

Being ignored is not the only possible form of social exclusion in human-agent interaction

Clarissa Sabrina Arlinghaus

Center for Cognitive Interaction Technology & Work and Organizational Psychology, Bielefeld University,
clarissa_sabrina.arlinghaus@uni-bielefeld.de

Günter W. Maier

Work and Organizational Psychology & Research Institute for Cognition and Robotics, Bielefeld University,
ao-psychologie@uni-bielefeld.de

In a world where humans and technical agents (e.g., robots, AI) work collaboratively, processes of social inclusion and exclusion in human-agent interaction (HAI) gain importance. However, the current focus of social exclusion in HAI is too narrowminded and neglects many forms of social exclusion (e.g., averted eye gazes, microaggressions, hurtful laughter). To change this, the effects of different types of social exclusion will be explored in a series of experiments against the background of William's need-threat model [34]. By doing so, we will test the transferability of the model, build a HAI-specific taxonomy, and derive prevention strategies. We look forward to interdisciplinary discussions about this topic and hope to receive valuable feedback and inspiration for the presented PhD project which has just started a few months ago.

CCS CONCEPTS • Human-centered computing -> Human computer interaction (HCI) -> HCI theory, concepts and models • Human-centered computing -> Collaborative and social computing -> Collaborative and social computing theory, concepts and paradigms -> Computer-supported cooperative work • Human-centered computing -> Collaborative and social computing -> Empirical studies in collaborative and social computing

Additional Keywords and Phrases: social exclusion, human-agent interaction, human-robot collaboration, need-threat

ACM Reference Format:

Clarissa Sabrina Arlinghaus and Günter W. Maier. 2023. Being ignored is not the only possible form of social exclusion in human-agent interaction. In HAI '23: The Importance of Human Factors for Trusted Human-Robot Collaborations, December 04–07, 2023, Gothenburg, Sweden. ACM, New York, NY, USA, 4 pages.

1 INTRODUCTION

Today's working environment is transforming into a hybrid world where humans and technical agents (e.g., AI, robots) are expected to work collaboratively [9, 22, 30]. For example, humans and robots can collaborate in

personnel selection [14, 20, 26] or manufacturing processes [2, 25]. Moreover, AI support teachers during exams [18], journalists during research [1, 4, 29] or physicians with diagnostics [27, 31]. The paradigm “Computers Are Social Actors” (CASA) states that people treat computers like human beings [17]. Unfortunately, this does not only apply to desirable behavior. People abuse robots [11, 12, 21], even in childhood [19, 35, 36]. Robots can be the reason for bullying situations among employees as well as they can initiate workplace bullying themselves [5]. It is also well known that robots [8] or AIs can be biased and therefore discriminate against certain people [13, 23]. While the discussion centers around terms like “abuse,” “bullying,” or “discrimination,” it ignores that these are only some forms of social exclusion. There are also other forms of social exclusion (e.g., dehumanization, microaggressions) which all entail severe consequences (e.g., alienation, depression, helplessness) in the long run [32] but have been neglected in HAI research so far. We will address this research gap by exploring various types of social exclusion in HAI in light of Williams’ famous need-threat model [34] to enhance prosilience and long-term robustness through human-centered design. In order to understand the broadness of social exclusion and to differentiate the forms of social exclusion from each other, a taxonomy is necessary, which we want to develop. We also want to engage in interdisciplinary discussion on how to prevent social exclusion in HAI.

2 RELATED WORK

There are plenty of definitions of “social exclusion” [3], with lack of participation usually being a core aspect [16]. In psychology, we often distinguish between ostracism-based exclusion (e.g., averted eye gaze, ignoring, silent treatment) and rejection-based exclusion (e.g., dehumanization, microaggression, hurtful laughter) [32]. According to Williams’ temporal need-threat model, ostracism triggers need-threat, which is reflected in a decrease in human needs (i.e., belonging, self-esteem, meaningful existence, control). If people’s need-fortification strategies (e.g., compliance, retaliation) fail, severe consequences (e.g., alienation, depression, helplessness) will occur [34]. Williams’ need-threat model [34] was mainly researched with the software “Cyberball” where players can be included or ignored in a virtual ball game [33]. In 120 Cyberball studies, need-threat has been widely demonstrated [7]. Some studies also proved need-threat when ignored by computers [10, 37] or robots [6, 15, 28]. However, other forms of social exclusion like averted eye gazes, micro-agressions, or hurtful laughter have not been explored in HAI yet. Nevertheless, we assume that all forms of social exclusion can cause need-threat and thus potentially harm users. For a safe, robust, inclusive, and trusted HAI, more forms of social exclusion and their consequences should be investigated and prevented during the development of technical agents.

3 OUTLOOK

It is crucial to ensure the (psychological) well-being of users and protect them from potential damage. Ostracism and rejection are just umbrella terms where it remains unclear what subforms play a crucial role in HAI. Perhaps some forms of social exclusion seem more severe in HAI than others. Some forms of social exclusion may not even be perceived as exclusive in HAI. There is a need for an HAI-specific taxonomy of social exclusion that considers human perception during HAI. Therefore, we will explore various forms of social exclusion in HAI in a series of experiments to compare effects, deepen understanding, build a HAI-specific taxonomy, test the transferability of Williams’ need-threat model [34], and derive prevention strategies. For this purpose, we will conduct vignette studies where subjects should imagine one form of social exclusion in HAI settings. We will vary the form of social exclusion and assess the subjects’ needs and need-fortification strategies with questionnaire items.

ACKNOWLEDGMENTS

SAIL [24] is funded by the Ministry of Culture and Science of the North Rhine-Westphalia under the grant no NW21-059A.

REFERENCES

- [1] Maha Abdulmajeed and Nagwa Fahmy. 2023. Meta-analysis of AI Research in Journalism: Challenges, Opportunities and Future Research Agenda for Arab Journalism. In *From the Internet of Things to the Internet of Ideas: The Role of Artificial Intelligence. EAMMIS 2022. Lecture Notes in Networks and Systems, Volume 557*, November 2022. Springer, Cham, 213-225. https://doi.org/10.1007/978-3-031-17746-0_18
- [2] Alexander Arntz, Sabrina C. Eimler, and H. Ulrich Hoppe. 2020. Augmenting the Human-Robot Communication Channel in Shared Task Environments. In *Proceedings of the 26th International Conference of Collaboration Technologies and Social Computing (CollabTech '20)*, September 8 – 11, 2020, Tartu, Estonia. Springer, Cham, 20-34. https://doi.org/10.1007/978-3-030-58157-2_2
- [3] Carsten Kronborg Bak. 2018. Definitions and Measurement of Social Exclusion – A Conceptual and Methodological Review. *Advances in Applied Sociology* 8, 5 (May 2018), 422-443. <https://doi.org/10.4236/aasoci.2018.85025>
- [4] João Canavilhas. 2022. Artificial Intelligence and Journalism: Current Situation and Expectations in the Portuguese Sports Media. *Journalism and Media* 3, 3 (August 2022), 510-520. <https://doi.org/10.3390/journalmedia3030035>
- [5] Premilia D’Cruz and Erenesto Noronha. 2021. Workplace Bullying in the Context of Robotization: Contemplating the Future of the Field. In *Concepts, Approaches and Methods*, January 2021. Springer, Singapore, 293-321. https://doi.org/10.1007/978-981-13-0134-6_22
- [6] Hadas Erel, Yoav Cohen, Klil Shafir, Sara Daniela Levy, Idan Dov Vidra, Tzachi Shem Tov, and Oren Zuckerman. 2021. Excluded by Robots: Can Robot-Robot-Human Interaction Lead to Ostracism? In *Proceedings of the 2021 ACM/IEEE International Conference on Human-Robot Interaction (HRI '21)*, March 8 – 11, 2021, Boulder, USA. ACM, New York, NY, USA, 312-321. <https://doi.org/10.1145/3434073.3444648>
- [7] Chris H. J. Hartgerink, Ilja van Beest, Jelte M. Wicherts, and Kipling D. Williams. 2015. The Ordinal Effects of Ostracism: A Meta-Analysis of 120 Cyberball Studies. *PLOS ONE* 10, 5, Article e0127002 (May 2015), 24 pages. <https://doi.org/10.1371/journal.pone.0127002>
- [8] Tom Hitron, Benny Megidish, Etay Todress, Noa Morag, and Hadas Erel. 2022. AI bias in Human-Robot Interaction: An evaluation of the Risk in Gender Biased Robots. In *Proceedings of the 31st IEEE International Conference on Robot and Human Interactive Communication (RO-MAN '22)*, August 29 – September 02, 2022, Napoli, Italy. IEEE. 1598-1605. <https://doi.org/10.1109/RO-MAN53752.2022.9900673>
- [9] John Howard. 2019. Artificial intelligence: Implications for the future of work. *American Journal of Industrial Medicine* 62, 11 (July 2019), 917-926. <https://doi.org/10.1002/ajim.23037>
- [10] Melissa Jauch, Selma Carolin Rudert, and Rainer Greifeneder. 2022. Social pain by non-social agents: Exclusion hurts and provokes punishment even if the excluding source is a computer. *Acta Psychologica* 230, Article 103753 (September 2022), 19 pages. <https://doi.org/10.1016/j.actpsy.2022.103753>
- [11] Merel Keijsers, Christoph Bartneck, and Friederike Eyssel. 2021. What’s to bullying a bot? Correlates between chatbots humanlikeness and abuse. *Interaction Studies* 22, 1 (September 2021), 55-80. <https://doi.org/10.1075/is.20002.kei>
- [12] Merel Keijsers, Hussain Kazmi, Friederike Eyssel, and Christoph Bartneck. 2021. Teaching Robots a Lesson: Determinants of Robot Punishment. *International Journal of Social Robotics* 13 (December 2019), 41-54. <https://doi.org/10.1007/s12369-019-00608-w>
- [13] Alina Köchling and Marius Claus Wehner. 2020. Discriminated by an algorithm: A systematic review of discrimination and fairness by algorithm decision-making in the context of HR recruitment and HR development. *Business Research* 13 (November 2020), 795-848. <https://doi.org/10.1007/s40685-020-00134-w>
- [14] Lisa Masjutin, Jessica K. Laing, and Günter W. Maier. 2022. Why do We Follow Robots? An Experimental Investigation of Conformity with Robot, Human, and Hybrid Majorities. In *Proceedings of the 17th ACM/IEEE International Conference on Human-Robot Interaction (HRI '22)*, March 7 – 10, 2022, Sapporo, Japan. IEEE. 139-146. <https://doi.org/10.1109/HRI53351.2022.9889675>
- [15] Sara Mongile, Giulia Pusceddu, Francesca Cocchella, Linda Lastrico, Giulia Belgiovine, Ana Tanevska, Francesco Rea, and Alessandra Sciutti. 2023. What if a Social Robot Excluded you? Using a Conversational Game to Study Social Exclusion in Teen-robot Mixed Groups. In *Companion of the 2023 ACM/IEEE International Conference on Human-Robot Interaction (HRI '23)*, March 13 – 16, 2023, Stockholm, Sweden. ACM, New York, NY, USA, 208-212. <https://doi.org/10.1145/3568294.3580073>
- [16] Craig Morgan, Tom Burns, Ray Fitzpatrick, Vanessa Pinfeld, and Stefan Priebe. 2007. Social exclusion and mental health. Conceptual and methodological review. *British Journal of Psychiatry* 191, 6 (December 2007), 477-483. <https://doi.org/10.1192/bjp.bp.106.034942>
- [17] Clifford Nass, Jonathan Steuer, and Ellen R. Tauber. 1994. Computers are social actors. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '94)*, April 24 – 28, 1994, Boston, Massachusetts. ACM, New York, NY, USA, 72-78. <https://doi.org/10.1145/191666.191703>
- [18] Aditya Nigam, Rhitvik Pasricha, Tarishi Singh, and Prathamesh Churi. 2021. A Systematic Review on AI-based Proctoring Systems: Past, Present and Future. *Education and Information Technologies* 26 (June 2021), 6421-6445. <https://doi.org/10.1007/s10639-021-10597-x>
- [19] Tatsuya Nomura, Takayuki Kanda, Hiroshi Kidokoro, Yoshitaka Suehiro, and Sachie Yamada. 2016. Why do children abuse robots? *Interaction Studies* 17, 3 (January 2016), 348-370. <https://doi.org/10.1075/is.17.3.02nom>

- [20] Sladjana Nørskov, Malene F. Damholdt, John P. Ullhøi, Morten Berg Jensen, Mia Krogager Mathiasen, Charles M. Ess, and Johanna Seibt. 2022. Employers' and applicants' fairness perceptions in job interviews: using a teleoperated robot as a fair proxy. *Technological Forecasting and Social Change* 179, Article 121641 (April 2022), 18 pages. <https://doi.org/10.1016/j.techfore.2022.121641>
- [21] Jo Ann Oravec. 2023. Rage against robots: Emotional and motivational dimensions of anti-robot attacks, robot sabotage, and robot bullying. *Technological Forecasting and Social Change* 189, Article 122249 (April 2023). <https://doi.org/10.1016/j.techfore.2022.122249>
- [22] Sonja K. Ötting, Lisa Masjutin, Jochen J. Steil and Günter W. Maier. 2020. Let's Work Together: A Meta-Analysis on Robot Design Features That Enable Successful Human-Robot Interaction at Work. *Human Factors: The Journal of Human Factors and Ergonomics Society* 64, 6 (November 2020), 1027-1050. <https://doi.org/10.1177/0018720820966433>
- [23] Dana Pessach and Erez Shmueli. 2021. Improving fairness of artificial intelligence algorithms in Privileged-Group Selection Bias data settings. *Expert Systems With Applications* 185, Article 115667 (December 2021), 14 pages. <https://doi.org/10.1016/j.eswa.2021.115667>
- [24] SAIL. 2023. SAIL - Sustainable Life-cycle of Intelligent Socio-Technical Systems. Retrieved from <https://www.sail.nrw/>
- [25] Alision Sauppé and Bilge Mutlu. 2015. The Social Impact of a Robot Co-Worker in Industrial Settings. In *Proceedings of the 33rd Annual Conference on Human Factors in Computing Systems (CHI '15)*, April 18 – 23, 2015, Seoul, Korea. ACM, New York, NY, 3613-3622. <https://doi.org/10.1145/2702123.2702181>
- [26] Jessica Schick and Sebastian Fischer. 2021. Dear Computer on My Desk, Which Candidate Fits Best? An Assessment of Candidates' Perception of Assessment Quality When Using AI in Personnel Selection. *Frontiers in Psychology* 12, Article 73911 (October 2021), 11 pages. <https://doi.org/10.3389/fpsyg.2021.739711>
- [27] Michaela Soellner and Joerg Koenigstorfer. 2021. Compliance with medical recommendations depending on the use of artificial intelligence as a diagnostic method. *BMC Medical Informatics and Decision Making* 21, Article 236 (August 2021), 11 pages. <https://doi.org/10.1186/s12911-021-01596-6>
- [28] Sharon Ewa Spisak and Bipin Indurkha. 2023. A Study on Social Exclusion in Human-Robot Interaction. *Electronics* 12, Article 1585 (March 2023), 17 pages. <https://doi.org/10.3390/electronics12071585>
- [29] Jonathan Stray. 2019. Marking Artificial Intelligence Work for Investigative Journalism. *Digital Journalism* 7, 8 (July 2019), 1076-1097. <https://doi.org/10.1080/21670811.2019.1630289>
- [30] Weiyu Wang and Keng Siau. 2019. Artificial Intelligence, Machine Learning, Automation, Robotics, Future of Work and Future of Humanity: A Review and Research Agenda. *Journal of Database Management* 30, 1 (January 2019), 61-67. <http://dx.doi.org/10.4018/JDM.2019010104>
- [31] Edmund M. Weisberg, Linda C. Chu, and Elliot K. Fishman. 2020. The first use of artificial intelligence (AI) in the ER: triage not diagnosis. *Emergency Radiology* 27 (July 2020), 361-366. <https://doi.org/10.1007/s10140-020-01773-6>
- [32] Eric D. Wesselmann, Michelle R. Grzybowski, Diana M. Steakley-Freeman, Eros R. DeSouza, John B. Nezelek, and Kipling D. Williams. 2016. Social Exclusion in Everyday Life. In *Social Exclusion*, July 2016. Springer, Cham, 3-23. https://doi.org/10.1007/978-3-319-33033-4_1
- [33] Kipling D. Williams and Blair Jarvis. 2006. Cyberball: A program for use in research on interpersonal ostracism and acceptance. *Behavior Research Methods* 38, 1 (February 2006), 174-180. <https://doi.org/10.3758/BF03192765>
- [34] Kipling D. Williams. 2009. Ostracism: A Temporal Need-Threat Model. In *Advances in Experimental Social Psychology, Volume 41*, March 2009. Elsevier Academic Press, 275-314. [https://doi.org/10.1016/S0065-2601\(08\)00406-1](https://doi.org/10.1016/S0065-2601(08)00406-1)
- [35] Sachie Yamada, Takayuki Kanda, and Kanako Tomita. 2023. Process of Escalating Robot Abuse in Children. *International Journal of Social Robotics* 15 (April 2023), 835-853. <https://doi.org/10.1007/s12369-023-00987-1>
- [36] Sachie Yamada, Takayuki Kanda, and Kanako Tomita. 2020. An Escalating Model of Children's Robot Abuse. In *Proceedings of the 2020 ACM/IEEE International Conference on Human-Robot Interaction (HRI '20)*, March 23-26, 2020, Cambridge, United Kingdom. ACM, New York, NY, 191-199. <https://doi.org/10.1145/3319502.3374833>
- [37] Lisa Zadro, Kipling D. Williams, and Rick Richardson. 2004. How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem and meaningful existence. *Journal of Experimental Social Psychology* 40, 4 (February 2004), 560-567. <https://doi.org/10.1016/j.jesp.2003.11.006>