The role of culture in the acceptance of elderly towards social assertive robots

How do cultural factors influence the acceptance of elderly people towards social assertive robotics in the Netherlands and Japan?

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Abstract

Because of demographic aging in developed countries, new ways have to be found to deal with the number of elderly and the lack of people in the workforce. Using social assertive robots in nursing homes or elderly homes may provide the solution. However, before taking such a big step into the future, more needs to be known about the acceptance of elderly towards such technology. Moreover, to what extent does culture play a role in elderly willing to accept robots into their lives? In this thesis, the acceptance towards social assertive robots will be looked at through cultural glasses by using three of Hofstede's cultural dimensions: individualism, masculinity, and uncertainty avoidance. Using a comparative case analysis, differences have been found between the Netherlands and Japan. The dimension which gave the most substantial signs in the Dutch studies is individualism, this shows because of the need for autonomy regarding the robot. Remarkably, in the Japanese case an interplay between uncertainty avoidance and the masculinity dimension was found which was predicted by Hofstede (1999). This was apparent through their preference of security above privacy. Overall, the most substantial dimension In Japan was uncertainty avoidance. Although the findings are minimal and more research needs to be done, it can be hypothesized from this thesis that culture has an influence on the acceptance of social assistive robots

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Introduction

The population is getting older in the Netherlands this results in an increasing demand for specialized care. Even though the demand for specialized health care is increasing the number of healthcare professional will become less each year, such as caregivers for the elderly and registered nurses. The main reason for this is the shrinking working population. (Broadbent, Stafford, & MacDonald, 2009) Since 2011 the first children of the post-second world war baby boom have turned 65 years old, from then on the number of people that will become 65 years and older will rise even more (Poelman, 2010). This increase in elderly will reach its highest point around 2040 (van Duin, Stoeldraijer, Nicolaas, Ooijevaar, & Sprangers, 2015). In 2016 about 18% of the population is older than 65 in 2040 this will be 26%. Moreover, the fertility rates are going down and the working population is shrinking because of this (van Duin et al., 2015).

Because the availability of caregivers is not enough to keep up with the increasing demand for specialized care a way needs to be found to enable healthcare professionals to use their time more efficiently or a way that assists older adults in living independently (Marcel Heerink, Kröse, Evers, & Wielinga, 2010). Robots are one of the options that have been proposed as an assistive device that could accommodate the widening gap between the need and supply of healthcare services (Broadbent et al., 2009)

If social assistive robots (SAR) are going to be part of the homes of elderly people and at care facilities it is important to know the process of how elderly come to accept or reject SAR (Marcel Heerink et al., 2010). For example, many older people in western cultures live independently in their own homes and don't want to go to nursing homes away from their familiar surroundings, family and friends. Social assistive robotics (SAR) are therefore developed to enable elderly to live independently for a longer time (Broadbent et al., 2009).

If robots are going to appear more often in our daily lives and especially in healthcare institutions it is important to know whether the users (elderly themselves and caregivers) will like it and be inclined to make use of this technology. An important but newly rising topic within research of factors that influence the acceptance of robots is the role of culture (Šabanović, Bennett, & Lee, 2014) and her effect on the technologies, the effect of technologies on culture, and the acceptance of these technologies. Not every person on earth will react the same when new technologies are used to help you in your daily live. It is possible that culture is one of the indicators why some countries are very accepting towards new technologies such as robotics and why some are not (Šabanović et al., 2014).

But first, we need to know more about how culture affects the acceptance towards robots, especially concerning health care robots as they are needed in the near future. This

thesis will concern the following topic: ***How do cultural factors influence the acceptance of elderly people towards social assertive robotics in the Netherlands and Japan?***

Cultural differences could play an important part in understanding possible differences in attitude that emerge when comparing countries. In a study done by Bartneck, Suzuki, Kanda, and Nomura (2007) where they compared the attitude towards the pet dog robot Aibo they found that 'culture had a significant influence on all of their measurements and recommended that more research needs to be done in why these cultural differences exist.

The people in Japan have the highest longevity in the world and the Japanese population is already among the countries with the highest share of elderly people in relation to the working population (Faruqee & Mühleisen, 2003). Japan has already reached a population of which 25% is older than 65 years old since 2013 (OECD, 2017) which the Netherlands is fearing to reach in 2040(van Duin et al., 2015). Furthermore, fertility rates are among the lowest in the wold this implies that the population is declining and the population will only get older in the coming decades. (Faruqee & Mühleisen, 2003)

Japan has been struggling with a problem that is a future for us in the Netherlands it is good to look at what Japan has done to combat this problem. Japan is also a country that has always been the leader in development of robotics. Since the 80's Japan became known as a country that loves robots and their focus on developing service robots have been recognized. The positive attitude towards robots is encouraged by the Japanese government, corporations and scientists to convince the public. (Šabanović, 2014) For example, Japan has promoted robots such as robot dog Aibo, humanoid Qrio, Asimo and the seal robot Paro to support human interaction. These robots are often put in the spotlight on public events, conventions, expositions and on television (MacDorman, Vasudevan, & Ho, 2009). Another, reason given for this supposed love for robots is the Shinto religion in Japan, a part of this religion is the believe that spirits reside in everything so also objects. Furthermore, during the modernization in Japan a view of science was developed from Shinto a sort of "scientism" a heroic view of science and technology. (MacDorman et al., 2009)

Several studies have found that the Japanese people aren't the most enthusiastic about robots and even have thought deep about the consequences robots could have on society (Šabanović & Chang, 2016; Shibata, Wada, Ikeda, & Sabanovic, 2009; Shibata, Wada, & Tanie, 2004). However, Japan is still more positive towards robot than most of their western counterparts (Šabanović et al., 2014). So, what are these differences and what will these differences mean for SAR?

For the next paragraphs first the theory that is available regarding the acceptance of social assistive robots and how culture could play a role in this will be explored. Here I will also

formulate some assumptions of the theory that will help me to explore the data and help me answer the research question. Thirdly, the methods section will be presented. Fourthly, the data will be analysed and in finally conclusions will be drawn and the research question will be answered in the conclusion.

Theory

Before going into depth it should be clear what a socially assistive robot is. Feil-Seifer, Mataric, and Ieee (2005) define Social Assistive Robots (SAR) in their research as a robot which "goal is to create close and effective interaction with a human user for the purpose of giving assistance and achieving measurable progress in convalescence, rehabilitation, learning, etc." (p. 465) Basically research has been done in mostly two areas of research on assistive social robots for eldercare. Firstly, SAR which pose as social support and are companion type robots that are used in robot assisted therapy, such as the baby seal robot Paro which possibly has the same positive effect on older adults as real pets which improves ones' health and sense of wellbeing. The second type concerns robots which give cognitive and physical assistance. Cognitive assistance includes making the user remember their plans and to take medication and physical assistance is guiding, carrying, give information or work as a butlerlike figure. (Marcel Heerink et al., 2010). The SAR that are targeted in this thesis are those that are focused on elderly care, tasks are daily life assistance, and the role of the SAR is to work alongside nurses,(informal) care givers and family. (Feil-Seifer et al., 2005)

Technology acceptance

Literature posits that its essential to know when and how people accept technology because acceptance is the determinant whether people will use a certain technology or not (Chuttur, 2009). As said in the introduction demographic change is an urgent problem that needs to be accommodated and using SAR is one of the few possible solutions. If we want SAR to be successful, they need to be accepted by older people. (Broadbent et al., 2009)Therefore, more must be known how acceptance towards technology works. A large body of academic work tries to explain why people accept specific technologies. One of the most used models to look at acceptance of people towards specific technology is the **technology acceptance model (TAM).** TAM suggests that external factors have an effect on perceived usefulness and perceived ease of use which has an effect on attitude of technology which leads to behavioural intention to use and ends with actual adoption (Chuttur, 2009). This means that if people have a positive perception on the usefulness of a technology and perceive this technology as easy to use the product will be accepted by the user group. However these kinds of models are mostly applied to technologies

which are far into the development stage or are already in use (Allouch, van Dijk, & Peters, 2009). SAR are still in its development stages and are not widely in use yet, so then what kind of model can be used to look at how people accept a specific technology such as SAR?

Another way to predict acceptance is **theory of planned behaviour (TPB)** (Ajzen, 1991) as accepting something is a certain behaviour. The TPB suggests that behaviour is result of three variables, attitude towards the behaviour, subjective norm and perceived behavioural control. These variables are independent of each other, meaning that every variable has an influence on the other. Attitude is affected by subjective norm and the other way around, just as perceived behavioural control is influenced by subjective norm and the other way around having an indirect effect on attitude (Ajzen, 1991).

Attitude towards behaviour is described as *'the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question'(p.188)* (Ajzen, 1991). Attitudes are formed because an individual person connects his or her beliefs about a behaviour with certain attitudes and judges them with a positive or negative outcome (Ajzen, 1991). Because this variable is so connected to individual events it can be assumed that culture will not affect attitude strongly and I will not use this in the analysis.

Subjective norm refers to '*the perceived social pressure to perform or not perform the behaviour*'(p.188) (Ajzen, 1991). An individual learns and executes certain behaviour based on what one sees in their social environment. Meaning that what one observes from others will influence the observer to react such behaviour. When people around you cannot accept SAR it is very likely that you will also hesitate before accepting the technology (Yi, Jackson, Park, & Probst, 2006). For example, in the medical world there is a hierarchy and when someone from a higher position has a negative opinion about a new technology it could be a basis for a lower ranked individual, the same with one's peers. Likewise, when someone thinks a certain technology will enhance that persons image and social status that individual may have a more positive view on that technology. (Yi et al., 2006) Subjective norm is influenced by the opinions of others and norms of a society. As hierarchy and the importance of image differ per country and norms also differ per country, subjective norm could be very much influenced by culture. For the acceptance of SAR, it means that when a culture has more influence on subjective norm (which would mean to what extent the people of a certain culture conform to social norms) the more subjective norm has an effect on acceptance. Subjective norm could be explained as whether people's opinions have an influence on an individual or not and the strictness of norms and values.

Lastly, **perceived behavioural control** refers to the *'perception of the ease or difficulty of performing the behaviour of interest. A person may believe that, in general, the outcomes are determined by her own behaviour yet at the same time she may also believe her chances of*

becoming for example a doctor may be very small.'(p.183) (Ajzen, 1991) Both external and internal elements determine how a user perceives their level of control (Yi et al., 2006). Connecting this with SAR perceived behavioural control means that when someone thinks that they cannot use it, because it doesn't fit in their home situation or when someone thinks they are not competent enough. This can be because robots are for example only for the rich, seem dangerous, you're female, to old, etc.

The TPB has been used to explain acceptance towards different types of technology, such as information technology (Yi et al., 2006) and ambient intelligent appliances (Allouch et al., 2009). Therefore, this theory could also work for SAR.

Acceptance towards technology according to Yi et al. (2006)is also related to **personal innovativeness** meaning that 'some individuals are more willing to take a risk by trying out an innovation, whereas others are hesitant to change their practice' (p. 356) In this theory Yi et al. (2006) have made categories based on the levels of innovativeness, the categories are: *'innovators, early adopters, early majority, late majority and laggards' (p. 356)* (Yi et al., 2006). This concept explains why some people, organizations or countries accept technologies earlier than others and could therefore possibly explain why some countries will accept SAR more/earlier than others. Some countries are less innovative then others which is observed by the difference in spending on R&D, could the difference in culture be a reason?

Culture and technology

How are the factors then connected to culture? Culture teaches us what the important rules, rituals, and procedures are within our society. Besides rules culture 'cultivates and reinforces believes and values', how we understand the world is based on our culture. (Liu, Volcic, & Gallois, 2014) Furthermore, culture is imaginary meaning that not we cannot understand everything and we use what we learn in our culture how to look at new things (Liu et al., 2014). Culture thus influences our attitude towards new technologies, possibly influencing ones' level of innovativeness, and determines what norms are of how one should act in any situation determining the variable subjective norm. Because culture has such a big influence on the way we think it would be a logical assumption that how we perceive new technology is influenced by our culture. If our culture would be negative towards certain technology that would mean that this technology will not be accepted by the users and this could form a problem. For example, social assertive robotics are completely ready to be replacements of nurses and the government is planning to implement these robots into nursing homes.

Cultural factors

If culture plays such a big role in our lives, how can we identify what culture we have and how can we identify the cultures of others? One theory that has been widely applied when comparing national cultures are the cultural dimensions of Hofstede (Bagchi, Cerveny, Hart, & Peterson, 2003).

Hofstede uses the results of a research done by the International Business Machines Corporation (IBM) which was a research concerning the values of people working at IBM in 50 different countries in his book *alles anders denkenden (1999)*. From the analysis of the data four fundamental problem areas were found, these four areas were power distance, the relation between the individual and the group, the desired distribution of roles between men and women and the way how people deal with uncertainty. These four components stand for cultural dimensions, dimensions as in aspects of culture. They are called collectivism versus individualism, Femininity versus Masculinity, uncertainty avoidance and power distance. (Hofstede, 1999)

In 2010 through research by Michael Minkov the fifth dimension was added which is long-term versus short-term orientation (Hofstede, n.d.). This was added because of a too "western approach" of the researchers of the first four dimensions (Hofstede, 1999). In a research also my Michael Minkov in 2010 where he analysed the World Values Survey data of 93 countries a sixth dimension was added which is indulgence versus restraint (Hofstede, n.d.). The first dimension **'power distance'** is defined as *"the degree to which the less powerful members of society accept and expect that power is distributed unequally*" (Hofstede, n.d.). The second dimension '**individualism versus collectivism**' is defined as "*a society's position in whether people's self-image is defined in terms of 'I' or 'We'*" (Hofstede, n.d.). It could also be said that individualism is the degree to which one's preference is to put their own needs above those of social others (Zhang & Maruping, 2008). For **'masculinity versus femininity'** the level is measured in how much a society has a *preference "for achievement, heroism, assertiveness and material rewards for success"* (Hofstede, n.d.). This dimension could also be measured as the extent to which an individual prefers achievement, assertiveness, and material rewards as success(Zhang & Maruping, 2008). **Uncertainty avoidance** is measured with *"the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity"* (Hofstede, n.d.). Thereupon, uncertainty avoidance refers to the degree to which individuals can accept unpredictable situations in their lives (Zhang & Maruping, 2008). The fifth dimension of **'long-term versus short-term'** is based on the Chinese Value Study of IBM data as questions concerning uncertainty avoidance were not understood by East Asian people. This dimension describes *'how every society has to maintain some links with its own past while dealing with the challenges of the present and future'* (Hofstede, n.d.). They found that the difference in

understanding was because of the Confucian philosophy on which many East-Asian countries are build. (Hofstede, 1999) Therefore, in my thesis I need to keep in mind that this might be an important in the way I interpret the scores of Hofstede's analysis of the IMB research. Moreover, it could be important because I am comparing a Western country to an East-Asian country. Lastly, '**indulgence versus restraint**' means *"a society that allows relatively free gratification of basic and natural human drives" versus "a society that suppresses gratification of needs and regulates it by means of strict social norms"* (Hofstede, n.d.). Meaning the extent to which one is allowed to enjoy live and have fun. In countries who lean more to the side of indulgence people feel that they are masters of their own lives while in restraint countries people tend to feel that what happens to them is not because of what they intended themselves. (Hofstede, 1999)

Interplay between culture and technology acceptance

In this thesis only three dimensions are analysed that have been suggested to be most relevant for the technology acceptance (Al-Jumeily, Hussain, & Crate, 2014). In a study by Zakour (2004) dimensions by Hofstede were used to explore to what extent culture influences technology acceptance. In this thesis the focus lies on three of the four most used and recognized dimensions of Hofstede (Zakour, 2004) which are individualism versus collectivism, masculinity versus femininity, and uncertainty avoidance. Every dimension has an index of 0 to a 100 which is based on a survey of IBM, a country that has a score below 50 on any of the dimensions will be collectivistic, feminine or does not avoid uncertainty. Hence, a country with a score on any of the dimensions above 50 will be individualistic, masculine or will avoid uncertainty.

Dimension 1: Individualism versus collectivism

Collectivist countries think more as a group, individuals are pressured by their peers and family to make certain choices (Hofstede, 1999) meaning that the less individualistic a country is the more a person perceives social pressure to perform certain behaviour. In Hofstede's study the Netherlands is one of the most individualistic countries with a score of 80 out of 100 on the index (Hofstede, 2015) while Japan is only slightly collectivistic with a score of 46 out of 100. Japan does show collectivistic characteristics such as harmony and the group above the individual opinion and losing face is something to be very ashamed of. However, they are not as collectivistic as other Asian countries. In relation to SAR is that in individualistic countries people would only want to use robots if they would not interfere with them living autonomously. Even more so, people in individualistic countries will not solely rely on the opinions of others to form their own. Collectivistic countries would need to know the opinions of other family members or society in general towards SAR to form an opinion. Hence the first assumption is that **the more individualistic a country is the less subjective norm can be**

observed. Thus, in individualistic countries the people would perceive less pressure of the opinions of others than in collectivist countries.

Dimension 2: Masculine versus feminine

In Hofstede's study the Netherlands stands on the 5th place of most feminine countries while Japan is the second to most masculine country measured by Hofstede (Hofstede, 2015). In countries such as the Netherlands values such as, caring for others are important, high quality of life is a sign of success and standing out from the crowd is often not seen as something admirable. While in a masculine country such as Japan success is achieved by being a winner or being the best in your field and competition is found in many aspects of life such as how you score in school. (Hofstede, 1999) In feminine countries individuals value the opinion of other people more concerning behaviour because they are people-oriented while in masculine cultures achieving ones goal is the most important taking others opinion less into account(Zhang & Maruping, 2008). Therefore, the second assumption would be **the more masculine a country is the less subjective norm can be observed.** This would mean that elderly from more feminine countries would value the advice of others more in making decisions concerning technology (Zhang & Maruping, 2008). When others have negative ideas towards technology it is likely that the elderly person will not accept the use of SAR. Hence there are less people that feel competent using robots in masculine countries. Therefore, it can be assumed that **the more masculine a country the less behavioural control is perceived.** Regarding the elderly, those from more masculine countries are more focused on the usefulness of the robot, how the robot could help them reach their goal (Zhang & Maruping, 2008). While elderly from more feminine countries would like the robot to improve their quality of living by doing household chores or using it to pay bills (Zhang & Maruping, 2008). Furthermore, organizations in masculine countries are more competitive and emphasize rewards, performance of the individual and training to improve oneself (Hofstede, 1999), these are characteristics that are often seen in innovative organizations (Erumban & de Jong, 2006). For this reason, **the more masculine a country the more innovativeness is perceived.** When a robot would be an efficient way to solve a problem such as demographic aging masculine countries will be more positive of the idea to use them in elder care as a replacement or addition to humans. Because by using a new technology it would mean achieving the goal of solving a problem which is what people in masculine countries strive for. In Japan for example the government is even encouraging the development of SAR because it sets them apart from other countries (Šabanović, 2014) showing Japans competitiveness.

Dimension 3: Level of uncertainty avoidance

Because of demographic changes new ways must be found to accommodate the rising number of elderly. As said previously robotics is an option besides employing foreigners to take care of the elderly. However, SAR is a technology that is still in its development stage and it is still uncertain what all effects on the society are, therefore one could say that **the higher the level of uncertainty avoidance the less innovative the culture is.**

Japan is one of the most uncertainty avoiding countries according to Hofstede's study with a score of 92 out 100. This could be the case because Japan often from earth quakes, tsunamis and other natural disasters. The Japanese have learned to be cautious and this has become part of all facets in the Japanese society. (Hofstede, 2015) People have the tendency to be very thorough before making any kind of decision and any risk must be found out. Because of this change is very difficult to pull through in Japanese society (Hofstede, 2015). Thus, regarding SAR, the Japanese will be very careful before implementing it in elderly care. Especially not before they have thought through every risk SAR could pose to current society.

The Netherlands however scores 53 out of 100 of Hofstede's uncertainty index, which means that although we have a slight preference to avoid uncertainty. This can be best explained as citizens in countries with a high uncertainty avoidance will say*: 'What is different from normal, is dangerous' on the other hand those who live in countries with a low score on uncertainty avoidance will say: 'What is different from normal, is interesting' while in the Netherlands there we would say: 'What is different from normal, is strange'. (p. 152)* (Hofstede, 1999) We even have the idiom in the Netherlands: 'Act normal, normal is already crazy enough'. For the acceptance towards SAR this could mean that the Dutch people will react sceptically towards robots and for this reason they will find the idea too farfetched and far removed from reality. Furthermore, in countries with a high uncertainty avoidance index tend to feel less competent in regards to the government and authorities (Hofstede, 1999). Most healthcare facilities are publicly owned and when the government takes the decision to use SAR in care facilities civilians could feel that they don't have a choice to accept them or not.

Therefore, it can be assumed **that the higher the level of uncertainty avoidance the less behavioural control is perceived.**

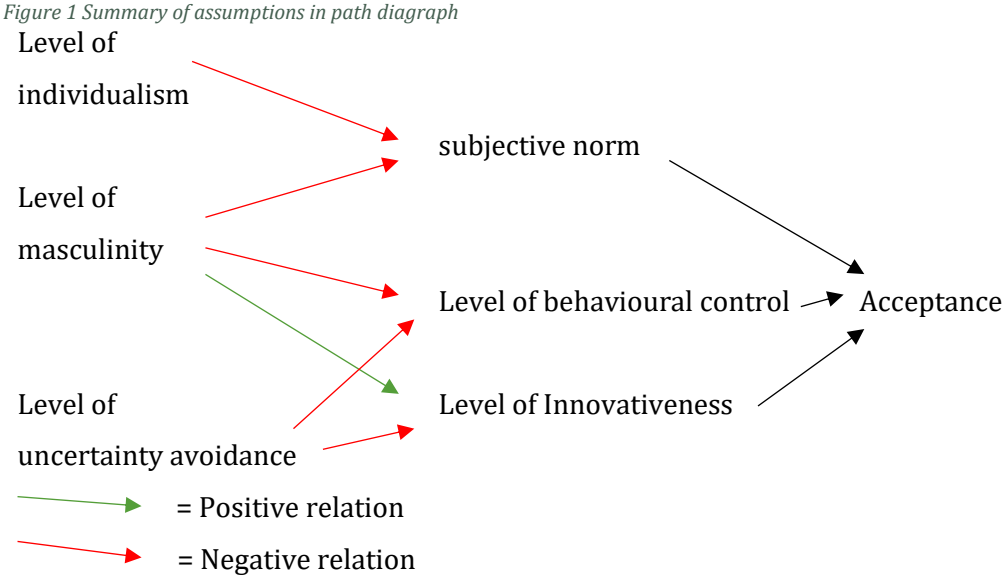
In table 1 the assumptions have been summarized to give an overview and show how Japan and the Netherlands could be different.

Table 1 Statements comparing Japan and the Netherlands

Japan	Netherlands
Slight collectivism, high level subjective norm	Individualism, low level subjective norm
Masculine, lower level subjective norm	Feminine, higher level subjective norm
Masculine, lower level perceived behavioural control	Feminine, higher level perceived behavioural control
Masculine, higher level innovativeness	Feminine, lower level innovativeness
High uncertainty avoidance, lower level perceived behavioural control	Moderate uncertainty avoidance, higher level perceived control
High uncertainty avoidance, lower level innovativeness	Moderate uncertainty avoidance, higher level innovativeness

Summarizing this causal path of assumptions, the level of individualism towards the level of subjective norm is negative and the level of masculinity on the level of subjective norm is also negative. The more a country is individual or masculine the less subjective norm is perceived. Secondly, the assumption between the level of masculinity and level of behavioural control is also negative, however the assumption between the level of masculinity and the level of innovativeness is positive. Meaning the higher a country scores on masculinity the more innovative a culture is. The level of uncertainty avoidance is assumed to have a negative effect between the level of behavioural control and the level of innovativeness. Below a table shows a summary of the expectations for the two countries for all dimensions, all statements are in comparison with the other country. The assumptions in relation to the variables will look as follows:

Figure 1 Summary of assumptions in path diagraph



Methodology

Research design

To see whether the dimension of Hofstede could be a workable theory to explain the effect of culture on acceptance trough subjective norm, perceived behavioural control and innovativeness, I have compared the two previous mentioned countries the Netherlands and Japan.

This main question of this thesis is an exploratory question, exploratory research is needed since the area of robotics is emerging quickly, however there is still little known about the cultural aspects. To study this phenomenon, I used the middle-range theory approach. This approach is used for theory construction when it is not possible to determine the overarching independent variable or to determine the essential feature of the phenomenon, but when it is possible and more efficient to only study a small part (Boudon et al., 1991). I want to understand how culture may be related to technology acceptance and how this differs in two countries. The findings of this thesis will hopefully lead to a working hypothesis that can be studied in future research.

The approach that I have used is a case study design in which I systematically compare qualitative research that study the acceptance of the elderly on SAR in the case of the Netherlands and Japan, a comparative case study (Kaarbo & Beasley, 1999).

The first step I took was to find what the dependent variable consists of and what is important to keep in mind when looking at acceptance of SAR. In this section I will explain how I selected my cases and samples and provide an extensive table with the found data. In this section I will also explain why these cases can be compared and I will also keep in mind to have a sample that has variation in the values of the dependent variable. Fourth, I will construct a codebook to guide the collection of evidence and then I will code the articles. Sixth, I will look for patterns within and across the articles and then try to explain them with the dimensions of Hofstede to come to a working hypothesis. (Kaarbo & Beasley, 1999)

Data collection

The data that will be used for the independent variable culture factors will come from G.J. Hofstede and his book For the cultural dimensions theory of Geert Hofstede I will use his book *allemaal anders denkenden(1999)* which means everyone thinks differently in which he explains what cultural dimensions are and how they came to be with the results of his and IBM's research for 50-70 different countries. Every dimension uses an index which differs on scale. However, I will be using the 0 – 100 scale which G.J. Hofstede provides on his website to make comparing easier. I will not be able to use every dimension to analyse the data and because not

every dimension can be related towards technology. In the theory section, it has been explained which dimensions I have used in the analysis.

More importantly, because this thesis will focus on the cultural aspect of the acceptation of SAR the data will not be focused on the middle segment of graph 1. The data cannot provide this information because I use existing qualitative studies and cannot ask the questions myself. What is more, the data is limited concerning technology acceptance as the data is not necessarily using the TAM or TPB. Therefore, the focus lies on finding signals of Hofstede's dimensions. However, in the analysis I will give possible answers to the assumptions that have been made in the theory regarding subjective norm, level of behavioural control and innovativeness.

In my thesis I have used existing qualitative studies. The articles should include samples of the Netherlands and Japan. My search strategy is as follows:

- I have used search terms for SAR: robots, zoomorphic robots, social robots, assistive robots, socially assistive robots and robotics in databases that will be mentioned in the data collection section Because the information can be limited I will also search with more general terms such as technology and artificial intelligence.
- I have used the search terms for SAR in combination with acceptance of elderly.
- I have used Japan or the Netherlands to define the search further by using the define country/territory option.
- An extra search term I will use is qualitative, interview or focus-group.

The articles included interviews or surveys in which they explain what the participants have said/chosen, either with statistical data or with quotations. Because the topic is relatively new I will limit my search to studies done between 2001 and 2016, which give me a span of 15 years.

The searching machines used were Scopus, Web of Knowledge, library of the University of Twente and Google Scholar. Furthermore, a lot of articles are found on SpringerLink in the International Journal of Social Robotics. The data is selected on the basis that they the articles should also mention where the subjects are from (a city or country) as to specify if they come from the Netherlands or Japan, include specific information about how Dutch or Japanese participants reacted and that the robot should be a SAR either a pet, service robot, communication, etc.

In this next section a summary of the articles that will be used as data is given. To give an overview of the articles the author, the mentioned country or countries, the type of robots and the sorts and number of participants are given.

Table 2 Summary of data

Author	Country	Type of robot	participants
Wada and Shibata (2007)	Japan	Seal robot Paro	12 elderly participants
Oida, Kanoh, Inagaki, Konagaya, and Kimura (2011)	Japan	Yorisoi ifbot (communication robot)	4 elderly participants
Iio, Shiomi, Kamei, Sharma, and Hagita (2016)	Japan	Fall Detection	18 elderly and 9 caregivers
Shiomi, Iio, Kamei, Sharma, and Hagita (2015)	Japan	Wheelchair robot	18 elderly participants
Shibata et al. (2009)	Japan (and United Kingdom, Sweden, Italy, South Korea, Bunei, United States)	Seal robot Paro	785 from Japan of all ages (survey)
Bedaf, Draper, Gelderblom, Sorell, and de Witte (2016); Draper et al. (2014)	Netherlands (and France, United Kingdom)	Care-O-Bot	10 older persons, 11 informal caregivers and 13 professional caregivers as participants from the Netherlands
Allouch et al. (2009)	Netherlands	Zoomorphic robot (A rabbit)	3 female elderly participants
M. Heerink, Kröse, Wielinga, and Evers (2006)	Netherlands	I-Cat	11 elderly participants and during the second experiment 40
Marcel Heerink et al. (2010)	Netherlands	I-Cat	40 elderly participants

The data will be coded using a codebook following the method of a comparative case study (Kaarbo & Beasley, 1999). The codebook is based on the dimensions of Hofstede. To study the data I will use the program ATLAS, in this way I can easily code and organize the data I find in the articles. By sorting the data according to the dimensions and sorted by the Netherlands

and Japan I can easily compare the data. I will analyse and compare the data and apply the theory of Hofstede's cultural dimensions as a means to explain the differences and/or similarities. I will then try to come to a conclusion whether using the cultural dimensions were useful and whether culture is playing a role in acceptance of SAR by the elderly people.
The codebook will be expanded when the first version of the codebook turns out during the data collection that it is not extensive enough. *The final version of the codebook is shown in appendix A.*

Table 3 Codebook of dimensions

Dimension	terms
Individualism	Independent, "alone", "without help", "my"/"mine", need for privacy, the use of 'I' a lot, "I like", having a strong opinion, use of yes and no, unique, personalize, self-respect, freedom
Collectivism	Using the robot together or with a group, "others", "our", "it should be", no outspoken opinion, embarrassed, family, equality, tradition
Masculine	The robot should be female because of the tasks, goal, efficient, well-built
Feminine	The robot can be male of female it depends on own preference, friend, conversation, social
Uncertainty avoidance	Risks, ethics, monitoring, dangerous, rules/guidelines, future, precise, exact, secure, competence

Limitations

The first potential threat is that there is still not a lot known and this subject is yet put out on the table. This means that I have built on general and broad theories of acceptance on technology and the cultural dimensions of Hofstede which are widely discussed. Secondly, I have used secondary sources that do not necessarily aim to describe cultural differences or use cultural dimensions to explain them. Thirdly, I must think about the internal validity, when the conclusion is that there is no difference between the Netherlands and Japan this does not directly mean that culture does not play a role on attitude on robotics. Moreover, any conclusions that I make are not yet to be generalized meaning that results would also count for

two different countries, therefore to secure the external and internal validity more research on the effects of culture on the elderlies' attitudes on social robotics needs to be done.

With this said, articles which included interview transcript were hard to find, I found a few for the Netherlands and one for Japan. The studies from Japan are more diverse as data was hard to find, therefore the internal validity is at risk. However, all articles are focused on health care related robotics, have health care professionals and/or elderly included. All data is focused on technology in elderly care and the acceptance of the participants towards these technologies. Therefore, the two countries can still be compared. The first potential threat is that there is still not a lot known and this subject is yet put out on the table. This means that I will build on general and broad theories of acceptance on technology and the cultural dimensions of Hofstede which are widely discussed. Secondly, I will have to use secondary sources that do not necessarily aim to describe cultural differences or use cultural dimensions to explain them. Thirdly, I have to think about the internal validity, when the conclusion is that there is no difference between the Netherlands and Japan this does not directly mean that culture does not play a role on attitude on robotics. Any conclusions that I make are not yet to be generalized meaning that results would also count for two different countries, therefore to secure the external and internal validity more research on the effects of culture on the elderlies' attitudes on social robotics needs to be done.

Analysis

The main findings from the analysis are that individualism is very observable in the Dutch studies as show in table 3 and multiple dimensions are moderately present in the Japanese studies. Masculine and feminine characteristics were hard to obtain as not a lot of distinction was made between the comments of men and women., concerning effectiveness, goal achievement or quality of life. In the tables below the results of the analysis of the articles from Atlas.ti is shown. The tables show that quite some signals have been found. Not every finding will be discussed in the analysis.

Table 4 Japanese articles findings summary

articles / dimensions	**collectivism**	**individualism**	**level of masculinity**	**uncertainty avoidance**	**Totals**
Shibata et al. (2009)	1	0	1	0	2
Oida et al. (2011)	1	2	7	3	13
Iio et al. (2016)	5	5	3	9	22
Shiomi et al. (2015)	2	0	1	1	4
Wada and Shibata (2007)	5	1	1	0	7
Total	14	8	13	13	

Table 5 Dutch articles findings summary

Article/dimension	**collectivism**	**individualism**	**level of masculinity**	**uncertainty avoidance**	**Totals**
Marcel Heerink et al. (2013)	1	0	1	2	4
Allouch et al. (2009)	0	6	8	0	14
Bedaf et al. (2016)	0	22	8	3	33
M. Heerink et al. (2006)	0	1	3	0	4
Total	1	29	20	5	

Culture

Dimension 1: Individualism versus collectivism

The first dimension tackled the assumption that in the Dutch articles signals of individualism should be found and for Japan collectivist signals should appear. It was easy to find characteristics of individualism in the Dutch articles; however, it was harder to divine whether things that were said fitted the collectivism dimension for Japan.

In the study by *Bedaf et al. (2016)* elderly participants in the Netherlands mentioned that the robot should not interfere to much in their lives and that reminders should only be given when appropriate. One of the participants said: "But if it is programmed to push you every 30 minutes and you're watching a thrilling movie. You don't want to get up and then it stands next to your chair: You have to get up, you have to walk." (P. 414)(Bedaf et al., 2016) Furthermore, when the interviewer asked: "So the role of the robot should be more passive? Something that gives reminders but no orders. An inferior." (p. 414) The participant answered yes.(Bedaf et al., 2016) In the Japanese studies the role of the robot was not discussed.

Furthermore, autonomy of the user was found to be important to the participants, the fact that the robot should behave as the user wants and not the other way around (Bedaf et al., 2016). One participant to prove this said: "I'm also such a person, so I can tell you that I don't always do what they tell me to do" (p. 413). Another sign of individualism is that if the robot would try to change the elderlies' behaviour it would not be accepted, such as stop smoking. One of the informal care givers shared her experience that elderly can be stubborn and that this would be the same if the robot would tell them to change their behaviour: "I think these older people they will not go with the robot, really! From the experience with my father... He would not say something like: Ok, I will walk. More like: Switch that device off!" (p. 415). (Bedaf et al., 2016) Autonomy of the individual regarding the robot was only mentioned once by a caregiver.

However, in the study done by Marcel Heerink et al. (2013) a Dutch caregiver mentioned that the family of the elderly may react negatively and be reluctant seeing their parents "play" with stuffed animals and may see it as humiliating or even insulting towards their parents. This comment could shows a collectivistic characteristic because shame and humiliation is a terrible event in such countries while individualistic countries would focus more on feelings of guilt (Hofstede, 1999). This is a little weird because the Netherlands is one of the most individualistic countries according to Hofstede (1999), hence there should be another cause for this kind of reaction, such as our Calvinistic Protestantism. Yet, nothing regarding shame was mentioned in Japan while Japan is more collectivistic and a country following Confucius where saving "face" is really important(Hofstede, n.d.).

In the Japanese studies autonomy was not mentioned a lot as mentioned previously. One caregiver did say: "Even though the system is very useful and convenient, we cannot employ the

system unless guests prefer and have the intention to use it." (p. 193) (Iio et al., 2016).Which could be a sign of intended autonomy however nothing regards this topic was mentioned by the seniors. The possibility of reminders was not applicable. However in regards to the study of *Iio et al. (2016)* concerning a fall system it was often mentioned that participants did not want to bother or create extra work for the caregivers. One of the participants said: "The system repeats its alerts even in save situations, which causes too much trouble for the caregivers." (p.202) one of the caregivers also confirmed this sentiment among the seniors: "Some seniors avoid the sensor when getting out of bed. She knows that we will come if she steps on it. She wants to avoid troubling us; so avoids it."(p.192). (Iio et al., 2016) Also In Iio et al. (2016) it was mentioned that the elderly were not only 'worried about their own safety but also the mental and physical well-being of the caregivers'. This could be a sign of collectivism, thinking more about others than one's own benefits. On the one side this could mean loyalty to the group or just their social nature or even something completely unrelated to the dimensions. Moreover, the elderly have not expressed their worry for the caregivers in the Dutch studies. Another possible collectivistic sign in the study by *Wada* of Japanese elderly which was not observed in the Dutch studies was that one elderly lady refused to use Paro in the community room because she has a dialect and was afraid to be negatively treated by the others, she said: "It is safer to keep to oneself than talk to the others… because women suddenly make fish-fights"(p.978). (Wada & Shibata, 2007) These two things show that the Japanese take others very much into account and avoid any possible conflict which is a characteristic of collectivism. In the Dutch studies a comparable sign was not present. Other collectivistic characteristics or individualistic characteristics were hard to find in the Japanese studies.

Dimension 2: Masculine versus feminine

One way of recognizing the level of masculinity is the differentiation between men and women and their opinions regarding the robots. The only Dutch study that specified the gender of the participants was by Allouch et al. (2009) where there were only 3 female participants. However, gender was specified in the Japanese studies, however quotes were mostly anonymized and differences weren't mentioned. One comment from a Japanese male participant towards Paro was: "I'm too old to be relaxed by (playing with) such a thing" (p.976) (Wada & Shibata, 2007).The same participant avoided contact with female inhabitants to avoid misconceptions about his behaviour. Both actions could mean that Paro was associated with female behaviour so the male participant did not want to interact with it, which is a sign of a masculine country, however because it was only one male participant this cannot be concluded. Another observation that was made in de study by Oida et al. (2011) was that patients got frustrated when the robot did not work correctly: " The subject felt provoked if there was no response,

malfunction on part of the robot caused bewilderment". Not reaching the goal effectively and getting annoyed by this would be a characteristic of a masculine country, however inhabitant of female cultures could also be annoyed by malfunctioning of a product. Feminine attributes could be found in the Japanese studies, reactions such as naming the robot: "See you, Shi-shi maru" and reactions such as "Watch the house please" and "I'm back! Were you a good boy?" (p. 997) (Wada & Shibata, 2007).Yet, all these reactions came from female participants and the only male reaction from the same study was mentioned above, that he was too old to play with such a thing. This could show the separation of roles between the female and male participants, which is a masculine cultural trait.

In the Netherlands, however there was not a lot of difference to be observed between men and women, yet no distinction was being made and often there were only female participants. This could be because the Netherlands has a feminine culture. The only difference was found in the study by M. Heerink et al. (2006) where men wanted to know how the service robot worked and women "would not want any technology that would help them too much in doing and remembering things"(p.40) (M. Heerink et al., 2006) which actually suggest more individualistic characteristics than feminine. However, both genders had the same sort of demands for the robot "They demanded it to make coffee, they informed about its wellbeing and one participant even told he would love to have a swimming pool in the new building for his eldercare institution, hoping it could talk to the management about it" (p.40)(Marcel Heerink et al., 2013). In addition, in the study by Allouch et al. (2009) the participants wished that the robot would have been able to "answer some questions once in a while" (p.6). All these demands and the equality between men and women suggest an improvement in the quality of life of the elderly which is a feminine cultural characteristic. As opposed to the Japanese subjects that tended to talk a lot to the robot and give it names, only one participant in the study by Allouch et al. (2009) gave the robot a name which was Harvey. Other participants waved goodbye to the robot when they left and all of them tended to talk to the robot or mimicked it when it asked a question (Allouch et al., 2009). Furthermore, Japanese participant became annoyed or provoked when the robot did not work (Oida et al., 2011), however in the Dutch study by Allouch et al. (2009) the participants just ignored the fact that they did not know how to use the robot correctly. However, in the study of the Japanese case the participants were less mentally healthy *(Oida et al., 2011).*

Dimension 3: Uncertainty avoidance

The index score on Uncertainty avoidance leaned for both countries to a higher tendency to avoid uncertainty, however Japan much more so than the Netherlands. Nevertheless, both countries showed ways they would avoid uncertainty. For the Netherlands it was mentioned

that there should be guidelines for when unexpected reactions occur (Marcel Heerink et al., 2013), also the guidelines needed to include that the elderly themselves must agree with having a robot in their homes and that autonomy of the elderly should be guaranteed (Bedaf et al., 2016).

For the Netherlands privacy was an important issue, however when it concerned sharing health data it was seen as a necessary, the interviewer asked: "And concerning the data the carer could get from the robot, isn't it personal?" the senior answered: "No, home carers do the same" (p.416). (Bedaf et al., 2016)

This difference could be explained by the interplay between the uncertainty avoidance and masculine versus feminine dimensions. Masculine dimensions with a strong tendency to avoid uncertainty will prefer security above privacy while in feminine countries social needs are put above privacy (Hofstede, 1999). This can be observed in Japan, a country with a high level of uncertainty avoidance and a high score on masculinity.

In the Japanese studies uncertainty avoidance was not shown by the need for guidelines as in the Netherlands but security was put slightly above privacy by seniors and caregivers. Regarding Japan in the study of Iio et al. (2016) that concerned a fall detection system a majority of the elderly participants mentioned that they felt more safe knowing that someone was watching all the time and they didn't mind having less privacy. For example, One of the elderly participant said: "actually privacy is important but monitoring care is the best for those who live in a nursing home"(p. 202) (Iio et al., 2016). On the other hand some participants had more trouble with being monitored all the time this is best summarized by what another elderly participant said: "Monitoring makes me secure but discomfort as well"(p. 202)(Iio et al., 2016). Some participant, however, even suggested: "the data should be saved. I want the caregivers to use the data to tell doctors about falls".

Technology acceptance

Besides the observations from the analysis concerning the presence of Hofstede's dimensions, assumptions were made in the theory section regarding the connection of these dimensions with the acceptance of SAR. Some useful theories to asses to what extent people accept new technologies were discussed such as the theory of planned behaviour, the technology acceptance model and others. In this thesis, a connection was made between the dimensions of Hofstede and Ajzen's theory of planned behaviour, the level of individualism and masculinity towards subjective norm, the level of masculinity and uncertainty avoidance towards perceived behavioural control, and level of uncertainty avoidance towards the level of innovativeness.

The level of individualism was expected have a positive relationship on subjective norm and the level of masculinity a negative effect on subjective norm. As said in the book of Hofstede

(1999) values are at the core of culture and are hard to notice if you do not specifically ask about them. This was also why it is hard to connect the observations to the level of subjective norm, the extent to which others opinions matter and the strictness of the norms. Nothing specifically was said in the studies of either countries. However, two things were mentioned. Firstly, the Dutch caregivers who said that family members would feel embarrassed to see their parents play with a toy (Marcel Heerink et al., 2013) and secondly the Japanese elderly women who said she didn't want to interact with Paro because her rural accent might be discovered by the other inhabitants of the elderly home (Wada & Shibata, 2007). These two things show that collectivism could increase subjective norm which when negative emotions are associated make it harder for people to accept SAR. On the other hand, nothing was said to show that individualism would have a positive effect.

The level of perceived behavioural control could be slightly observed. In the Japanese case, no problems were observed in terms of difficulty using the robot. One male participant however did not want to interact with the seal robot Paro because he thought he was to old and did not want to connect with female participants to avoid misconceptions (Wada & Shibata, 2007). In the Dutch case participants of the study by Allouch et al. (2009) did not enjoy using the robots because it was difficult to use and the limited conversational options. In the study by Bedaf et al. (2016) participants made clear that they would only accept a robot if they could have control over it in some way, this was less possible when they had less knowledge about using technology. Furthermore, if the robot would increase the individuals' autonomy over their lives the robot became less acceptable, the robot should not remind the senior or help with household activities too much (Bedaf et al., 2016; M. Heerink et al., 2006). This shows that when the Dutch elderly would be forced to have less control over their behaviour they would like the robot less. However, the latter shows that the level of individuals could have an effect on perceived behavioural control, the level of masculinity having an effect cannot be concluded on the single male comment of the Japanese studies or the lack of experience with technology in the Dutch case. Other factors are probably at play regarding perceived behavioural control than just culture.

Lastly, the level of innovativeness was assumed to be influenced by the level of uncertainty avoidance in a negative manner and a positive correlation between level of masculinity and innovativeness. However, in the Japanese studies nothing was found that suggests innovative behaviour. In the Dutch cases, where a participant tried to fool the robot by taking another key to leave the home (Allouch et al., 2009) and wanting to know more how the robot was made (M. Heerink et al., 2006), could suggest innovative behaviour. Because there was no connection found between masculinity and innovativeness this assumption cannot be confirmed. The case of uncertainty avoidance and innovativeness is a two-edged sword. On the

one side technology has always been a tool to avoid uncertain situations and create possibilities for men to rule over nature, technology has been used in the same line as laws and religion according to Hofstede (1999). On the other hand, because of the same reason people have begun to fear new technologies because it is hard to find a new job. Therefore, people will feel their future becomes uncertain when new technology is introduced. New technology will be continuously developed by uncertainty avoiding countries to tackle the uncertainty of nature, however in the same countries this tendency will withhold them from implementing these new technologies until all uncertainty has been cleared. Therefore, it can be assumed that these countries could be in the late majority or laggards of innovators, nevertheless they could be the first ones to think of new innovations.

Conclusion

In this thesis, I have tried to look at SAR through the lenses of culture. Trying to find signals of the dimensions of Hofstede and now being able to conclude that some have been found. After that I looked back at the assumptions that were made in the theory section that connected the dimensions of Hofstede to the theory of planned behaviour and the level of innovativeness. One question remains: H*ow do cultural factors influence the acceptance of elderly people towards social assertive robotics in the Netherlands and Japan?* Thus, how are Hofstede's dimensions related to acceptance and what cultural dimensions make it harder or easier for SAR to be accepted?

First of all, the analysis showed that there are differences in the reactions on certain robots between different countries. In the Dutch studies a lot was found that showed individualism and on first sight it could be that individualism may have a negative effect to the acceptance of SAR. The elderly seemed to only approve of a machine if it did not interfere with their daily lives to much and wanted to be able to have control over the machine. On the other hand, what was not shown in the Dutch studies is that robots can actually make it possible for the elderly to live independently for a longer time (Feil-Seifer et al., 2005). If the government wants to stimulate acceptance of SAR by the public in an individualistic country, the aspect of being able to live longer in your own house and not needing help of others for daily things should be promoted.

On the other hand, Japan shows that collectivism can have a positive effect on the acceptance of SAR if society is positive towards these robots. In the Japanese study concerning Paro it was observed that when the inhabitants saw others playing with Paro they would also feel happy and saw Paro as a necessary thing (Wada & Shibata, 2007). Therefore, In countries with a collective culture it could be important for the government and important organizations

to promote SAR in a positive light, which the Japanese government is doing (Šabanović, 2014), and by showing positive interaction with the robot.

Both individualistic and collectivistic characteristics in a culture can work out positively or negatively depending on how SAR are brought into the lives of the public which will make the difference. The same counts for masculine and feminine aspects.

In masculine countries it might be important to focus more on efficiency and effectiveness of the robot. In feminine countries enhancement of quality of life would be more important. In the Dutch studies the aspect of quality of life was shown clearly; The robot should not invade the seniors' leisure time with constant reminders. Furthermore, a lot more was expected of the abilities of the robot, seniors wanted to increase their leisure time letting the robot do administrative work (M. Heerink et al., 2006).

In the Japanese studies, however the level of uncertainty avoidance would possibly be the dimension that could make it more difficult for the public to accept SAR. Most SAR are still in the development stage meaning that when they are ready to be sold that the concept is still very new and problems that come with them for society are almost unknown. People want to be certain that there will be enough jobs left for the public when SAR are implemented, privacy should be assured, and possible defects should be known. The more a country tends to avoid uncertainty it is highly possible that they would have a harder time accepting the new technology. For the Japanese and the Dutch privacy seemed very important. In Japan it was also important that the robot provides the user more security, maybe even more than privacy (Iio et al., 2016). In the Dutch studies nothing was mentioned as more important than privacy, however in the same article autonomy was mentioned more often than privacy (Bedaf et al., 2016). The fact that Japan prefers security above privacy is because Japan is a very masculine country in combination with very high uncertainty avoidance (Hofstede, 1999). Therefore, uncertainty may make it a bit more difficult for people to accept SAR because the consequences of using them are still unclear.

The theory that has been used in this thesis is one that tries to categorize cultures into dimensions and results have been found, but there are many more theories that could have been used to answer this research question. There is Hall's high- and low-context cultural dimension, Kluckhohn's and Strodbeck's value orientations, Schwartz's cultural value theory to name a few. These theories are all top-down theories which go against the fact that culture is dynamic, it changes over time. (Liu et al., 2014) It may be that when people get more used to technology around the house, people will be more acceptant towards robots and robots will be appropriated into the culture. 'Therefore, robotics need to take into account that the social meaning and practice of science and technology, the social roles of people and robotics

technologies, and normative human responses to and relationships with these technologies and with each other across generations, artefacts, practices, and time, are constantly changing and adapting existing cultural models to new social and material circumstances.' (Šabanović et al., 2014).

Not only roboticists need to consider culture when developing SAR. Governments also need to keep culture in mind as a policy tool to increase the likeliness of the public to accept SAR and for this reason governments will experience less resistance to implement new ways of using robots which in turn will make the whole process more effective and efficient.

740 Altogether, it can be said that culture does have an influence on the acceptance towards technology and the use of Hofstede's dimensions may be one of the possibilities to analyse the difference. First of all, the working hypothesis as an outcome of this thesis is as follows:

The hypothesis: Culture has an influence on the acceptance of elderly people towards social assertive robotics.

This working hypothesis could be a guideline for further research as this thesis was only a tip of the iceberg. The focus however should in this case not only from the aspect of the roboticist and the looks of the robot. The effect of implementing a new technology in public and private organizations could be hugely different upon national and organizational cultures and need to be considered.

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Appendix

Appendix A

Table 6 Final codebook

Dimension	terms
Individualism	Autonomy, “alone”, “without help”, privacy, no orders, not listening to the robot, less reminders, intention, discomfort because of monitoring, alone, yourself, free/freely, non-compliant, the user, unique
Collectivism	Using the robot together or with a group, “others”, no outspoken opinion, embarrassed, family, tradition, fine with being monitored/ being watched
Masculine	It is only for women and children, childish, no time, misunderstanding between men and women, provoked not working
Feminine	friend, conversation, social, disturbing free time, lonely, giving names, grandchild, pet, ignoring, showing the robot to others
Uncertainty avoidance	Risks, ethics, secure, competence, security, guidelines, sudden reactions
General	When the information did not fit the dimensions, but is still important

Appendix B

Table 7 Japanese articles findings summary

articles / dimensions	**collectivism**	**individualism**	**level of masculinity**	**uncertainty avoidance**	**Totals**
Shibata et al. (2009)	1	0	1	0	2
Oida et al. (2011)	1	2	7	3	13
Iio et al. (2016)	5	5	3	9	22
Shiomi et al. (2015)	2	0	1	1	4
Wada and Shibata (2007)	5	1	1	0	7
Total	14	8	13	13	

Table 8 Dutch articles findings summary

Article/dimension	**collectivism**	**individualism**	**level of masculinity**	**uncertainty avoidance**	**Totals**
Marcel Heerink et al. (2013)	1	0	1	2	4
Allouch et al. (2009)	0	6	8	0	14
Bedaf et al. (2016)	0	22	8	3	33
M. Heerink et al. (2006)	0	1	3	0	4
Total	1	29	20	5	