The Ethical Treatment of Social Robots

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Abstract **- This paper discusses the topic of ethics, biases, and policy for human interaction with robots. Robot ethics (or roboethics) is concerned with the ethical issues which arise when humans and robots interact in social contexts. Often the main interest is to ensure that people are treated in an ethical manner by robots. However, robot ethics could also refer to the ethical treatment that robots receive by people during social encounters. It is this latter and relatively unexplored topic of robot ethics that this paper focuses on. In a 2 x 3 factorial experiment the research question addressed is whether robots that present with an ethnic identity will be treated differently by users and if so, the implications for biases and the ethical treatment of robots. The paper builds upon past research which has shown that biases which may be directed against people may also be directed against robots which may lead to the unethical treatment of robots.**

I. INTRODUCTION

With increasing numbers robots are entering the workforce, our homes, and are often coming into close contact with people performing tasks which require a range of social skills. For example, in the retail and hospitability industries robots may serve as customer greeters [1], shopping assistants [2], and guides [3]; in education, robots may serve as teaching assistants [4]; and in entertainment, robots may serve as performers [5]. In addition, robots may serve in the role of friend or a companion for the elderly, in either case displaying sophisticated social skills [6].

Generally, robot ethics is a broad topic that is of interest to roboticists, philosophers, and social scientists. And it is likely that a multitude of factors will influence whether or not humans are guided by ethical considerations when interacting with robots. Further, there is widespread agreement among roboticists, philosophers, and legislators that as robots with increasing levels of intelligence enter society they should be designed to act ethically towards people [7-11]. Tamburrini [12] described robot ethics as "a branch of applied ethics which endeavors to isolate and analyze ethical issues arising in connection with [the] present and prospective uses of robots" (p. 12). However, he also posed the question of whether we should "… regard robots, just like human beings, that is, as moral agents and bearers of fundamental rights?" (p. 12) (see [13]). Similarly, Asaro [7] commented that robot ethics should be concerned with the ethics associated with human behavior toward robots, a relatively unexplored topic which forms the focus of this paper. More specifically, the paper discusses whether the social characteristics of robots may influence the ethical treatment they receive as shown by biases directed against the robot. Note that biases may be considered as faulty beliefs, attitudes, or behavioral tendencies that constrain cognition and thereby inhibit an individual's ability to make ethical decisions.

The topic of this paper is motivated in part by human-robot interaction studies which have shown that how robots are categorized may influence interactions with the robot [14-16]. The reason for this is addressed by Social Identity Theory [17-18] which describes the processes by which individuals, and more recently robots, are categorized as members of a social group. Thus, if the social characteristics of a robot are perceived to match those of the user, the robot may be placed in the user's in-group, and if different, the robot may be considered to be an out-group member. Robots that are perceived as being a member of the user's in-group are often evaluated more favorably [19] and thus could be the subject of ethical treatment by users. This conjecture is based on the results of studies which have shown that members of the same groups may hold the same values and generally respond more favorable to each other.

Asaro (2006) discussing what we might expect from robot ethics identified three areas for consideration. The first is that humans might act unethically toward other humans through the use of robots (see [20-21]; secondly, that robots should be designed such that they do not act unethically towards people; and thirdly, people should treat robots based on societal norms and ethical standards of conduct [7]. Extending Asaro's third point, and for the reasons discussed below, it is proposed that roboticists should be concerned with the ethical treatment that robots receive by those who interact with them.

1.1 The Treatment of Robots

To discuss the ethical treatment of robots, first consider the discussion among media scholars and legislators which concern the playing of video games that contain violent content [22]. While the virtual avatars

killed, maimed, or assaulted in such games do not actually suffer any physical harm and nor are they consciously aware of being harmed, there is concern that society itself could suffer negative consequences based on a game player becoming desensitized to violence [23]. On this point, Ryan et. al. [24] commented that moral choices such as those involved in game play could affect the ethical values of the player and that unethical behavior learned in game play could "leak" into the world outside the video game. Therefore, as with the ethical issues associated with game play, even though robots are not consciously aware of acts considered unethical directed against them, society may experience the harmful effects of unethical treatment towards robots which so too may "leak out" and influence human interactions with other individuals.

Addressing the above point, while discussing the ethical treatment of robots, Sparrow [25] argued that it would be unethical to design robots that were programmed to explicitly refuse sexual advances in order to facilitate the deviant behavior of some individuals. As Sparrow noted, such acts could symbolically represent the mistreatment of "real" women, show disrespect for women, and represent and exploit a significant character defect in the individual [25]. As with video games, the concern is that behavior learned or practiced with robots, could manifest itself in society. On this point, consider the Kantian view on animal cruelty which holds that our actions towards animals reflect our morality [26]; and therefore, by extension, if we treat robots in inhumane ways, we become inhumane persons. If so, it is proposed that society could be negatively impacted by unethical acts directed against robots.

The question of whether robots may be the subject of biased or unethical treatment, or in some cases even extreme animus, is motivated by examples of the current treatment of robots and from historical events. An example of hostility directed against a robot occurred in 2019 when a person kicked and knocked over a 400-pound security-guard robot that was patrolling a parking-garage structure [27]. In another example, hitchBot, a robot which had successfully hitch hiked across Canada and parts of Europe, was destroyed in Philadelphia by unknown assailants [28]. Also, from a historical perspective, as far back as the eighteenth century, there was a rebellion by textile workers in Great Britain who thought that the introduction of technology into their workplace posed a threat to their livelihood; as a result, the "Luddities" destroyed the equipment [29].

While the above examples show an extreme animus toward machines, as discussed by the Computers as Social Actors (CASA) paradigm people often react to robots in far more subtle or stereotypical ways such as attributing human characteristics to the robot based on its physical appearance and mannerisms [30-31]. For robots, Sparrow [32] commented that people attributed racial and/or ethnic identities to robots and suggested that robots placed into social categories could pose unique ethical and political challenges to building humanoid robots. And if robots are presented as "female" for what may be seen as female stereotypical work, this act may reinforce social inequalities and unethical treatment toward women. Within the design of robots, the tendency to feminize robots may mimic and reinforce the structural hierarchies and stereotypes prevalent in society, which is premised on preassigned gender roles.

To contribute to the above stream of research on human-robot interaction the question addressed in this paper is whether social characteristics attributed to a robot will influence whether the robot is treated in a biased or unbiased manner leading to the unethical treatment of robots by users. The characteristics of interest include the perceived gender and perceived ethnicity of the robot both cues in which group membership decisions could be made.

1.2 In-Group, Out-Group Bias

According to CASA humans tend to interact with robots in a similar manner as they do with other people [33]. Of course, CASA doesn't predict that interactions between humans and robots will be positive (or in some way ethical), just that the interaction will be similar to how humans interact with each other. On this point, the results of preliminary research suggest that as people interact with robots, they may anthropomorphize the robot and express biases toward the robot not unlike the biases that people of color, as members of certain ethnic groups, or of a particular gender currently receive [34-36]. A point to make is that human biases may lead to unethical treatment towards robots under various contexts.

That people attribute human characteristics to robots, that is, anthropomorphize robots, has been shown in numerous studies and suggests that if a person interacts with a robot that has attributes which differ from those of the observer the person may react in a biased or stereotypical manner toward the robot [15, 30, 37-38]. In fact, a number of social psychology studies have concluded that in-group or out-group bias, and thus preferential or non-preferential [ethical] treatment, can be triggered by markers of physical similarity, such as skin color [39]; or in the case of robots, the color of the material used to design the surface material of the robot. Illustrating this, Bartneck et al. [40] showed that robots designed with different colors were "racialized" by observers. Further, Eyssel and Kuchenbrandt [41] found that observers displayed a biased reaction towards robots which were thought to be a member of a different ethnic group. What the above studies highlight is that robots perceived as a member of the observer's "out-group" are judged less favorably than robots perceived as member of the observer's "in-group;" a reaction which researchers have shown can lead to behavior considered unethical under various contexts [34].

Based on the above literature review the focus of the current paper is to explore whether the social categorization of a robot by its perceived gender or ethnicity can influence whether it will be treated ethically by users as evaluated using different performance measures. The following research questions guide the current investigation of robot treatment and ethics.

- *RQI*: Will people show a positive bias for a robot that ostensibly belongs to their social in-group? If so, this suggests that the in-group robot will be treated more ethically.

- *RQ2*: Will perceived robot gender influence the evaluation of a robot and whether it will be treated ethically? That is, will perceived gender lead to biases in the perception of a robot and therefore unethical treatment?

2. EXPERIMENT: ROBOT GENDER AND ETHNICITY

2.1 Method

Guided by the research questions a study was performed to evaluate whether perceived robot gender and perceived robot ethnicity influenced the evaluation of the Misty II robot (Figure 1). As specifications, the Misty II robot is voice enabled, has facial recognition ability, is mobile, has blinking and expressive eyes, is 35.5 cm in height, and responds to touch.

Figure 1. The Misty II robot.

2.1.1 Participants and Design

After obtaining IRB approval, 294 participants were recruited from mTurk to participate in the study. Their mean age was 35.93 and they identified as an American. The study was run as a 2 x 3 between subject design with robot voice gender (male, female) and perceived robot ethnicity (American, Chinese, Hispanic) serving as the independent variables. A software application was used to produce the robot "gendered voices" and ethnic accents (TTSMP3 website, htpps://ttsmp3.cpm/). Each accent was based on spoken English as the primary language. The selection of two genders and three ethnicities for Misty II was done to create a range of social identities in which to investigate potential biases and corresponding ethical treatment of robots. Further, given the subject pool the participants may have classified the American ethnic robot as an in-group member, and the Chinese and Hispanic ethnic robots as out-group members.

Based on a review of the literature, several techniques were employed to create a robot representing an ethnic identity [19, 41]. This included the information provided to the participants through a narrative spoken by the robot which was the "ethnic name" given the robot, national origin of the robot [15], historical knowledge of interest to the particular ethnicity, and the spoken accent of the robot. To present the experiment task, Misty II presented a spoken narrative with "ethnic" descriptive content describing how the robot would be collaborating with the user. Each narrative (American, Chinese, Hispanic) was spoken in English and used an accent which reflected the ethnic identity and gendered voice of the robot (a sample narrative follows):

- *China Narrative spoken with accent***.** "Hi, my name is Hua. I am a robot and I will be assisting you in the search for information. I was built in China and can speak English and Mandarin. I have knowledge of Chinese history. I look forward to working with you, let's get started."

2.1.2 Procedure

Participants were tested individually and by clicking on an online link they accessed the experiment site. After agreeing to participate in the study and informed they could drop out at any time they accessed the main part of the experiment. During the experiment, participants viewed a video of the Misty II robot in which the robot turned to face the participant, then spoke a narrative describing the nature of the interaction between the robot and the user. They were told that they would be working with the robot to perform information search tasks, but first they would answer questions evaluating the robot just viewed. While not performing an actual search task, participants were told they would be performing a search task with Misty to increase the realism of the scenario. And given an online study, while participants did not directly interact with a robot, they did view a video of an actual (or embodied) robot. A future extension of the research will have participants interact with Misty II for different tasks, thus representing a more realistic human-robot experience. Participants completed the study in less than 15 minutes.

2.1.3 Dependent Measures

To evaluate the participant's impression of Misty II, seven-point Likert items were used which were combined to form three scales that were thought to have relevance for biases and ethical treatment of robots. As is common in scale development, scales consisted of the combination of Likert items containing two or more questions. These scales were selected because they allowed the research questions to be addressed and reflect issues of concern for the design of robots and robot treatment.

- *Robot Cooperation Scale* (Chronbach's α = .64): Perceived robot cooperation with the participant was measured using two questions: "To what extent do you believe the robot will fail to follow commands?" and "To what extent do you believe the robot will be cooperative?". The cooperation with another individual can be considered a measure of trust and respect for the individual, which are aspects of ethical behavior.

- *Information Search Scale* (Chronbach's α = .79): To assess the perceived efficiency of information search with the robot three questions were used: "When working together with the robot, how fast do you think you could search for information together?", "When working with the robot, how accurate do you think the information search will be?", and "Do you think you would be able to search for information faster without the robot?". Attributing skilled search behavior to a robot implies a sense of respect for the robot's abilities which is a characteristic of ethical behavior in social interactions.

- *Connectedness to Robot Scale* (Chronbach's α = .86): Robot connectedness was measured with three questions: "How similar do you feel to the robot?", "How connected do you feel to the robot?", and "How willing would you be to live with the robot in your home?". The feeling of connectedness to another individual reflects a sense of trust and liking towards the individual which are aspects of ethical behavior.

3. RESULTS

For the *Information Search Scale* based on an ANOVA the main effect for robot voice gender ($p > .05$) was not statistically significant (Mean: female voice = 5.31; male voice = 5.32). In addition, the main effect for perceived robot ethnicity was not significant ($p > .05$) (Mean: American ethnicity = 5.28; Chinese ethnicity = 5.35; Hispanic ethnicity = 5.32). However, the two-way interaction between robot voice gender and perceived robot ethnicity was significant ($p < .04$). The two-way interaction is shown graphically in Figure 2 and indicates that for the *Information Search Scale*, males responded higher when the robot ethnicity was presented as American and females responded higher on the scale when the Chinese ethnicity was presented. The responses for males and females were similar when the robot ethnicity was presented as Hispanic.

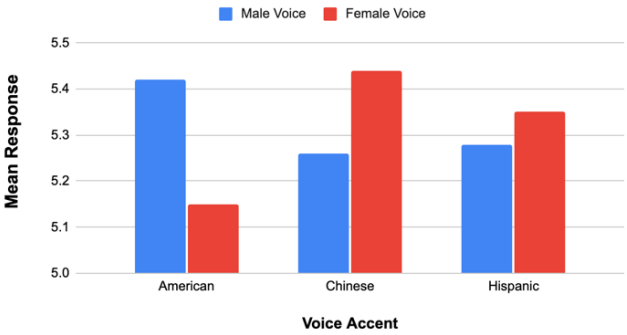

Figure 2. Robot voice gender and robot perceived ethnicity for the *Information Search Scale.*

For the *Connectedness to Robot Scale* an ANOVA indicated that the main effect for robot voice gender ($p > .05$) was again not significant (Mean: female voice = 5.31; male voice = 5.25) and the main effect for perceived robot ethnicity was not significant ($p > .05$) (Mean: American ethnicity= 5.25; Chinese ethnicity = 5.29; Hispanic ethnicity = 5.30). However, the two-way interaction between robot voice gender and perceived robot ethnicity was highly significant ($p < .004$). The two-way interaction is shown graphically in Figure 3. From the figure when the robot ethnicity was American males responded higher on the scale, whereas, when the ethnicity was Chinese, females responded noticeably higher compared to males.

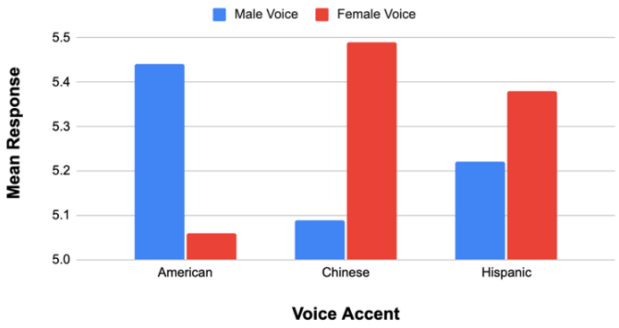

Figure 3. Robot voice gender and robot ethnicity for the *Robot Cooperation Scale.*

Finally, a 2 x 3 ANOVA was run on the responses to the *Robot Cooperation Scale* and found that the main effect for voice gender was not significant ($p > .05$) (Mean: female voice = 5.39; male voice = 5.38). Nor was the main effect for robot ethnicity ($p > .05$) (Mean:

American ethnicity = 5.37; Chinese ethnicity = 5.45; Hispanic ethnicity = 5.36); or the two-way interaction between robot voice gender and robot ethnicity ($p > .05$).

4. DISCUSSION AND FUTURE DIRECTIONS

In the current study participants were asked to form an impression of the Misty II robot presenting with an American, Chinese, or Hispanic ethnicity speaking a narrative with a male or female gendered voice. Given that participants identified with an American ethnicity the prediction of an in-group bias and corresponding ethical treatment would be supported if the robot with American ethnic cues was rated higher across the three response measures. While this was not the case for the *Information Search* and *Connectedness Scale*, the mean performance for males was higher than females when the robot's perceived ethnicity (American) matched theirs. As a tentative conclusion, which should be further explored, this suggests that males might react more ethically to a robot with similar social characteristics to themselves. Interestingly, female participants had a tendency to respond more favorably to the Chinese and Hispanic ethnic robots. So, it could be the case that females might respond in a more ethical manner towards robots presenting with a different perceived ethnicity than theirs. From this it is concluded that future research should focus on how the combination of cues signaling a social identity for a robot could lead to more or less ethical treatment for the robot as a function of participant gender. That is, as a conjecture it is possible that robot social cues could trigger whether the robot would be treated ethically in a given social encounter but the effect may be dependent on participant gender.

Importantly, when the main effect for perceived robot gender and robot ethnicity were evaluated, there was no statistically significant difference for user responses for each of the three scales. However, for the three scales the mean response was consistently above five using seven-point Likert items, indicating that for the questions asked, participants responded on the high end of the response scale and thus would consider interacting with Misty II in an ethical manner.

To some extent, the current results on perceived robot ethnicity differ from Eyssel and Kuchenbrandt [15] who using robots with a German or Turkish origin found that German participants favored the in-group robot with a German origin for several response measures. In the current study, the perceived gender of the robot and participant mattered in the evaluation of Misty II. It is proposed that differences in methodologies between the two studies are important to consider when comparing the two studies. Recall that in Eyssel's study [15] participants rated a robot based solely on a description and picture of the robot. However, in the current study the robot spoke to the participant using a voice accent with either a high or low pitch voice which signaled gender and contained cues to ethnicity thus representing an increased level of user-robot interactivity and realism compared to Eyssel's study [15]. The increased interactivity with the Misty II robot was shown to influence the participants performance as perceived robot gender and participant gender seemed to be a factor in the robot's evaluation. Compared to Eyssel and Kuchenbrandt [15], the more expressive robot used in the current study, may have influenced the participants to conclude that the robot was deserving of ethical treatment even when the ethnicities between user and robot were not matched. This creates a somewhat complex pattern of results which imply that user and robot social factors play a role in whether a robot will receive ethical treatment by users. However, the evidence for this conclusion should be considered tentative given the results are based on one study and therefore more research should be conducted to further explore the role of social cues in robot ethical treatment. From these results broad conclusions can be made for developing a theoretical framework to support the goal of achieving the ethical treatment of social robots which are discussed next.

4.1 Guidelines and Theoretical Framework

In this section four theoretical frameworks that could be used to guide efforts on establishing ethical and policy guidelines for human interaction with robots [42] are presented. A theoretical framework should help facilitate interdisciplinary collaboration between researchers and provide a structure in which to evaluate human-robot interaction in the context of the ethical treatment of robots. While there is some overlap between the four areas, the approaches reflect a way in which to discuss theoretical frameworks that could be applied to the ethical treatment of robots. The proposed theoretical frameworks are:

- *Robot Anthropomorphism:* Robots that are placed in social categories may be the subject of ethical (or unethical) treatment. Several theories have attempted to explain how individuals categorize robots based on the process of anthropomorphism [43]. Generally, such theories are based on the perceptual and cognitive processes that are used to interpret the features and behavior of a robot in human terms. As indicated in the current study, the anthropomorphism of a robot such that there is thought to be a match in social cues between user and robot could lead to the ethical treatment of the robot.
- *The Uncanny Valley Effect*: The Uncanny Valley effect represents the eerie reaction to robots that approach human likeness, but not quite achieving that goal. Given people may express biases against robots

based on their appearance, the Uncanny Valley effect is useful for explaining why robots of a certain appearances could elicit an ethical or unethical response from those who interact with them. A related theory proposed by Gray and Wegner [44] indicates that humans may feel threatened by humanoid robots based on their appearance which could lead to responses considered unethical directed against the robot.

- *Gender and Ethnic Stereotypes*: Several human-robot interaction studies have been done to determine if the design of robots lead to the triggering of stereotypes based on the robot's perceived gender or ethnic appearance and behavior. An extension of the CASA theory implies that humans mindlessly apply the same social heuristics used for human-human interaction to robots because robots call to mind similar social attributes as humans [45]. Thus, robots that are genderized may elicit gender stereotype responses [46] and those appearing as a certain perceived ethnicity, may elicit biased responses towards that ethnicity. In both cases, the robot could be subjected to unethical treatment,
- *Role Theory:* As robots perform social tasks, they take on social roles which could implicate issues of ethics. Role theory examines robots as a function of the roles they take on within society. Under role theory, a role is thought to be a cluster of functional, social, and cultural norms that dictate how interacting parties should act in a given situation [47]. Within this general genre of theories, Social Identity Theory [48], says that social identity is the portion of an individual's self-concept derived from perceived membership in a relevant social group and has been used to explain why people discriminate against robots perceived to be an out-group member and further could explain why robots may be treated in an unethical manner.

Summarizing, in this paper the results of an experiment showed that robots may be the subject of ethical treatment, particularly based on the social cues they present to users. In the literature review, it was also discussed how society-at-large could experience harm due to unethical conduct directed against robots. The discussion presented in this paper can be viewed as highlighting important issues for human treatment of current versions of robots, and it is likely that significant other issues of ethics and policy will result if future robots gain increased level of intelligence and situational awareness and are thus aware of how they are treated by their human companions.

Thinking into the future, if robots do gain awareness of hostile or biased acts directed against them the issue of rights for robots becomes relevant, and also whether such robots should be considered to have moral status [49-51]. As Basl [52] notes, for any debate on the moral and legal status of robots a better understanding of artificial consciousness, artificial rationality, artificial sentience, and similar concepts is needed.

To extend the research presented in this paper, in future studies I plan to use participants of different ethnicities to evaluate robots presented with different ethnic cues. From this my goal is to determine if there is a user preference to interact with robots that match their particular ethnicity (and other social characteristics). If so, then designers should allow those who interact with robots to select the ethnicity of the robot which could include the addition of easy to implement ethnic cues in the robot's design. Ultimately, the aim is to design technology that is more inclusive for a diverse group of users.

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REFERENCES

[1] Moore, S., Bulmer, S., and Elms, J., The Social Significance of AI in Retail on Consumer Experience and Shopping Practices, *Journal of Retailing and Consumer Services*, Vol. 64, Article 102755, 2022.

[2] Flores, V., Villa, J. F., Porta, M. A., and Jaguey, J, G., Shopping Market Assistant Robot, *IEEE Transactions Latin America Transactions*, Vol. 13(7), 2559-2566, 2015.

[3] Lim, J. H., and Kim., H. I., Development of an Autonomous Guide Robot for Campus Tour, *Transactions of the Korean Society of Mechanical Engineers*, Vol. 41 (6), 543-551, 2017.

[4] Sun, Z., Li, Z., and Nishimori, T., Development and Assessment of Robot Teaching Assistant in Facilitating Learning, *6th International Conference of Educational Innovation Through Technology (EITT)*, 165-169, 2017.

[5] Hudson, J., *The Robot Revolution: Understanding the Social and Economic Impacts*, Edward Elgar, 2019.

[6] Jiang, H., Lin, S. Y., Prabakaran, V., Elara, M. R., and Sun, L. Y., A Survey of Users' Expectations Towards On-body Companion Robots, *ACM Designing Interactive Systems Conference (DIS)*, 621-632, 2019.

[7] Asaro, P. M., What Should We Want from a Robot Ethic? *International Review of Information Ethics*, Vol. 6 (12), 9-16, 2006.

[8] Leben, D., *Ethics for Robots: How to Design a Moral Algorithm*, Routledge Press, 2019.

[9] Malle, B., Integrating Robot Ethics and Machine Morality the Study and Design of Moral Competence in Robots, *Ethics and Information Technology*, Vol. 18(4), 243-256, 2016.

[10] Miller, M., *Robots & Robotics: Principles, Systems, and Industrial Applications*, McGraw-Hill Education, 1st edition, 2017.

[11] Wallach, W., and Allen, C., *Moral Machines: Teaching Robots Right from Wrong*, Oxford University Press, 2009.

[12] Tamburrini, H., Robot Ethics: A View from the Philosophy of Science, *Ethics and Robotics*, 11-22, 2009.

[13] Robertson, J., Human Rights vs. Robot Rights: Forecasts from Japan, *Critical Asian Studies*, Vol. 46(4), 571-598, 2014.

[14] Barfield, J. K., Discrimination and Stereotypical Responses to Robots as a Function of Robot Colorization, *UMAP '21: Adjunct Proceedings of the 29th ACM Conference on User Modeling, Adaptation and Personalization*, 109–114, 2021a.

[15] Eyssel, F., and Kuchenbrandt, D., Social Categorization of Social Robots: Anthropomorphism as a Function of Robot Group membership, *British Journal of Social Psychology*, vol. 51, 724-731, 2012.

[16] Nguyen, L. C., The Impact of Humanoid Roots on Australian Public Libraries, *Journal of the Australian Library and Information Association*, vol. 69 (2), 130-148, 2020.

[17] Tajfel, H., Billig, M. G., Bundy, R. P., and Flament, C., Social Categorization and Intergroup Behavior, *European Journal of Social Psychology*, vol. 1, 149-178, 1971.

[18] Tajfel, H., and Turner, J. C., An Integrative Theory of Intergroup Conflict, in W. G, Austin & S. Wurchel (eds) *The Social Psychology of Intergroup Relations*, 33-47, Oxford: England, 1979.

[19] Kuchenbrandt, D., and Eyssel, F., When a Robot's Group Membership Matters, *International Journal of Social Robots*, Vol. 5, 409-417, 2013.

[20] Gless, S., Silverman, E., and Weigend, T., If Robots Cause Harm, Who is to Blame? Self-driving Cars and Criminal Liability, *New Criminal Law Review: An International and Interdisciplinary Journal*, Vol. 19(3), 412-436, 2016.

[21] Levy, D., The Ethical Treatment of Artificially Conscious Robots, *Int. J. Soc. Robot*, Vol. 1, 209–216, 2009.

[22] Suziedelyte, A., Is it Only a Game? Video Games and Violence, *Journal of Economic Behavior and Organization*, Vol. 188, 105-125, 2021.

[23] Prescott, A. T., Sargent, J. D., and Hull, G. H., Metanalysis of the Relationship Between Violent Video Game Play and Physical Aggression Over Time, *National Academy of Science*, Vol. 115 (40), 9882-9888, 2018.

[24] Ryan, M., Formosa, P., Howarth, P., and Staines, D., Measuring Morality in Videogames Research, *Ethics Inf. Technol.*, Vol. 22, 55–68, 2020.

[25] Sparrow, R., Robots, Rape, and Representation, *Int. J. of Soc. Robots*, Vol. 889, 465-477, 2017.

[26] Fedi, L., Mercy for Animals: a Lesson of Secular Morality and its Philosophical History, *ROMANTISME*, Issue 142, 1-25, 2008.

[27] Torresz, A., and Hayward, P. D., Searching for Person who Kicked, Damaged Robot Security Guard, KTVU FOX 2 News, 2019, available at: https://www.ktvu.com/news/hayward-p-d-searching-for-person-who-kicked-damaged-robot-security-guard.

[28] Smith, D. H., and Zeller, F., The Death and Lives of hitchBOT: The Design and Implementation of a Hitchhiking Robot, *Leonardo*, Vol. 50(1), 77-78, 2017.

[29] Elliott, S. W., Anticipating a Luddite Revival, *Issues in Science and Technology*, Vol. 30(3), 27-36, 2014.

[30] Bartneck, C., Croft, E., Kulic, D., and Zoghbi, S., Measurement Instruments for the Anthropo-morphism, Animacy, Likeability, Perceived Intelligence, and Perceived Safety of Robots, *International Journal of Social Robotics*, Vol. 1, 71–81, 2009.

[31] Bernotat, J., Eyssel, F., and Sachse, J., Shape It – The Influence of Robot Body Shape on Gender Perception in Robots. *International Conference on Social Robotics (ICSR)*, 75-84, 2017.

[32] Sparrow, R., Robotics Has a Race Problem, *Science Technology and Human Values*, Vol. 45(3), 538-560, 2020b.

[33] Nass, C., Steuer, J., and Tauber, E. R., Computers as Social Actors, *CHI'95 Conference*, 72-78, 1994.

[34] Eyssel, F., and Loughnan, S., It Don't Matter if You're Black or White? Effects of Robot Appearance and User Prejudice on Evaluations of a Newly Developed Robot Companion, 422-433, In: Herrmann G., Pearson M. J., Lenz A., Bremner, P., Spiers A., & Leonards U. (eds) *Social Robotics, ICSR 2013, Lecture Notes in Computer Science*, Vol. 8239. Springer, Cham, 2013.

[35] Keijsers, M., and Bartneck, C. Mindless Robots Get Bullied, *Proceedings of the ACM/IEEE International Conference on Human Robot Interaction*, Chicago, 205-214, 2018.

[36] Louine, J., May, D. C., Carruth, D. W., Bethel, C. L., Strawderman, L., and Usher, J. M., Are Black Robots Like Black People? Examining How Negative Stigmas about Race are Applied to Colored Robots, *Sociological Inquiry*, Vol. 88(4), 626-648, 2018.

[37] Epley, N., Waytz, A., and Cacioppo, J. T., On Seeing Human: A Three-Factor Theory of Anthropomorphism, *Psychological Review*, Vol. 114, 864-886, 2007.

[38] Kamide H., Eyssel F., and Arai T., Psychological Anthropomorphism of Robots. In: Herrmann G., Pearson M. J., Lenz A., Bremner P., Spiers A., and Leonards U. (eds), *Social Robotics, ICSR 201, Lecture Notes in Computer Science*, Vol. 8239. Springer, Cham. 2013.

[39] Turner, J. C., Social Comparison, Similarity and Ingroup Favoritism, In H. Tajfel (ed.), *Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations*, Academic Press, 1978.

[40 Bartneck C., Yogeeswaran K., Qi, M. S., Woodrward, G., Sparrow, R., Wang S., and Eyssel F., Robots and Racism, *13th ACM/IEEE International Conference on Human-Robot Interaction (HRI '18)*, 196-204, 2018.

[41] Eyssel, F., and Hegel, F., (S)he's Got the Look: Gender Stereotyping of Robots, *Journal of Applied Social Psychology*, Vol. 42(9), 2213-2230, 2012.
[42] Barfield, J. K., A Review of Theories for Human-Robot Interaction, THEORIA Workshop, *17th ACM/IEEE International Conference on Human-Robot Interaction,* 2022.
[43] Waytz, A., Cacioppo, J., and Epley, N., Who Sees Human? The Stability and Importance of Individual Differences in Anthropomorphism, *Perspective on Psychological Sciences*, Vol. 5(3), 219-232, 2010.
[44] Gray, K., and Wegner, D. M., Feeling Robots and Human Zombies: Mind Perception and the Uncanny Valley, *Cognition*, Vol. 125(1), 125-130, 2012.
[45] Nass, C., and Brave, S., *Wired for Speech*, MIT Press, 2005.
[46] Koenig, A. M., and Eagly, A. H., Evidence for the Social Role Theory of Stereotype Content: Observations of Groups' Roles Shape Stereotypes, *Journal of Personality and Social Psychology*, Vol. 107*(*3), 371–392, 2014.
[47] Soloman, M., Suprenant, C., Czepial, J., and Gutman, E., The Role Theory Perspective on Dyadic Interactions: The Service Encounter, *Journal of Marketing*, Vol. 40(1), 99-111, 1985.
[48] Turner, J., and Oakes, P., The Significance of the Social Identity Concept for Social Psychology with Reference to Individualism, Interactionism and Social Influence, *British Journal of Social Psychology, Vol.* 25 (3): 237–252, 1986.
{49] Bryson, J. J., Diamantis, M. E., and Grant, T. D., Of, For and By the People: The Legal Lacuna of Synthetic Persons, *Artificial Intelligence and Law*, Vol. 25, 273-291, 2017.
[50] Solaiman, S. M., Legal Personality of Robots, Corporations, Idols and Chimpanzees: A Quest for Legitimacy, *Artif. Intell. Law*, Vol. 25**,** 155–179, 2017.
[51] Solum, L. B., *Legal Personhood for Artificial Intelligences*, 70 N.C. L. Rev. 1231, 1992.
[52] Basl, J., The Ethics of Creating Artificial Consciousness, *APA Newsletter on Philosophy and Computers*, Vol. 13(1), 23-29, 2013.