Improving Evaluations of Advanced Robots by Depicting Them in Harmful Situations – Study 1 (#71317)

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1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
According to prior research, users tend to evaluate robots with emulated feelings (i.e., experience) more negatively than robots without sophisticated mental abilities (tool robots). In our planned study, we investigate a potential way to mitigate these negative user responses. More specifically, previous studies have suggested that depicting robots in harmful situations (e.g., physically harming them) may evoke empathy among observers, which, in turn, seems to be connected to more positive user evaluations.

Thus, the planned online experiment will compare user evaluations of robots with or without mind (factor: robot mind) which are presented in either a harmful or a neutral situation (factor: situation). We anticipate that the negative evaluations of robots with mind (vs. without mind) can be reduced or even reversed if the robots are exposed to a harmful treatment. Empathy is considered to serve as a mediating variable.

H1a (main effect situation): A robot shown in a harmful situation evokes more likeability than a robot shown in a neutral situation.
H1b: This effect is mediated by participants' empathy.

H2a (interaction effect): If shown in a neutral situation, a robot without mind evokes more likeability than a robot with mind. This effect is reduced, nullified, or reversed if the robot is shown in a harmful situation.
H2b: This effect is mediated by participants' empathy (moderated mediation).

3) Describe the key dependent variable(s) specifying how they will be measured.
Likeability, Godspeed-Questionnaire, Bartneck et al. (2009)
Bipolar, ranging from 1 to 5
- Dislike – like
- Unfriendly – friendly
- Unkind – kind
- Unpleasant – pleasant
- Awful – nice

State empathy scale:
inspired by Oswald (1996):
Ranging from 1 (does not at all describe how I feel) to 5 (describes how I feel extremely well)
How does this robot make you feel?
- Empathic
- Compassionate
- Softhearted

References:
Bartneck, C., Kulić, D., Croft, E., & Zoghbi, S. (2009). Measurement instruments for the anthropomorphism, animacy, likeability, perceived intelligence, and perceived safety of robots. International Journal of Social Robotics, 1(1), 71-81. https://doi.org/10.1007/s12369-008-0001-3
Oswald, P. A. (1996). The effects of cognitive and affective perspective taking on empathic concern and altruistic helping. The Journal of Social Psychology, 136(5), 613-623. https://doi.org/10.1080/00224545.1996.9714045

4) How many and which conditions will participants be assigned to?
An online study will be conducted to test our hypotheses, using a 2×2 between-subject design.
First, we will randomly assign participants to one of two "robot mind" conditions and present them with an according text vignette:
- Tool robot: The text describes the robot as a tool robot that can assist users with daily life chores, while lacking any elaborate mental capabilities
- Mind robot: The text describes the robot as being able to feel and think (combination of the factors experience and agency, Gray et al., 2007), which is facilitated by complex artificial intelligence

Second, participants will be randomly assigned to view one of two different video recordings of the robot (factor "situation"):
- Harmful situation: The video shows the robot as it attempts to pick up a box; doing so, it is repeatedly stopped by a human, who uses a hockey stick to poke the robot and push the box out of its reach
- Neutral situation: The video shows the robot successfully packing boxes into a shelf and walking around

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
Interactions, associations, and conditional indirect effects will be tested by using the SPSS-PROCESS-Makro (Hayes), bootstrapping analyses, 5000 iterations.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We conduct outlier analyses for the time that was needed to complete the questionnaire and exclude all participants with a response time that indicates careless responding. Participants who do not have sufficient English skills will be excluded: We will ask participants to describe the topic of the study in a few words; failing this task will lead to the exclusion from our analyses. A comparison between entered age and year of birth should not deviate by more than three years. As another attention check we will ask what this study was about in a multiple-choice answer format (innovative robots, climate change or presidential election). If participants indicate that they did not realize the hockey stick teasing the robot even though it was shown or report to have seen the hockey stick even though they were assigned to the neutral situation, we will also exclude them from the analysis. Participants must select the abilities of the robot about which they have been informed; participants who interchange the mind robot and the tool robot will also be excluded.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
In prior research, the effect of mind (experience vs. tool condition) on eeriness amounted to
d = 1.05 (Appel et al., 2020, Experiment 2). The lower bound of the 60% confidence interval (Perugini et al., 2014) was d = 0.89. We expected that the effect of the robot introduction could be smaller in our design, given the presentation of robot videos after the introduction, before the DVs. Thus, we determined the focal effect size to be d = .60.
A power analysis with G*Power (Faul et al., 2007) left us with an aspired sample size of 64 for a two-group main effect (two-tailed independent t-test, power = .80, alpha-error-probability = .05). To account for the more complex design and the power needed to identify an interaction effect, we multiplied this sample size with factor 8 (Giner-Sorolla, 2018; Simonsohn, 2014), leading to a proposed sample size of 512. We will ask 650 persons of the MTurk pool to participate in our online experiment, to guarantee enough power and to have a buffer if careless responding occurs.

References:
Appel, M., Izydorczyk, D., Weber, S., Mara, M., & Lischetzke, T. (2020). The uncanny of mind in a machine: Humanoid robots as tools, agents, and experiencers. Computers in Human Behavior, 102, 274-286. https://doi.org/10.1016/j.chb.2019.07.031
Giner-Sorolla, R. (2018, January 24). Powering your interaction. Approaching significance. https://approachingblog.wordpress.com/2018/01/24/powering-your-interaction-2/
Perugini, M., Gallucci, M., & Costantini, G. (2014). Safeguard power as a protection against imprecise power estimates. Perspectives on Psychological Science, 9(3), 319-332. https://doi.org/10.1177/1745691614528519
Simonsohn, U. (2014, March 12). [17] No-way interactions. Data Colada. http://datacolada.org/17

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
Exploratory analyses will be conducted to test whether there is a difference in the evaluation of robots depending on the participants' gender and age.