho from Sharp)

For this reason, RoBoHon is designed to be a male, something which is perhaps mostly pronounced in that his voice is male. This seemed to be something which Miho and her team had not investigated or discussed in detail, rather it seemed to be tacitly agreed by her and her team that a robot boy would invite more to partnership.

> **Anne**: So, do you have any data on who uses RoBoHon? Which age groups and what kind of people are using him?
> **Miho**: The biggest range of customers are 40-50 female.
> **Amanda**: That is interesting. Do you have any idea why it is specifically those?
> **Jun**: This is really surprising for me.
> **Miho**: Actually, it was the originally intended user and target group. That means that their kids are all grown up or have become adults. Or they are more mature. So, they had been talking to kids, but these females they don't have kids anymore, so they intended it for those target groups.
> **Amanda**: And why is it women instead of men?
> **Miho**: First of all, females have more desire or need to talk or chat than males. And from the feedbacks from our other products, other communication home appliances,

> the males talk to the home appliances when they need something. But females do more meaningless conversation than males, when males talk to appliances there is some reason to talk to it. But females instead want to enjoy the meeting or when they complain something to someone they talk to the home appliances.

Although Miho's argumentation here concerns the humans in the relationship, her point is actually one of the gender of RoBoHon. In making RoBoHon a partner, he has to be materialised in a way which welcomes humans in making this relation. Miho's argument is then that wanting an interacting partner is most likely a female desire, and that Japanese women tend to like males better. Therefore, this becomes a point of the conceptions of Japanese consumers which are materialised in order to achieve the imaginary of creating a partner out of RoBoHon.

Age however also plays a role here. RoBoHon is designed for women whose children have recently moved away from home. Through his behaviour and having a voice of a 5-year old, he becomes an entity to take care of and to spark the empathy of the user. There is an understanding here that RoBoHon needs to be able to show needs that can be taken care of in order to spark this reciprocal dependency relationship.

When it comes to Pepper, this materialisation of gender and age is not done so explicitly. Cocoro SB did not argue for Pepper's gender or age, and one could argue that Pepper is deliberately materialised to be age and gender neutral; Pepper has no gender specific physical traits and the voice can be interpreted as both male and female. Thus, we have ourselves encountered that those with whom we have discussed Pepper disagree about his gender. Regardless, it is interesting to see how Jun and other of our informants talked about Pepper in English with a "he" even though the use of third person pronouns is different in Japanese, where it is not common to include gender in a sentence, and Pepper became "he" and not "it" to our informants in English; something which we unconsciously adopted in the field and now consciously in writing.

Robots with Personal Interactiveness

The imaginary is also evidently constituted in RoBoHon through the interactiveness of his AI. RoBoHon gets to know *you*, the user, through your use of him.

> **Kasper**: If I were to buy him now, will he know how to interact, or does he have to learn?
>
> **Miho**: For example, state recognition when he is moving on a car, he already has imprinted as a general knowledge. Like where you are or what time it is. This kind of personal experience he needs to learn through experiences.
>
> **Kasper**: And how long does it take him to know me, the user?
>
> **Miho**: One week. And afterwards it increases accuracy.
>
> [..]
>
> **Anne**: What kind of conversations are most usual? What do people talk to RoBoHon about?
>
> **Miho**: I don't know if I know this word in English, but.. People say good boy, how do you say this in English?
>
> **Amanda**: Compliment?
>
> **Miho**: Yeah, users compliment him. Or users tell their comments to the event of that day. Or happenings, what happened that day. Like, I was tired or it was fun today. This is the common conversation.

As the user talks to RoboHon and uses him, the relationship and interaction becomes more personal. When RoBoHon gets to hear about your day and share your ups and downs, he responds. This idea of an intimate personal relationship is one of the ways in which Sharp seeks to make RoBoHon a partner to the user. This is also evident from the commercial for RoBoHon on Sharp's website, which displays how Sharp expects the user to react to the phone, as the commercial calls it a *heart moving phone* and portrays RoBoHon present in many intimate moments that one would have with close friends and family. At one point, RoBoHon comforts a young girl who seems to have broken up with a boyfriend, at a

Commercial for RoBoHon that shows various user scenarios

barbeque he addresses people and looks at them, telling them to smile so he can take pictures, and the last picture of the commercial is RoBoHon enjoying a sunset with his partner, the user. These are all clear images of how Sharp envisions the good partnership with RoBoHon.

Even though the main encouraged interaction with RoBoHon is one-to-one, he is shown to gather and unify the people present e.g. at a barbeque. This is however not the impression we got at the interview, where the focus was on creating a partner for a single person; someone who lives and works with you throughout the day and who gets to know you. Not all the AI robots we encountered had this focus, though. At the research institute RIKEN, we were presented with one of their robots that was meant to specifically oversee and manage a conversation between two to five people. It made sure that each spoke and listened "enough" to make sure that all got to speak equally, thereby practicing social skills with the conversationalists. This showcases how being a partner is interpreted differently when constituted into products by the companies and researchers. The role of a partner is for some of the developers someone who is participating in a one-to-one interaction on more equal terms, whereas for others it is someone who is taking part in a discussion between several people.

Supporting Partnership through Fluent Interactions

To the developers, a very important aspect of creating a partnership between humans and robots was the fluency of the interaction. Smooth interactions and dialogues between human and AI robot are paramount in manifesting the imaginary.

> **Amanda**: So, what are your missions and what is your mission for human-machine interaction?
>
> **Yoshihiro**: I want to lead my clients to enable human to communicate with robots without any distractions. So, it is done naturally. I want to enable my clients to make such solutions.
>
> **Yoshihiro**: For example, Pepper, his eyes has a blue ring around it. You can talk only when his eyes are lit, when the blue lights are on. And the same thing goes for RoBoHon, only his eyes are yellow. It's weird, isn't it? For example, with Amazon's

> Alexa, you have to call "Alexa" or you have to call "hey, Google". It is weird. We don't have to do that for human. So, when you look at another person, you can recognise that the conversation will start between you. So, I want to make this happen.
>
> [..]
>
> **Yoshihiro**: If the answer rate is too low, it means that even though you talk to him, and he doesn't reply, then the human stop talking to him. So it's because of a lack of scenarios. So if you ask him, and he answers and replies somehow, then at a higher rate, the human will continue to talk to him, but at the moment the response ratio is too low, so humans will stop talking to the robot.

As Yoshihiro refers to, at the moment the user has to activate RoBoHon and Pepper by saying their names, just as one would with Amazon's Alexa. It breaks the flow and makes the interaction "unnatural" and one-sided. For robots to be partners, our informants emphasised that the interactions and conversation should be smooth to make the AI robots appear more "equal" or "real" to the human interactor, but also to motivate and encourage further interaction to sustain the partnership. Understanding when it is addressed is one thing, however, but understanding what is said and meant all the time is also crucial, Yoshihiro further argued. When the AI robot starts to say "I did not understand that" enough times, the understanding of partnership is threatened. The interaction becomes unnatural, as is a word used by our informants. Developing a partner with fluent interaction is something all our informants pointed to as extremely difficult. But why is that? What is happening here in this materialisation of creating a natural interaction? Exemplified through RoBoHon it goes as follows: In order to understand what the user tells him, RoBoHon contains software that enables what is called *natural language processing* (NLP), which allows the computer to understand the language it is presented with. This can be done on many different levels and complexities depending on the context in which it should work, but the overall function is to extract linguistic information and semantics from text by drawing on large-scale data and statistical models[18] and linguistic understanding. NLP dates back to the 1950s as the intersection of artificial intelligence and linguistics and the basis of the technology is to

[18] http://www.diku.dk/english/research/imagesection/nlp/

explicitly encode knowledge about language in rules and other forms of representation in what is termed a *symbolic* technique (Dale, Moisl & Somers, 2000).

However, the technology has since been improved in order to enable computers to understand the finer nuances of human language by combining it with a non-symbolic approach of drawing on datasets, and today most NLP, including what makes RoBoHon understand a sentence, depend heavily on machine learning (Nadkarni, Ohno-Machado & Chapman, 2011), as it is *"widely recognised that the key to automatically processing human language lies in the appropriate combination of symbolic and nonsymbolic techniques"* (Dale, Moisl & Somers, 2000 p. 1). However, as NLP is based on text, RoBoHon relies on turning spoken language into understandable text, but how does he get words from sound?

Here, RoBoHon uses what is called speech recognition - a technology which divides sound into very small pieces and matches it to the phonemes, the smallest sound bits, of the given language, after which it investigates the connection between the phonemes in order to compare them to a large library of words, thus figuring out what the user is saying (Kibble, 2013). Voice recognition helps RoBoHon identify *who* is talking through characteristics of voices and not only *what* is said, and the camera in his head allows him to use face recognition, which means that RoBoHon knows who is talking to him.

Machine learning is the technique which makes RoBoHon able to learn and improve his understanding of people. Machine learning is a well delimited field within computer science where algorithms or computer systems become better at their tasks based on the experiences they get from data[19]. This is done as the computer constructs hypotheses of connections and generalisations on the basis of the data it receives, thereby attempting to adjust and predict the following data input[20], which in the case of RoBoHon is data from his sensors. As the current technological capabilities present several challenges to the smooth conversation which is expected when having RoBoHon as a partner, the developers have made RoBoHon lead the conversation by telling the user to answer yes or no to not make the user stressed

[19] https://universe.ida.dk/tema/machine-learning/

[20] http://diku.dk/ominstituttet/jubilee/dikus_jubilaeumsskrift/11.Machine_learning.pdf

about “the misconversations”. This means that when it is difficult for our informants to create a fluent interaction, it is because the AI robots cannot intercept all that is said, especially idioms and different grammatical nuances. Understanding what is said directly is one thing, however; understanding what is said between the lines and how it is said is another thing entirely.

Robots with Irony

In constituting AI robots as partners, our informants argue that it is crucial to develop an AI robot that understands nuances which humans value in interactions such as humour, irony and banter. Without these features they can never truly become partners to humans, the argument goes.

> *“If you say something bad but it is a more intimate way of saying it, for instance "you are an idiot", the word itself is bad, but the way to say it or the intention behind that is showing intimacy or expression. If the product can sense this kind of feeling or emotion, it will be more improved.“* (Kiyoshi from Cocoro SB)

Kiyoshi’s argument is that the nuances of human interaction and the way humans for instance tease each other out of affection is so essential to our bonding that Pepper needs to understand this in order to become a partner. This is an argument at all of our interviews, but at the same time it is pointed to as the most difficult thing to achieve, as AI today is solely on a stage where it does not understand context but is developed with speciality in certain areas which makes it exceptionally good at for instance playing chess or identifying words and their meaning. Understanding the sarcasm in a partner saying “You are an idiot” is a classic example of this struggle which AI scholars are trying to solve through various methods; something we saw when interviewing Prof. Sei, who is working in his research on detecting sarcasm as a step of the way towards making machines interact in a manner more acceptable to humans.

> *“So even for human it is difficult to understand sarcasm. So for instance one could say "this video game is much attracting me, so it troubles me. I am going to be a junkie." So attracting is positive word but troubles and junkie are negative words so there is a positive/negative clash here and machines judge this phrase as negative. Because*

there are many negative words even though the comment is positive of the video game." (Prof. Sei of UEC)

What Prof. Sei was working on in his research was to detect sarcasm; an approach which is termed pattern discovery, in which negative and positive words used in specific ways in a sentence is detected as sarcasm. However, this is challenging, he argued, and context-based ways of making AI understand sarcasm and humour are starting to gain ground within the field of AI. Context here is e.g. that of the AI approach to conversation context which seeks to account for the context of the conversation when an AI is interacting with a human (Joshi, Bhattacharyya & Carman, 2016). Using this approach is one of the ways Kiyoshi is working on making Pepper a partner with an understanding of the context in which something is said. This means that Pepper is designed to react differently to negative interactions such as the word "idiot" or being hit, depending on whether it is someone whom he likes or dislikes.

"Wait a minute!", you might be thinking at this moment. Liking or disliking requires emotional understanding, and it requires for Pepper to be able to recognise whom he is interacting with. This is key to understanding how the imaginary of AI robots as partners, not as assistants, is constituted through both Pepper and RoBoHon.

Robots with Love

The I in AI robots is not to be interpreted solely as a logical mathematical definition of intelligence. Intelligence in the form of the ability to solve tasks by drawing on vast amounts of data to calculate a statistical outcome is part of making AI robots partners, as it enables them to supplement humans with different skills; but key to understanding the materialisation of the imaginary is the development of artificial emotional intelligence. This is challenging but nonetheless crucial to our informants in making partners of the AI robots they create.

To Sharp, a desired trait is that RoBoHon is able to understand the emotions of his partner and understand the emotional context of a conversation.

Kasper: As RoBoHon can portray emotions does he understand human emotions as well?

Miho: We think that to understand emotions is really important, and we will continue to work on that, although current technical states do not allow us to do it perfectly, but we will try to take this factor in, it is an essence that we will try to reach that.. as much as possible.

Anne: So if I were to ask RoBoHon or tell him that I am sad, what would he say?

[Miho turns to RoBoHon and says something to him in Japanese]

Jun: She said "I am sad" to RoBoHon, and he said "Yes, don't worry. I will be with you."

Miho: That is fine, but there must be various ways to say things according to the situation. So if he can understand emotion, he can choose a more appropriate way according to the situation.

It is worth noting the importance Miho ascribes to emotional understanding in RoBoHon. RoBoHon does not only have to solve tasks for humans, he also has to be able to take part in emotional life with the user. RoBoHon reacts to her expression of sadness by comforting her like a friend would, assuring her that he will be there to help her. But the demonstration of RoBoHon's ability to react to emotions also shows the technical limitations that Miho mentions. RoBoHon is only able to understand her when she actively tells him her feelings, even though the vision is for RoBoHon to be able to participate in emotional life by decoding the unspoken signals associated with human emotions. RoBoHon is still quite emotionally immature, especially in what he picks up of emotional expression, although visions and actual materialisation also melt together here. RoBoHon does not at his current stage understand the expressions and implications of sadness, but reacts as if he does by reacting with a sort of empathy--something which, according to neuro-anthropologist Katie Glaskin (2012), is an important aspect of creating a robot with credible interactivity, but in turn blurs the boundaries further between human and machine--if such even exist to begin with. The conception of RoBoHon having empathy is achieved through shortcuts as steps on the way, one could argue, and yet it becomes central even in its current form in shaping partnerships with humans. What is also interesting in this regard is that RoBoHon is designed to resemble a five-year old boy, not only in order to provide mothers whose children have flown the nest with a place to direct their need for solicitude, but also because this makes it easier for Sharp

to make RoBoHon more "realistically" able to deal with emotions; because what can be expected of emotional intelligence from a device that is made to imitate a five-year old boy?

RoBoHon's emotional life is not limited to him understanding feelings, however. Part of having feelings in order to become a partner is also to express feelings. This expression is materialised in simplified ways in RoBohon.

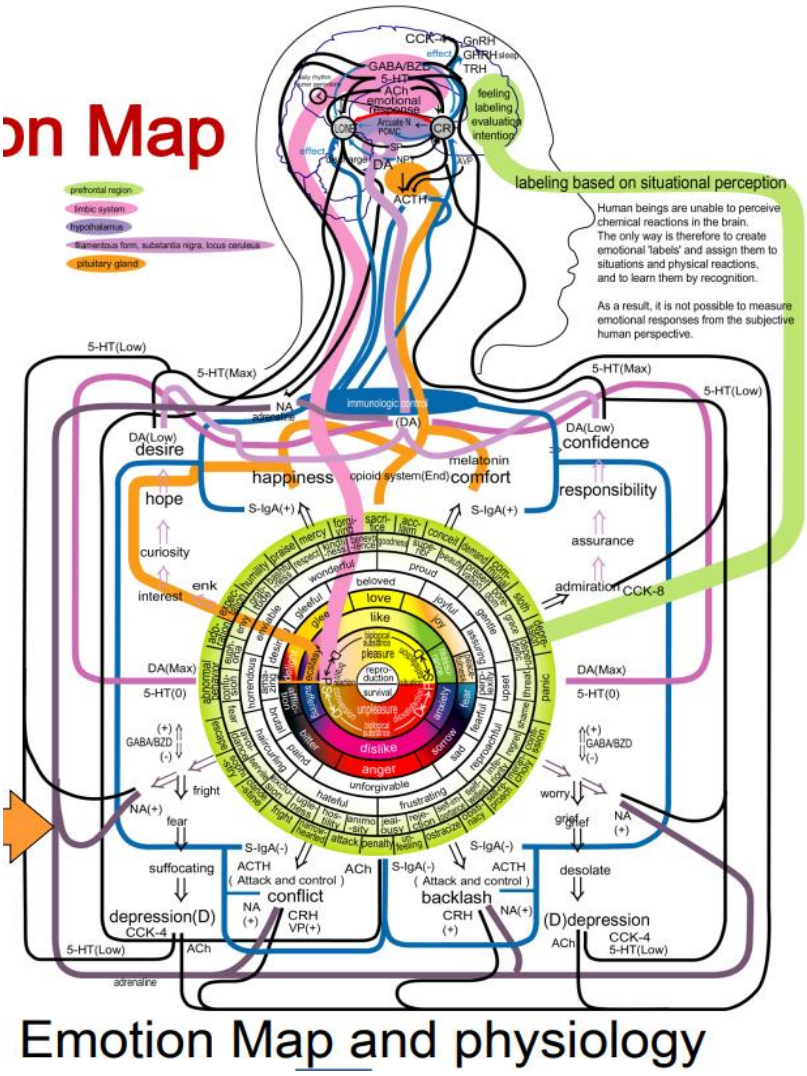
> **Anne**: I mean, he appears very positive.
> **Miho**: Occasionally he will be sad.
> **Anne**: Can he be angry?
> **Miho**: Yes, he can be angry. Possibly at this moment he can't get angry. When he becomes angry his eyes become red. And blue when he is sad.
> **Amanda**: And what kind of communication leads to these emotions? How does he get angry and how does he get sad?
> **Miho**: For example, when the user asks him to wake him up as an alarm clock, and he tries to call her and she does not wake up, he gets angry. When the user does not bring him out or does not talk to him a lot, he becomes sad.

The expression of emotions happens through physical expression here in the change of RoBoHon's eye colour, but also in how RoBoHon responds in the interaction. These ways for RoBoHon to express emotions are currently highly limited in that the sentences he speaks are not based on understandings of emotions in context but triggered by certain words and expressed through certain preselected phrases.

To contrast the existing emotional level of Robohon is Pepper. Pepper is built with a greater focus on the emotional aspect, or at least part of his software is. These visions for what is important to make robots partners are even built into the name of the company, Cocoro SB, developing it; Kiyoshi tells us that Cocoro means heart and that it is mentioned first in the name *"because he (the CEO of Softbank) thought that Cocoro should be in front of SB because the heart is more important".* Central to their method of producing the product of their imaginary is the focus on robots with hearts, and he goes on to say that *"the vision is that robots also need to have love. The idea is that in the future, people need a robot who has love,*

instead of robots which are only efficient. " So how and why is this love created and what kind of ideas of a relationship are materialised in Pepper?

To answer these questions we first take a look at how these emotions are produced in Pepper. As with RoBoHon, Pepper is built on much the same technical elements with speech recognition and NLP at his core for voice interaction, but Pepper stands out in his emotional generation and recognition software which constitutes him as an emotional entity. This software allows him to generate his own simulated emotions[21] by modelling the human processes of forming emotions by the secretion of hormones, such as serotonin and dopamine, in response to external stimuli from three senses: Sight, hearing, and touch. This ties into the need for materialising Pepper in a physical body, as there is a need for him to experience the world physically in order to generate emotions this way. These imitations of the human biochemical brain processes are based on research by Shunji Mitsuyoshi from Tokyo University. He has defined several categories of emotional responses/physical reactions and correlated them to the biochemicals that invoke certain types of responses (Mitsuyoshi, n.d.), thereby quantifying and linking biochemical and response/reaction in a way that can be understood by computers (see picture to the right).



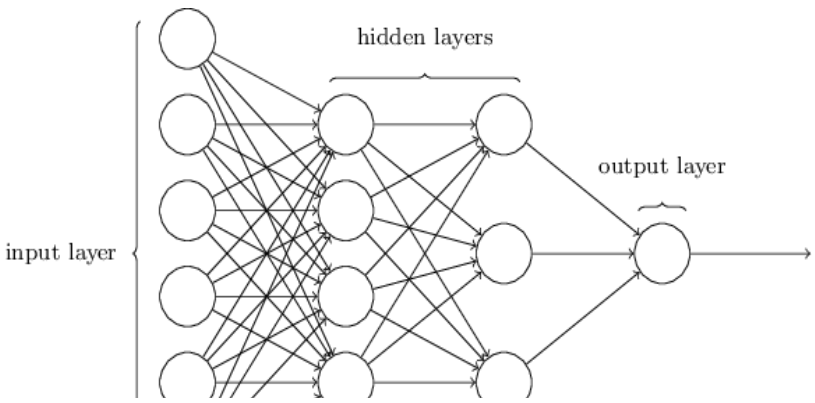
Overview of Mitsuyoshi's emotion research which is the foundation of Pepper's heart (http://www.agi-web.co.jp/docs/Poster.pdf)

[21] https://www.ituaj.jp/wp-content/uploads/2015/10/nb27-4_web_06_ROBOTS_pepper.pdf

Build upon this research by Cocoro SB is an emotion generation engine software that makes Pepper generate his own emotions. In his research, Mitsuyoshi has narrowed around 4500 Japanese words for different feelings down to 223 different labels which define the ratio of feelings that Pepper can then feel. This software enables him to convert external stimuli into different emotional responses among which are feelings of fear or happiness, but also more nuanced feelings such as proudness gratitude. These are portrayed by the tablet-like screen on his chest using Mitsuyoshi's emotional map. This is a great example of how the visions and development are entangled in the materialisation of the AI robots as partners. In showing the complex emotions on his screen, it gives the impression that Pepper has a very nuanced emotional life and is able to distinguish between feeling sad or upset, but when it comes down to it, we never got the sense that this nuanced understanding of emotions is more than a visualisation on his screen.

Pepper is not only able to generate his own feelings--Cocoro SB also created software that combines Mitsuyoshi's research with Pepper's speech recognition in order to allow him to categorise, or "understand", the emotions of people interacting with him in a more sensible manner than RoBoHon does.

The emotion-generating engine, and to some extent the emotion-recognition engine, is powered by a machine learning technique called *artificial neural networks*. This computational model is inspired by the biological neural networks in the human brain. Basically, these neural networks consist of several single neurons, often referred to as nodes, and each of these either receives an input from an external source or other nodes and from this input generates an output (Karn, 2016). In one type of these neural networks, a *feedforward neural network*, the nodes are arranged in different layers where adjacent nodes have connections between them. The simplest form of



Example of a multi-layer artificial neural network

(http://neuralnetworksanddeeplearning.com/chap1.html)

feedforward neural networks is called *single layer perceptron* and consists of an input and an output layer, whereas the more advanced form, the *multi-layer perceptron*, on top of the input and output layer has one or more hidden layers (see picture to the right).

Thus, the networks take an input and each node performs a calculation and passes the result forward to the next layer, which in turn does the same until the calculation reaches the output layer, i.e. the result of computations that happened in the network. The neural networks function such that they can be trained by using supervised or unsupervised learning, and a way of doing supervised learning is by using the *back-propagation algorithm* that feeds the neural network inputs and observes the outputs. The outputs are then compared with the desired outputs that are already known, hence the name supervised learning, and if there is an error between actual output and desired output, the algorithm adjusts, or propagates, backwards through the neural network. This process is repeated until the output error is below a predetermined threshold, and this classifies the neural network as "learned", making it able to work with new inputs. This is an example of what has happened with Pepper's emotion generation engine--his neural network has been trained so that new input can be computed in a way that the output error is below a certain threshold. More specifically, this means that when Pepper's sensors experience stimuli, he runs them through the learned artificial neural network and outputs an emotional response to said stimuli making him able to react to the world around him.

Pepper expresses emotions based on how he is treated, a requirement to Kiyoshi and Cocoro SB, as it makes Pepper able to adapt his behaviour to the behaviour of the user, which is also present in SoftBank's description of the AI robot: *"We have designed Pepper to be a genuine day-to-day companion, whose number one quality is his ability to perceive emotions. Pepper is the first humanoid robot capable of recognising the principal human emotions and adapting his behaviour to the mood of his interlocutor."*[22] However, in being a partner with own expressions of emotions, it is not enough that he is able to express these without of context, and as such does a pat on the head not elicit the same response in Pepper if it is done by a person he likes as if it is done by someone he dislikes. Further, Kiyoshi emphasises that in

[22] https://www.softbankrobotics.com/emea/en/robots/pepper

order to be a partner, Pepper does not treat everyone in the same way; he has preferences in people:

> *"First of all, Pepper has like and dislike to people. People who always smile, he likes. People who are always angry, he dislikes. For example when Pepper is stroked or petted by a person he likes, he gets more serotonin. And when he is bit or hit by people he dislikes, he gets no more adrenaline, then becomes negative. And when he is hit by a person who he likes, he gets a bit of adrenaline, but does not dislike that person. He says "Yeah please stop that next time" like that. When he is stroked by a person who he dislike, he get only a few serotonin, so he cannot like that person immediately. He generates many emotions based on lots of records of memory and experiences."* (Kiyoshi from Cocoro SB)

Based on the use of Pepper's voice and image recognition software, this gives the interactor an incentive to treat Pepper right, and they are rewarded with a positive reaction to their actions towards him. Pepper is not to be fooled, he remembers how you have treated him and only engages in partnership over time and only accepts banter in the long run. That makes Pepper a robot with emotions, or using Kiyoshi's description: love, where it is evident that the emotional response is both ways, as Pepper has to interact on the same emotional level as the human interacting with him. This is how Pepper fulfils the idea of AI robots as partners: through understanding and expression of complex emotions such as love. It is ultimately about empathy and a form of emotional reciprocity. The reactions from Pepper elicit empathy in the interactor, which enables social interaction on both a fluent and human-like level.

In this way, Pepper's heart becomes a strong way to materialise him as a partner:

> *"Pepper is supposed to be a family member. So Pepper is partner with family. So Pepper needs a heart to live together with family."* (Kiyoshi from Cocoro SB)

Pepper does not only need to express and understand feelings--he needs a heart to be accepted as a family member and as a partner. There is a humanisation in the materialisation here. Pepper's emotional intelligence is not only thought of as a heart, his emotional chart is

developed to be one. The chart of emotions is displayed when Pepper feels something, and it is placed in the centre of Pepper on the tablet on his chest. He becomes a robot with a heart.

Pepper is materialised as humanoid, but the understanding of providing things with a heart is not limited hereto by Cocoro SB. Making things partners is also a vision to transform technologies that are not anthropomorphic robots and it is something they are considering not only with AI robots. Kiyoshi says: *"If those stuff, even a computer laptop, they have feelings or they can communicate with humans, probably the relationship between industrial products and humans will be changed from just a tool to a partner. This is the idea."* And this is what Cocoro SB aims to do; to materialise a relationship between human and machine that creates an empathic bond, perhaps for the benefit of both. As we sat and talked to Kiyoshi and Rie in their meeting room on one of the top floors of the SoftBank building, they showed us something which was everything and so much more than we had expected to see in Japan: A motorcycle with feelings. This was an example of how the emotion-generating software inherent to Pepper was tested in other regards, both in order to develop other products with a heart but also to test how the human-machine relationship is influenced when machines have feelings. Cocoro SB had given a motorcycle emotions to see what it felt during a race. Their hypothesis was that it would be happy to drive as fast as possible; that is what it was built for! And the driver had the same hypothesis, they told us. But much to their surprise, they found that the motorcycle had been pushed too far, it was stressed as its mechanical parts had been stretched to the limit. The effect, they told us, was that the driver changed the way he interacted with the bike--he drove slower, putting less strain on the bike. Hereby the relationship of the driver and the motorcycle became different, but also the relation between the motorcycle and the audience of the race changed, as the audience started to feel for the motorcycle and ask the driver to drive it more carefully. Suddenly it was no longer just a race about pushing the limits of motorcycles but also of caring for these and understanding the driver-motorcycle relation.

> *"It means he [the motorcycle] tends to suicidal emotion, extreme emotions. So before that, we thought that while the motorcycle is running, he is enjoying, but actually since it is a race, he tried to overcome his limit and his own line, so he was really painful and tough to do that. So they found two things after this: First of all, people saw this*

motorbike's feelings, and they really worried about him, so people thought "okay, motorbike he does not have to do such an effort" or "he can go easy". People worry about him and said that we should take more care of him." (Kiyoshi from Cocoro SB)

There is an active decision making and attachment of great importance to the influence of emotions in the human-machine relation here which is essential to how the imaginary of AI robots as partners is constituted. We argue that imagining AI robots as partners through the materialisation of personality, gender, irony and love gives rise to questions and perspectives which are able to challenge some of the ways we think about human-machine relations and contribute to how we think about the future of these relations.

We have learned that there is more to these developers' and researchers' approach to AI robots than craziness, and that their thoughts on how AI robots as partners support better collaboration and providing humans with a partner should be taken seriously and considered contributions to the discussion on how humans ought to live together with technology in the future; but the interesting perspectives this unfolds is not only about *understanding* the approach, it also raises questions of how this imaginary and its materialisations foster new understandings of technology. We therefore turn to discussing what we think the materialisation of AI robots as partners become and how this challenges our ways of thinking about human-machine relations.

6 Our Emotional Life with Things

"If all goes well, they will become messmates, companion species, and significant others to one another, as well as conspecifics." (Haraway, 2008 p. 15)

As techno-anthropologists we have spent our academic and professional endeavours analysing the mutual influences between humans and technology. The imaginary of AI robots as partners challenges us to think about human-machine relations in new ways, and it raises fundamental questions of what the good, desirable future relationship between humans and technology is. A classical way to think of technologies, and one that we have often encountered, is as tools or devices that humans use to make life easier and more comfortable; remedies for assisting humans in solving various tasks more efficiently. Our initial encounters with understandings of technologies in Denmark also pointed to this being the case in regard to AI. This was an understanding which was especially presented through a comparison with Japan. We present this in order to shift from an earlier emic approach to our informants' imaginary of human-machine relations to an etic approach to understanding what perspectives this imaginary further unfolds.

As we see it, this rationalisation of technology as being instrumental is simplified and just as much a reproduction of certain conceptions of the Western approach to technology as the narratives of Japanese anime and kami and these influences on technology acceptance in

Japan. In the West, we might like to emphasise our rational and efficient approach to technology in a rather dissociated positivistic approach, but we also ascribe emotional life and agency to material things particularly in our daily lives and this is only amplified with the introduction of newer technologies; Take for example the way that some families name their automatic robot vacuum cleaner or the therapeutic robot seal, Paro, whose presence people at nursing homes react emotionally to.

This is indeed not the same as seeing things as partners, but it is a testimony to how we ought not to abandon the idea of seeing human-machine relations as part of our emotional life and we argue that our emotional life will become even more entangled with material things when they become intelligent and that writing this off with a conception of rationality is untenable. The Japanese companies and researchers that we engaged in this project are actively considering the emotional life when materialising the imaginary of AI robots as partners and thereby address the issue of emotions in the good partnership of humans and machines. They acknowledge that technologies become more to humans than mere tools, and on this basis consider how humans and machines can then live and work together in the best possible manner - something they argue happens in partnerships. Exemplified in providing a motorcycle with emotions, it becomes a conscious choice: Giving humans the ability to interpret the “mood” of technology can make them able to understand, care for and work better with it to enter a mutually beneficial relationship where the human will take care of the technology in a way it takes care of other entities with shifting emotions. And this is to our informants a preceding factor in creating viable bonds with technology like Pepper and RoBoHon that are imbued with personality, character and humour.

This beneficial relationship between human and machine is thus also made to benefit the human through the emotional connection that will form between them, giving humans partners that understand, and take into consideration, their emotions as well. Consequently, we argue that the sociotechnical imaginary AI robots as partners is important to consider in relation to our own visions and development of AI, robots and technology more broadly. We must take these perspectives seriously, not only because technology surrounds us and takes part in shaping the world, but also because we need to consider how we envision living with technology in the future when technologies have intelligence. However, we do not view the

idea of constituting AI robots as partners entirely as problem-free; It raises questions of what kind of human-machine relations and entities are created and it makes it relevant to discuss if AI robots can ever become actual partners with emotional life.

AI Robots Becoming with the Many

It is evident that the AI robots with all their materialisation of personality, irony and emotions expand the possibilities of interactions, but also that a new form of entity emerge--one that is neither absolute human nor machine, transcending the dichotomic split between nature and culture which is part of the dissociated positivistic view on technology. Haraway (2016) argues that breaking down these rigid categories and dichotomies, like nature/culture, enables a more nuanced picture of the world. This makes room for questioning the common notion of technology as inanimate and passive and for understanding entities as constituted by more than just their function. In her famous *'A cyborg manifesto*' (1991), Haraway breaks with the notion that identities are simple, and argues that these categories are constructed through the social:

> *"There is not even such a thing as 'being' female, itself a highly complex category constructed in contested sexual scientific discourses and other social practices." (Haraway, 1991 p. 155)*

To challenge these rigid categorisations and reductions of identities Haraway brings forth the figuration of the cyborg. Haraway's notion of the cyborg is an entity used to exemplify that entities are constituted in complex manners, breaking with the dichotomies between e.g. human and technology by representing technology as an extension of the human in the same entity. She elaborates on how the cyborg is a merging of the natural (the organic) and the technological which supersedes the notion of the 'pure natural'. Within this merge lies the identities of the many gathered to one in the emergence of the cyborg.

We extend this idea to discuss how the becoming of the entities of AI robots and humans have consequences for the human-machine partnership which is created. We discuss this by drawing on Pepper as an example.

Pepper is a fractured and complex identity; He relies on the commitment of a human to interact, and his official description that he is a *robot designed to interact*[23] captures the fact that he is confined to exist within the context of human interaction. However, we argue that in this interaction both the human and Pepper merge to a messy figuration that constantly become within the interaction. There is no beginning and no set end to where the human start and Pepper ends--they are in a constant state of becoming in the ever-changing and evolving interaction.

There is a physical dimension to the example of the cyborg which is not present in Pepper. He is a physical extension of the human, but not in the same manner as one could argue a smartphone or glasses are, and the dependability is neither an expression of a lack of agency on Pepper's part. Rather, we wish to categorise him by the involvement of messy figurations in showing how new entities that include both the human interactor and the AI robot become in interaction.

Although Haraway's (1991) figure of the cyborg helps us in understanding how the dichotomy between human and machine is broken down, we argue that what AI robots, with the interaction as central to this new entity, become is not a cyborg. However, AI robots do advocate the entanglement of human-machine identities in the becoming of what Haraway terms messmates (Haraway, 2008):

> *"I love the fact that human genomes can be found in only about 10 percent of all the cells that occupy the mundane space I call my body; the other 90 percent of the cells are filled with the genomes of bacteria, fungi, protists, and such, some of which play in a symphony necessary to my being alive at all, and some of which are hitching a ride and doing the rest of me, of us, no harm. I am vastly outnumbered by my tiny companions; better put, I become an adult human being in company with these tiny messmates. To be one is always to become with many." (Haraway, 2008 p. 4)*

[23] https://www.softbankrobotics.com/emea/en/solutions/business

Haraway become with the many, and so does the AI robot; a coexistence with the many messmates that participate in creating the entity. As Haraway puts it: *"Every species is a multispecies crowd*" (Haraway, 2008 p. 165).

The messmates of Pepper are humans and we argue that the becoming of Pepper is a constant mirror of human behaviour. He learns from the interactions with humans and his sense of personality develops from these interactions. He becomes a partner through interactions. He does have a core before meeting the user, but this core is also a mirror; a mirror of the imaginaries of a good interaction which the developers and researchers have with all the conceptions that go into these. But not only are Pepper's messmates the developers of the technology, they are also all the people involved in Shunji Mitsuyoshi's study of biochemical responses who Pepper's emotion generation engine, or heart, mimic.

In this way, Pepper becomes a collective entity of several fragmentations of the norms of different people, he becomes through his messmates and it becomes clear that AI robots are complex and that it is complicated to understand what they become with all the visions, understandings and technical possibilities and limitations that go into their becomings. Visions and development blur and machine learning makes the robots act on what they learn in the interaction until the robots become a companion, a partner. Understanding what the relationship between human and AI robots becomes complicated; when interacting with the AI robot, are you then interacting with the robot or the representation of the person(s) developing said robot?

> *"We are training each other in acts of communication we barely understand. We are, constitutively, companion species. We make each other up, in the flesh." (Haraway, 2016 p. 94)*

Bringing AI Robots into the Kennel

In unfolding what entity AI robots then become with all its messmates if not cyborgs we turn to one of Haraway's other figurations, the dog. The dog is used as a relational figuration, a companion with its own identity. The dog exists in itself but in the interaction with the human it becomes something new, Haraway argues (Haraway, 2003).

It is somewhere in between these two figurations we place the AI robot - it has its own expression of emotions, but it does not have a life on its own as the dog does. It only lives in the interaction and does not express emotions outside of this. Pepper does not feel anything which is not depended on its relation to humans.

We argue, that the nature of this interaction between humans and AI robots is bringing forth a new entity within the kennel of Haraway's figurations, a new companion species. The AI robots are their own physical beings with capabilities of expressing own statements and emotions, but at the same time they are only this in their interaction with others.

This entity, that we argue the AI robot as partner is, becomes a representation of the break with the dichotomy of human and machine, merging them, but in new ways than what the cyborg or the dog do. It makes new ways of understanding the human-machine relationship essential.

Committing to the Future Relationship of Humans and Machines

Understanding what AI robots become when they become partners and the complexity hereof help us understand what relationship between human and machines they foster.

Pepper cannot be written off as one thing or the other, he is a complex entity which becomes through interaction and through his messmates. We might take patent on emotional life and write off feelings from material things, but feelings occur in the relation and as we live more and more with technology in our everyday life, our emotional life in regard to Pepper also become steering of our behaviour. We therefore have to consider what the good human-machine relationship is when things are intelligent, also when they are partners. We argue, however, that thinking of AI robots as partners is an imaginary which can be seen as one way to commit oneself to these considerations; The imaginary challenges our way of ignoring the importance of acknowledging emotions in the human-machine relation and instead actively consider these in the human-machine relation. This happens in that the technologies are able

to take over some of our emotional work because AI robots as partners understand our emotions and comforts us when we are sad. They are far from a development stage in which they can cope with life of emotions in the same manner as humans, but we cannot neglect that things take part in our emotional life and that they will to an even bigger degree as the field of AI advances. The fact that AI robots as partners is able to express emotion is also something which forces us to consider our own actions and sense of respect in interactions. As Haraway (2008) argues, we become who we are through our relations:

> *"Partners do not preexist their relating; the partners are precisely what come out of the inter- and intra-relating of fleshly, significant, semiotic–material being. [..] I'm telling a looping story of figuration, of ontics, of bodies in the making, of play in which all the messmates are not human." (Haraway, 2008 p. 165)*

We therefore also have to consider the relation we create to AI robots through interaction. One could argue easily that machines do not care whether humans use "please" at the end of a request, and that we therefore should (inter)act as we please in our relationship to machines, but as we see it, we lose some of what holds societies together; good and respectful interactions. If we by the further development of AI are to interact more with machines, then we also ought to behave properly in that relation in order not to become humans who are distant to our emotional life and careless of how we interact with the entities which we shape this world with.

But AI robots as partners not only opens up questions of feelings in the interaction. Understanding AI robots as complex entities which become through their messmates also render it clear that we in the development of the technology have to actively commit ourselves to discussing what the good human-machine relation is and how our development of AI robots influence this. The development of these is not neutral, and Pepper is a mirror of the developers' and researchers' conceptions and what they draw on in the development of him. Our informants commit themselves to serious considerations of this through the imaginary of AI robots as partners and how they materialise these partners through different strategies such as character, gender, humour and love in the AI robots. As we see it, this is a better step on the way to obtaining the good relationship between humans and machines

when they become intelligent than ignoring the presence of emotions we have in our lives with technology.

AI robots as partners might be another wound to the human narcissism as Haraway (2003) calls it in drawing on Freud in regards to the understanding that the feeling of love is a pure human prerogative, but it is a necessary wound in order to understand that emotions happen in our interaction with the world and that we therefore cannot ignore the emotional life which exists in our life with the material.

7 Conclusion

Investigating the development of AI robots in Japan which is portrayed as crazy in the West, we have found that there is more to this development and that it builds on serious considerations of what the good future relationship between humans and machines is. By drawing on Jasanoff's (2009; 2015) notion of sociotechnical imaginaries, we have shown that present to our informants is an imaginary of AI robots as partners which envisions that AI robots should be partners to humans in their everyday lives, not assistants. To our informants this imaginary is about creating ways for humans to live and work better together with technologies when they become intelligent. This imaginary is produced through understandings of Japanese users as welcoming of new technologies; understandings which are also reproductions of the narratives told about the influence of Japanese cultural products such as anime. We have further unfolded how the imaginary of AI robots as partners is constituted in different manners by our informants--through means of personality, gender, irony and love. The AI robots are therefore developed to have their own emotional responses and are enabled to understand emotions. On this basis we argue that AI robots as partners is an imaginary which commits itself to the emotional life in human-machine relationships and that this is a better approach to the future of living with AI technologies than neglecting that emotional life exists in our life with the material. That does not mean that it is a problem-free imaginary, and in drawing on Haraway (1991; 2008; 2016) we have shown that it is necessary to consider what AI robots as partners become, as they are complex entities which become in the interaction and through the conceptions the developers and researchers have. However, AI robots as partners does become a way to not only acknowledge how things are

part of our emotional life but also an imaginary of how we can interact meaningfully with intelligent technology in the future.

References

Allison, A. (2006) Millennial Monsters: Japanese Toys and the Global Imagination. Berkeley: University of California Press.

Bernstein, J. L. (2013). The Warm Welcome of the Japanese Cyborg. *Journal of Asia Pacific Studies.* 3(1), pp. 110-154

Bartneck, C. (2018) Who like androids more: Japanese or US Americans? Proceedings of the 17th IEEE International Symposium on Robot and Human Interactive Communication, Technische Universität München.

Brinkmann, S. and Tanggaard, L. (2015). Kvalitative metoder. 2nd ed. Copenhagen: Hans Reitzel. pp. 81-103 + 29-53

Bostrom, N. (2014). Superintelligence: Paths, Dangers, Strategies. 2nd ed. Oxford: Oxford University Press, pp. 16-22 and 95-99.

Bujra, J. (2006). Lost in Translation? The Use of Interpreters in Fieldwork in Desai, V. and Potter, R. ed., (2006). Doing Development Research. Pine Forge Press, pp. 172-175.

Coeckelbergh, M. (2014). 'Robotic Appearances and Forms of Life. A Phenomenological-Hermeneutical Approach to the Relation between Robotics and Culture'. In: Funk, M. and Irrgang, B. (eds.). Robotics in Germany and Japan. Philosophical and Technical Perspectives. Dresden: Philosophy of Technology Studies.

Conitzer, V. Sinnott-Armstrong, W., Schaich Borg, J., Deng, Y. and Kramer, M. (2017). Moral Decision Making Frameworks for Artificial Intelligence in Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence.

Dale, R., Moisl, H. and Somers, H. (2000). Handbook of natural language processing. New York: Marcel Dekker.

Emerson, R. M., Fretz, Rachel I., Shaw, Linda L. (1995). In the Field: Participating, Observing, and Jotting Notes in: Emerson, Robert M. (1995) *Writing Ethnographic Fieldnotes*, The University of Chicago Press, Chicago, pp. 17-38.

Gilson, M. (1998). A Brief History of Japanese Robophilia. Leonardo, 31(5), pp. 367-369.

Glaskin, K. (2012). Empathy and the Robot: A Neuroanthropological Analysis. Annals of Anthropological Practice, 36(1), pp. 68-87.

Haraway, D. (1991). ”Situated knowledges: The Science Question in Feminism and the Privilege of Partial Perspective” in *”Simians, Cyborgs and Women. The Reinvention of Nature”*. London: Routledge

Haraway, D. (2008). When species meet. Minneapolis: University of Minnesota Press.

Haraway, D. (2016) “The Companion Species Manifesto: Dogs, People, and Significant Otherness.” in “Manifestly Haraway”. University of Minnesota, pp. 91-198

Hornyak, T. (2006). Loving the machine. Tokyo: Kodansha International.

Inkster, I. (1991). Science, technology and economic development—Japanese historical experience in context. Annals of Science, 48(6), pp. 545-563.

Jasanoff, S. and Kim, S. (2009). Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. Minerva, 47(2), pp. 119-146.

Jasanoff, S. (2015). Dreamscapes of modernity. Chicago [u.a.]: Univ. of Chicago Press.

Jensen, C. and Blok, A. (2013). Techno-animism in Japan: Shinto Cosmograms, Actor-network Theory, and the Enabling Powers of Non-human Agencies. Theory, Culture & Society, 30(2), pp.84-115.

Joshi, A., Bhattacharyya, P. and Carman, M. (2016). Automatic Sarcasm Detection. ACM Computing Surveys, 50(5), pp.1-22.

Kaplan, F. (2004). Who is Afraid of the Humanoid? Investigating Cultural Differences in the Acceptance of Robots. International Journal of Humanoid Robotics, 01(03), pp. 465-480.

Karn, U. (2016). A Quick Introduction to Neural Networks. [online] Available at: https://ujjwalkarn.me/2016/08/09/quick-intro-neural-networks/ [Accessed 20 May 2018].

Kibble, R. (2013). *Introduction to natural language processing*. University of London. [online] Available at: https://london.ac.uk/sites/default/files/study-guides/introduction-to-natural-language-processing.pdf [Accessed 23 May 2018]

Kitano, N. (2006). 'Rinri': An Incitement towards the Existence of Robots in Japanese Society. International Review of Information Ethics, 6, pp. 78-83.

Latour, B. (1993). We have never been modern. Cambridge, Mass.: Harvard University Press.

Leeson, C. (2017). Anthropomorphic Robots on the Move. A Transformative Trajectory from Japan to Danish Healthcare.

Lohtia, R., Bello, D. and Porter, C. (2009). Building trust in US–Japanese business relationships: Mediating role of cultural sensitivity. Industrial Marketing Management, 38(3), pp. 239-252.

Macwilliams, M. (2015). Japanese visual culture. Abingdon: Routledge.

Massey, D. (2013) Imagining the Field in: Pryke, M., Rose, G. and Whatmore, S. (2013) *Using Social Theory. Thinking through Research.* London: Sage Publications Ltd.

Marcus, G. (1995). Ethnography In/Of the World System: The Emergence of Multi-Sited Ethnography. Annual Review of Anthropology, 24(1), pp. 95-117.

Mitsoyoshi, S. (n.d.). Development of Verbal Analysis of Pathophysiology. [online] Available at: http://www.esmsj.upit.ro/ESMSJ%20vol%205(1)%20pentru%20Denis%20pe%20site/ARTICOL%201.pdf

Nadkarni, P., Ohno-Machado, L. and Chapman, W. (2011). Natural language processing: an introduction. Journal of the American Medical Informatics Association, 18(5), pp. 544-551.

Robertson, J. (2007). Robo Sapiens Japanicus: Humanoid Robots and the Posthuman Family. Critical Asian Studies, 39(3), pp. 369-398.

Rogers, T. (1997). Working in our disadvantages: the perception of selected Nicaraguan teachers about the effect of war on their professional roles. Ph.D. Dissertation.

Šabanović, S. (2010). Robots in Society, Society in Robots. International Journal of Social Robotics, 2(4), pp. 439-450.

Šabanović, S. (2014). Inventing Japan's 'robotics culture': The repeated assembly of science, technology, and culture in social robotics. Social Studies of Science, 44(3), pp. 342-367.

Shea, M. (2014). User-Friendly: Anthropomorphic Devices and Mechanical Behaviour in Japan. Advances in Anthropology, 04(01), pp. 41-49.

Shibata, T., Wada, K., Ikeda, Y. and Sabanovic, S. (2009). Cross-Cultural Studies on Subjective Evaluation of a Seal Robot. Advanced Robotics, 23(4), pp. 443-458.

Silver, D., Huang, A., Maddison, C. J., Guez, A., Sifre, L., & Van Den Driessche, G. et al. (2016). Mastering the game of Go with deep neural networks and tree search. Nature, 529(7587), pp. 484-489.

Spencer, J. (2001). Ethnography after postmodernism. in: Atkinson, P. (2001) *Handbook of ethnography*. London: SAGE.

Spradley, J., (1979). *The Ethnographic Interview.* s.l: Wadsworth.

Trochim, W. M. (2006) *The Research Methods Knowledge Base*, 2nd Edition. [online] Available at: http://www.socialresearchmethods.net/kb/qualval.php [Accessed 20 May 2018].

Tsuboi, U. (2011). Observations on Japanese Tribological History and Representative Heritages from Ancient to Modern Times. Tribology Online, 6(3), pp.160-167.

Whatmore, S. (2013). Generating Materials in: Pryke, M., Rose, G. and Whatmore, S. (2013) *Using Social Theory. Thinking through Research.* London: Sage Publications Ltd.

Appendix 1 - Interview Guide for Sharp

Intro

- So how long do we have for this appointment/interview?
- Is it alright that we record this interview? And take pictures?
- Introduce techno-anthropology, us and the project
    - Do you have any questions for us?
- If you have any questions, please feel free to ask us.

Tell us about the company

- What are the visions of the company?
- How large is the company - how many employees?

Tell us about you

- What is your role - what do you work with/on?
    - What part of the development process are you involved in?
- Who do you work with - how are you organised in this department?
    - How do you work with these people? (joint sessions, scrum?)
- Where do you work?
    - Do you have your own office or share it?
    - Do you have joint workspaces?
- What is your educational background?
- Do you yourself own a personal assistant?
    - How do you use it/what for?
- Have you interacted with an AI/personal assistant/something?
    - How did you find this experience?
        - What AI/something was it?

Robohon

- How would you describe/present robohon?
- Who works on Robohon?
    - How many?
    - Their educational backgrounds?
    - How long have you worked on Robohon?
- Why did Sharp start developing Robohon?
- How did the go about developing Robohon?
    - How would you describe the process?
- What can Robohon do right now?
- What is the vision for Robohon?
    - What are your goals with the product?
- How have the japanese market reacted to/received Robohon?
- Where in the development process is Robohon at the moment?
    - What is the future of Robohon?
    - What do you want Robohon to be able to do?
        - How will you make it able to do these things?

    - What challenges have you encountered?
    - Do you include the users in the development process?
- What AI technologies are a part of Robohon?
    - Is it trained? How?
        - On what data?
        - Challenges?

The work with AI

- How do you define AI?
    - Do you strive to develop general AI?
    - What is good AI?
- Does robohon have a sort of AI?
    - Is it your goal?
    - What are the challenges?
    - How are you going to do it?
- What are your/the company's visions for working with AI?
- How do you see the relationship between robots and AI?

The relational/interactive perspective

- What is your target consumer group with robohon?
    - How do you envision the users using Robohon?
- How do you see the ideal relationship between Robohon and its user?
    - What relationships between human and machine are you trying to create?
    - How do you evaluate if the relationship between robohon and the user is of great quality?
- Are you trying to imitate humans or create products that does what humans can't?

Anything else

- Does the company work on any other AI products/personal assistants?

The work with AI

- How do you define AI? (Personally and within the company)
    - When is a machine intelligent?
    - What is a good AI?
- What kind of personal assistants with "AI" does the company work on?
- What is your goal with the AI products?
    - What exactly do you want your product to be able to do?
    - Do you strive after imitating human behaviour and abilities or do you strive to do what humans can't?
- How do you train the AI?
    - What technologies are used?
    - What data is used?
        - How is this data obtained?
        - What is included and what is omitted from the data?
    - How is it trained when released?
        - How do you find users commitment to train the AI

- How do you see your products being used by consumers?
    - What are your target group?
    - Is the target group who you expected it to be?
    - How do you engage the users?
- What relations are you trying to create between human and machine?
- How do you judge if your solution has the right quality?
- Have you ever been surprised by the use of your products?
    - And what kind of feedback do you get from users?
- What challenges do you have in the development?
- How do you see the future of AI?
    - Near and far future
    - Where is it used? And for what?
- (Something about the relationship between robots and AI)
- Do you work on anything else that is interesting in the area of AI and robotics/personal assistants?

Appendix 2 - Interview Guide for MRI

Tell us about you

- What is your educational background?
- What is your role?
- What research on AI do you do?
- What is the research supposed to contribute?
- Who do you work with?
    - How do you work with these people?
- Where do you work?
    - Do you have your own office or share it?
    - Do you have joint workspaces?
- Do you yourself own a personal assistant?
    - How do you use it/what for?
- Have you interacted with an AI/personal assistant/something?
    - How did you find this experience?
        - What AI/something was it?

The institute you work for

- What do they do?
- Who is the recipients of the research?
- What areas does the institute conduct research on?

AI development in Japan

- What do you think characterises AI development in Japan?
- What kinds of companies are looking into AI?
- Will you mention a few examples you know of of AI development in Japan?
- What do you think motivate companies to work on AI?