Journal of Intercultural Management and Ethics

JIME

ISSN 2601 - 5749, ISSN-L 2601 - 5749

published by

Center for Socio-Economic Studies and Multiculturalism
Iasi, Romania
www.csesm.warter.ro

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DESIGNING CULTURE-SENSITIVE SOCIAL ASSISTIVE ROBOTS IN THE CARE OF ELDERLY LIVING WITH DEMENTIA: AN EXPLORATORY STUDY

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Abstract

Globally, most developed countries are already or will soon be entering aging societies and the elderly population living with dementia has been on the rise. A key challenge in dementia care is to assist the person to sustain communications and connection to family, caregivers and the environment (Mordoch, Osterreicher, Guse, Roger, & Thompson, 2013). Also, the growing population of elderly people with dementia accelerates a labor shortage of healthcare workers, which increases the burden on family members and caregivers. With today's rapid technological advancement, the use of social assistive robots in the care of the elderly living with dementia is hoped to address some of these care needs. Under such situations, human-robot interaction and user acceptance become critical when service robots start to provide a variety of types of assistance to users on a personal level (Kuo et al., 2009). The tendencies of how people and societies take care of the elderly vary from culture to culture. Several empirical studies indicate cultural differences in people's attitudes and acceptance towards social assistive robots. This paper presents the first step in a series of on-going studies on the possibility of developing culture-sensitive social assistive robots by exploring the cultural implications of relevant literature along with the extensive academic research of world-renowned inter-cultural professor Geert Hofstede.

Keywords: aging societies, elderly care, dementia, culture, social assistive robots

Introduction

Each country in the world is now facing a challenge of meeting the healthcare needs of a growing aging population. According to data from United Nations, those aged 60 years or over are expected to more than double by 2050 and to more than triple by 2100, rising from 962 million globally in 2017 to 2.1 billion in 2050 and 3.1 billion in 2100 (United Nations, 2017a). Population aging, which is driven by both declining fertility and increasing longevity, implies that successive generations can expect to live longer and have fewer adult children as potential sources of support in their old age (United Nations, 2015).

Statistics reported by the World Health Organization and Alzheimer's Disease International indicate that the number of people with dementia worldwide in 2010 is estimated at 35.6 million and is projected to nearly double every 20 years, to 65.7 million in 2030 and 115.4 million in 2050 (International & Organization, 2012).

Dementia is a syndrome in which there is deterioration in memory, thinking, behavior and the ability to perform everyday activities. There is no treatment currently available to cure dementia or to alter its progressive course. Typical problematic behaviors of dementia may include agitation, aggression, calling out repeatedly, sleep disturbance, wandering and apathy; while major psychological symptoms include anxiety, depression, delusion and hallucinations.

Nearly all studies indicated that these behavioral and psychological symptoms of dementia (BPSD) are an important cause of caregiver strain. Dementia progresses slowly,

which requires long-term care. The impact on those with dementia and on their caregivers and families is financially, medically, psychologically and emotionally extreme. One might anticipate that cultural and environmental factors could have a strong influence upon both the expression of BPSD and its perception by caregivers as problems (International & Organization, 2012). Despite their significance, there is not sufficient worldwide research into BPSD across cultures to date.

In order to reduce the burden of caregivers and family members for those who live with dementia, demands for social assistive robots to aid the daily life of the elderly are growing. Assistive technologies are considered a triple win solution: they not only ease the problems of societies and individual elderly adults, but also propel the economy (Flandorfer, 2012).

The degree of dependency on in-groups including family and societal circles in elderly care and how people interact with each other and their comfort level of personal space vary from culture to culture. In an experiment on human-robot interactions between Japanese and Egyptian participants the findings confirmed the importance of the localization of a robot in order to improve human acceptance during any social human-robot interaction (Trovato, et al., 2013).

This paper explores the possibility of developing culturally sensitive social robots by referring to the findings and implications from the research-based cultural framework of Geert Hofstede. The desired outcome being to provide a better sense of comfort to the users of social assistive robots. Developing culturally sensitive social assistive robots may not only potentially help ease the economical, physical and psychological burden of caregivers and family members, but also to improve the psychological quality of the users' life and help delay the progression of dementia.

Terminologies of robot and human interactive robots

The term "robot" was first used in 1920 in a play entitled "Rosum's Universal Robots (R.U.R)" by Capek, a Czech playwright. R.U.R. was a satire; robots were manufactured biological beings that performed all unpleasant manual labor (Hemal & Menon, 2018). Industrial robots used in various industries have been in existence since 1950.

E.Mordoch et al indicate that there are many terms used to describe robots that may fall under a general category of human interactive robots for psychological enrichment and personal interactions. The robots that perform these functions are called social commitment robots, entertainment robot, caring robot, mental health robot, interactive autonomous robot, interactive engaging robot, mental commitment robot. Terms are not consistently used within the literature and often lack clear operational definitions (Mordoch et al., 2013). Therefore, in this paper, the author uses the term "social assistive robots."

Types of social assistive robots in healthcare

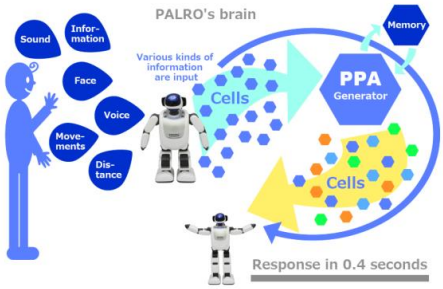
Assistive robots for older persons can be grouped into rehabilitation robots and socially assistive robots (Broekens, Heerink, & Rosendal, 2009; Feil-Seifer & Mataric, 2005). Rehabilitation robots provide physical assistance and as such are not considered social entities, while socially assistive robots can either be companion-type robots or service-type robots. Companion-type robots are often given the physical form of a pet and are used to improve the user's health and psychological well-being (Flandorfer, 2012).

Table 1: Examples of Social Assistive Robots

Robot name	Appearance	Features	Developed by
Paro	Harp Seal	Therapeutic	AIST (National Institute of Advanced Industrial Science and Technology), Japan
PALRO	Humanoid	Personal home concierge	Fujitsu
iCat	Cat	Human-robot & social interaction	Phillips
BIRON	Screen with mobile body	Personal assistant	University of Bielefeld
AIBO	Dog	Entertainment	Sony
NeCoRo	Tabby cat	Companion	Omron
Wakamaru	Humanoid	Household Companion	Mitsubishi Heavy Industry

Figure 1: Images of Social Assistive Robots

Paro (Yang, 2015)



PALRO (FUJISOFT, n.d.)

iCat (Graham-Rowe, 2007)

BIRON (Fritsch & Wrede, 2007)

AIBO (AIBO, n.d.)

NeCoRo (Weeks, 2005)

Wakamaru (Murph, 2008)

Socio-demographic factors to consider

Major socio-demographic variables that can influence people's attitudes and acceptance in social assistive robots include their age, gender, family status, cultural background (at national level), religion, education, technological experience and interest.

Several studies analyzed how the cultural background (as defined at the national level) might influence the acceptance of assistive robotic technologies (Flandorfer, 2012).

About Culture

There are numerous definitions of culture. Among the most recognized researchers and thinkers in the intercultural field is Professor Geert Hofstede. He defines culture as "the collective programming of the mind which distinguishes the members of one group or category of people from another." In his research Hofstede found that what people refer to as cultural preferences are not a result of our genes or chromosomes, they are the outcome of a subconscious learning process starting from the moment we are born, which Hofstede refers to as "programming." The content of this programming is best understood by considering it at the level of the "Nation-state." (Wursten, 2017).

Geert Hofstede, assisted by other researchers, came up with six basic dimensions that society needs to come to terms with in order to organize itself. Each dimension is expressed on a scale from 0 to 100 (some countries may have a score below zero or above 100, as those countries were measured after the original scale was defined.) The dimensions identified are referred to as Power Distance, Individualism, Masculinity, Uncertainty Avoidance, Long Term Orientation and Indulgence.

Power Distance (Relationship with Power)

The degree to which the less powerful members of a society accept and expect that power is distributed unequally. People in societies exhibiting a large degree of Power Distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low Power Distance, people strive to equalize the distribution of power and demand justification for inequalities of power.

Individualism vs Collectivism (Relationship to groups)

The Individualism side of this dimension, can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. In contrast, Collectivism represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we."

Masculinity vs Femininity (Source of Motivation. Cooperation vs Competition)

The Masculinity side of this dimension, also sometimes referred to as "Tough", represents a preference in society for achievement, heroism, assertiveness, and the material rewards of success. At the Masculine end of the dimension, society at large is more competitive. Its opposite, Femininity or "Tender", stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented.

Uncertainty Avoidance Index (Attitude towards Unknown. Needs for Predictability)

The Uncertainty Avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. Countries exhibiting strong UAI maintain rigid codes of belief and behavior, and are intolerant of unorthodox behavior and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles.

Long-term orientation vs Short-term orientation

Every society has to maintain some links with its own past while dealing with the challenges of the present and the future. Societies prioritize these two existential goals differently. Societies who score low on this dimension, for example, prefer to maintain time-honored traditions and norms while viewing societal change with suspicion. Those with a

culture which scores high, on the other hand, take a more pragmatic approach: they encourage thrift and efforts in modern education as a way to prepare for the future.

Indulgence vs Restraint

Indulgence stands for a society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms.

Table 2: Cultural Implications with Hofstede dimensions related to family and healthcare (Hofstede, Hofstede, & Minkov, 2010)

Power distance	Low • Parents treat children as equals • Children treat parents and older relatives as equals • Children play no role in old-age security of parents	High • Parents teach children obedience • Respect for parents and older relatives is a basic and lifelong virtue • Children are a source of old-age security to parents
Individualism vs collectivism	Individualism • Everyone grows up to look after him/herself and his/her immediate family only • Adult children leave the parental home • Low-context communication • People with disabilities should participate as much as in normal life	Collectivism • People are born into extended families or other in-groups that continue protecting them in exchange of loyalty • Adult children live with their parents • High-context communication • People with disabilities are a shame on the family and should be kept out of sight
Masculinity vs Femininity	Femininity (caring oriented) • Parents share earnings and caring roles	Masculinity (achievement oriented) • Father earns and mother cares
Uncertainty avoidance	Low • Curious about differences • Immigrants should be integrated • Values appearance higher than cleanliness • More ethnic tolerance • Positive or neutral toward foreigners	High • Different is danger • Immigrants should be assimilated • Cleanliness is critical • More ethnic prejudice • Xenophobia
Long-term vs Short-term orientation	Short-term • Matter and spirit separated	Long-term • Matter and spirit integrated

CASE 1: Cultural Comparison between Japan and North America

According to the United Nations, Japan was the world's most aged population in 2017 (33 per cent aged 60 or over) and it is projected to remain so through 2050 (42 per cent aged 60 or over). (Figure 2) (United Nations, 2017b). To cope with this situation, the Japanese government wants to introduce a nationwide system of robotic assistive technologies for aged care and heavily invests into the development of so-called service and health-care robots (Flandorfer, 2012). In August 2018, it was reported that the Ministry of Economy, Trade and Industry of Japan would seek a 20 percent increase in the budget it uses to support companies that produce "caregiver robots" for fiscal 2019. The funds requested for fiscal 2018 was reportedly ¥1.1 billion (Peckitt, 2018). While the Japanese culture has welcomed robots and recognized them as "Iyashi (healing), North Americans have been slower to accept the concept of social and personal robots. North Americans are more accepting of animal assisted therapy than the Japanese, which may partially explain North America's limited use of robots in care of elderly people with dementia and Japan's robust interest (Mordoch et al., 2013).

Figure 2: Ten countries or areas with the largest share of persons aged 60 years or over, in 1980, 2017 and 2050

1980			2017		2050	
Rank	Country or area	Percentage aged 60 years or over	Country or area	Percentage aged 60 years or over	Country or area	Percentage aged 60 years or over
1	Sweden	22.0	Japan	33.4	Japan	42.4
2	Norway	20.2	Italy	29.4	Spain	41.9
3	Channel Islands	20.1	Germany	28.0	Portugal	41.7
4	United Kingdom	20.0	Portugal	27.9	Greece	41.6
5	Denmark	19.5	Finland	27.8	Republic of Korea	41.6
6	Germany	19.3	Bulgaria	27.7	China, Taiwan Province of China	41.3
7	Austria	19.0	Croatia	26.8	China, Hong Kong SAR	40.6
8	Belgium	18.4	Greece	26.5	Italy	40.3
9	Switzerland	18.2	Slovenia	26.3	Singapore	40.1
10	Luxembourg	17.8	Latvia	26.2	Poland	39.5

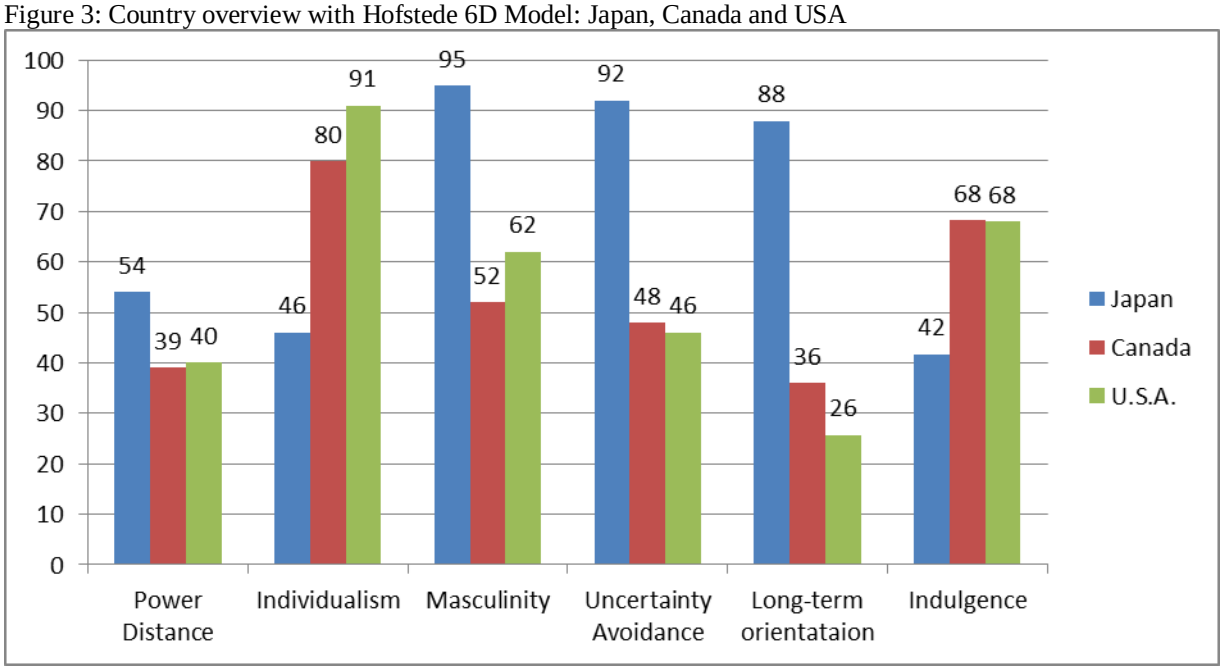
Data source: United Nations (2017). World Population Prospects: the 2017 Revision.
* Of 201 countries or areas with at least 90,000 inhabitants in 2017.

Analysis:

In Japan, people are disciplined not to offend others' feelings by speaking "out of turn" including saying "NO" and not to cause any burden to others. Human relationships in Japan are based on maintaining harmony and exchange of favors, thus being in the situations where asking for help or getting helped without returning favors make them feel guilty and awkward. Losing face can be one of the reasons why the Japanese feel comfortable with the use robots or other forms of technology devices, as they do not need to worry what others think of themselves. In handling labor shortage of healthcare workers, there are basically two options to choose from: hiring immigrants or using technology assisted alternatives. The majority of Japanese citizens view the ready acceptance of many immigrants as a problem or threat. On the contrary, in North America immigrants are viewed as a reliable workforce and essential asset in elderly care.

According to the cultural dimension scores of Geert Hofstede, Japan scores 54 in Power Distance, 46 in Individualism, 95 in Masculinity, 92 in Uncertainty Avoidance, 88 in Long-term orientation and 42 in Indulgence; while the US scores 40, 91, 62, 46, 26 and 86 and Canada has similar scores to those of the US, 39, 80, 52, 48, 36, and 68 respectively.

Figure 3: Country overview with Hofstede 6D Model: Japan, Canada and USA



The high level of Japan's uncertainty avoidance can explain their liking for the predictability that robots can offer as well as their sense of insecurity about accepting more immigrants to fill the shortage of healthcare workers. Animal-assisted therapy is now starting to be more accepted in Japan but at a much slower pace than that of North America due to the concerns about hygiene and safety for both patients and animals. This enhances their preference for social assistive robots. Medium levels of power distance and individualism mean that children and relatives are not considered as a reliable source of old age security in Japan.

In the long-term orientation dimension, Hofstede notes an implication that people tend towards integrated matters and spirits. This is a characteristic of many East and Southeast Asian countries including Japan where polytheistic beliefs are widely accepted. Thus, animal/human-like social robots can easily be imagined to have a soul.

In addition, this also has an influence from the robotic characters in the popular Animation programs, such as "Mighty Atom (known as "Astro Boy" overseas)," "Mobile Suit GAMDUM", and "DORAEMON," a cat-like robot. The Japanese have developed positive attitudes towards such robots, these robot heroes are equipped with superpower and human-like emotions and act as heroes who fight for humanity or as companions equipped with super tools who guide and help resolve everyday life problems. Many robotics engineers and researchers in Japan say that they have been inspired by these animation programs and that led them to choose their career in robotics (Fukuda, 2003).

CASE 2: Cultural comparison between Italian and Swedes

Cortellessa et al. (2008) focused on a comparison between Italian and Swedish elder persons with regard to their perceptions of socially assistive domestic robots. They showed 40 Italians and 43 Swedes eight short movies with different scenarios of robots in domestic settings. In general, the evaluation of both groups was positive. They rated positively the robot's abilities to avoid obstacles and to directly communicate, they also noted that people might feel safer and thought the robot could reduce problems caused by age-related impairments. Italians and Swedes had the same preferences regarding the physical aspects of the robot. They wanted a robot with less-human-like attributes and considered it useful for

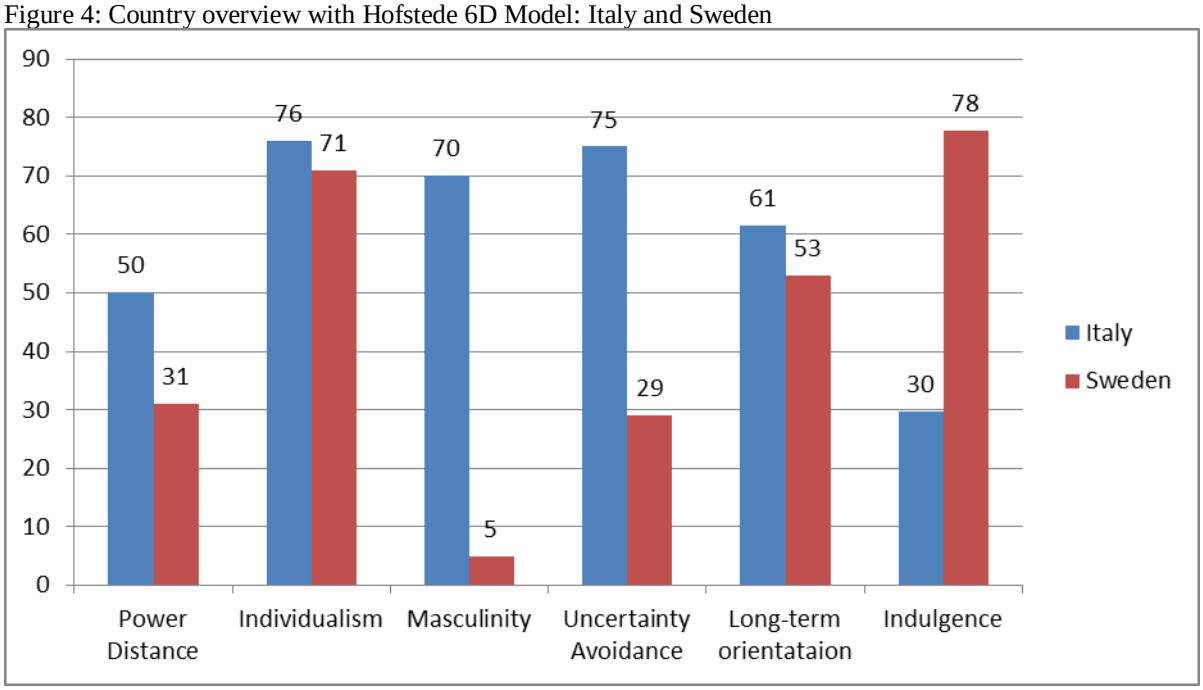
emergency-related tasks. The results also suggested that living conditions are an important factor for assessing the acceptance of robotic assistive technologies in a cross-cultural perspective: In Sweden more people live alone and the participants stated that a robot might violate their privacy, while this was not an issue for the Italian respondents. The Swedish respondents also worried that they might become dependent on the robot (Flandorfer, 2012).

Analysis:

According to the scores from the Hofstede six dimensional model, Italy scores 50 in Power Distance, 76 in Individualism, 70 in Masculinity, 75 in Uncertainty Avoidance, 61 in Long-term Orientation, and 30 in Indulgence, while Sweden scores 31, 71, 5, 29, 53 and 78 respectively.

With higher power distance and a tight knit family tradition with limited household space Italy has the tendency that children are expected to live with elderly parents. Elderly care is viewed as a family matter in Italy. On the contrary, a combination of lower power distance, higher individualism, lower masculinity and lower uncertain avoidance the elderly in Sweden tend to live independently from their children and extended family members.

Figure 4: Country overview with Hofstede 6D Model: Italy and Sweden



In the Nordic countries including Sweden, where the masculinity score is low, healthcare is mostly supported by government with about 80% of the health care funding coming from public sources (Blystad, 2012). Indeed, G. Cortelessa et al. indicate that in Sweden in 2002, 98% of elderly people lived either alone or with their spouse, while in the year 2000 35% of Italian elderly lived with other family members or within communities. In 1992 only 17% of the elderly in Nordic countries (Sweden, Denmark, Finland and Norway) received care from family members within their own household, while 67% of the elderly residing in other European countries (Italy, Portugal, Spain, Greece, Ireland and Austria) relied on family care (Cortellesa, et al., 2008).

The research of this Case #2 was carried out in Rome, Italy and Örebro, Sweden. Italian culture comprises of two distinctive regional cultures between the north and south. North of Rome the area rates at a medium level of power distance and more individualism; while the southern part of Italy is more accepting of power distance and more collectivist.

The degree of dependence on family care is therefore likely to be higher in the southern part of Italy.

Conclusion and Future Work

The literature suggests that cultural background influences the acceptance of social assistive robots.

As we have shown there are some empirical cross-cultural studies of people's attitudes towards social robots. However, the number of countries used for cross-cultural comparison in each study is limited to on the average two or three and with small sample sizes. Also methodologies and dates vary from study to study. Since Hofstede's intercultural studies encompass both quantitative and qualitative data for at least 86 countries, the scores of the six dimensions and their cultural implications might be helpful resources in the programming and design of culture-sensitive social assistive robots when combined with other socio-demographical factors.

In an effort to explore this field, several considerations are required: robots are not meant to replace human care but to function as part of multiple resources to bridge human contact. To what extent privacy should be protected to ensure the rights and dignity of vulnerable elderly with dementia and their family members, as well as how personal differences and preference should be incorporated in programming social assistive robots remain as challenges still to be solved.

In future work the author intends to delve further by taking these issues into account.

Acknowledgment

The author thanks Huib Wursten for valuable cultural insights and suggestions, and Paul Nichols for helpful suggestion in editing this manuscript.

References

1. AIBO (n.d.). AIBO [photograph]. Retrieved from https://us.aibo.com/
2. Blystad, H. (2012). Health care systems and communicable disease control in DK, FIN, NO and SWE. Retrieved from http://www.vhpb.org/files/html/Meetings_and_publications/Presentations/COPS28.pdf
3. Broekens, J., Heerink, M., & Rosendal, H. (2009). Assistive social robots in elderly care: A review. *Gerontechnology, 8*(2). doi:10.4017/gt.2009.08.02.002.00.
4. Cortellesa, G., Scopelliti, M., Tiberio, L., Svedberg, G.K. , Loufi, A. & Pecora, F. (2008). A cross-cultural evaluation of domestic assistive robots. In Proceedings of the AAAI Fall Symposium on AI in Eldercare: New solutions to Old Problems, pp. 24-31. Arlington, Tex, USA.
5. Feil-Seifer, D., & Mataric, M. (2005). Defining socially assistive robotics. In *Frontiers of the Human-Machine Interface ICORR 2005, IEEE 9th International Conference on Rehabilitation Robotics, Chicago, June 28 - July 1*. Chicago: Rehabilitation Institute of Chicago.
6. Flandorfer, P. (2012). Population Ageing and Socially Assistive Robots for Elderly Persons: The Importance of Sociodemographic Factors for User Acceptance. *International Journal of Population Research, 2012*, 1-13. doi:10.1155/2012/829835.
7. Fritsch, J., & Wrede, S. (2007). An Integration Framework for Developing Interactive Robots. *Springer Tracts in Advanced Robotics Software Engineering for Experimental Robotics,* 291-305.doi:10.1007/978-3-540-68951-5_17.
8. Fukuda, T. (2003). 福田敏男, 『鉄腕アトムのロボット学』(Robotic Study of Mighty Atom). Shueisha.

9. FUJISOFT (n.d.). Palro's expression and action skills. Retrieved from https://palro.jp/en/feature.
10. Graham-Rowe, D. (2007, July 26). An Emotional Cat Robot. *MIT Technology Review.* Retrieved from https://www.technologyreview.com/s/408308/an-emotional-cat-robot/
11. Hemal, A. K., & Menon, M. (2018). *Robotics in Genitourinary Surgery*. Cham: Springer International Publishing.
12. Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations software of the mind: Intercultural cooperation and its importance for survival*. New York: McGraw-Hill.
13. International, A. D., & Organization, W. H. (2012). *Dementia: A Public Health Priority*. World Health Organization.
14. Kuo, I., Rabindran, J.M., Broadbent, E., Lee, Y.I., Kerse, N., Stafford, R., & Macdonald, B. (2009). Age and gender factors in user acceptance of healthcare robots. Proceedings of the 18th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN). 214 - 219. 10.1109/ROMAN.2009.5326292
15. Mordoch, E., Osterreicher, A., Guse, L., Roger, K., & Thompson, G. (2013). Use of social commitment robots in the care of elderly people with dementia: A literature review. *Maturitas, 74*(1), 14-20. doi:10.1016/j.maturitas.2012.10.015.
16. Murph, D. (2008). Wakamaru robot to help / freak out UNIQLO SoHo shoppers. Retrieved from https://www.engadget.com/2008/09/06/wakamaru-robot-to-help-freak-out-uniqlo-soho-shoppers/
17. Peckitt, M.G. (n.d.). Do the elderly and disabled people in Japan want robots to look after them?. Retrieved from https://www.japantimes.co.jp/community/2018/10/14/voices/elderly-disabled-people-japan-want-robots-look/#.XI2K7ShKjIU.
18. Trovato, G., Zecca, M., Sessa, S., Jamone, L., Ham, J., Hashimoto, K., & Takanishi, A. (2013). Cross-cultural study on human-robot greeting interaction: Acceptance and discomfort by Egyptians and Japanese. *Paladyn, Journal of Behavioral Robotics*, *4*(2). doi:10.2478/pjbr-2013-0006.
19. United Nations (2015). World Population Ageing 2015. Retrieved from http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf, p46.
20. United Nations (2017a). World Population Prospects: The 2017 Revision, Key Findings and Advance Tables. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/WPP2017_KeyFindings.pdf
21. United Nations (2017b). World Population Prospects: the 2017 Revision. Retrieved from https://www.un.org/development/desa/publications/world-population-prospects-the-2017-revision.html.
22. Weeks, L.(2005, June 16). Cat-robots not yet purrfect. *The Spokesman-Review.* Retrieved from http://www.spokesman.com/stories/2005/jun/16/cat-robots-not-yet-purrfect/
23. Wursten, H. (2017). Culture, religion and ethics. What is the connection?.Retrieved from https://www.academia.edu/32293280/Culture_religion_and_ethics._What_is_the_connection.docx
24. Yang, J. (2015, October 5). Meet Paro, a furry friend to dementia patients. *The Star*. Retrieved from https://www.thestar.com/news/insight/2015/10/05/meet-paro-a-furry-friend-to-dementia-patients.html.