

Described robot functionality impacts emotion experience attributions

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Abstract. This work tested whether attributions of emotional experience vary with the perceived functionality of robots. When robots were described in terms of their social value, participants assigned greater levels of emotional experience compared to when robots merely seemed to fulfil economic needs. However, increased perceptions of experience elicited more uncomfortable feelings in observers, apparently tapping into the uncanny valley. Implications for the use of social robots and human responses to feeling machines are discussed.

1 INTRODUCTION

Research suggests that mind perception is necessary to explain differences in how we perceive and respond to humans and machines (e.g. [1]). Robots possess agency (i.e. memory, planning), but capacity to feel and sense is seen as uniquely human [2]. The purposes served by robots have been developed independently from these two dimensions of perceived mind [3]. Some are built to increase work efficiency and bring financial profits (i.e. fulfil economic functions), while others provide companionship and social support (i.e. fulfil social functions [4]). Although robots do not possess capacity for emotional experience as defined by biological principles, their perceived function could imply different types of mind. Given that social functions centre on traits such as caring, benevolence and communality, it was hypothesised that robots with ascribed social value will be attributed higher levels of experience and emotions than those with economic value. However, increased perceptions of experience (rather than agency) could lead to humans feeling unnerved and uneasy [5, 1].

2 EXPERIMENT

Short text-based descriptions were developed that emphasised either the social value (i.e. social support and companionship that robots bring to human society) or the economic value (i.e. financial benefits and profits that robots bring to the corporate world) of robots. Pilot-testing ($N = 36$) revealed that robots that accomplish social goals were rated higher in social value ($M = 58.1$ vs. $M = 13.2$) but lower in economic value ($M = 34.7$ vs. $M = 78.5$) than those that meet financial goals, $ps < .0001$.

In the present study, participants ($N = 107$) evaluated robots that varied in described functionality (social vs. economic) with respect to their capacity for a) emotional experience (i.e. experience emotions, have feelings, and be emotional, $as \geq .88$) and b) agency (i.e., exercise self-control, think analytically, and

be rational, $as \geq .92$). Participants also indicated the extent to which they felt uncomfortable towards robots of each type (i.e., uneasy and unnerved, $as \geq .89$). All responses were made on 100-point scales ranging from 0 (*not at all*) to 100 (*very much*).

3 RESULTS

In general, robots were rated to possess more agency ($M = 40.2$, $SD = 29.7$) than emotional experience ($M = 12.5$, $SD = 12.4$), $F(1, 106) = 113$, $p < .001$, $\eta_p^2 = 0.515$. Central to the claim of the current study, a significant interaction between the robot's described functionality and the type of inferred mind was obtained, $F(1, 106) = 91.5$, $p < .001$, $\eta_p^2 = 0.463$. As can be seen in Figure 1, participants attributed greater emotional experience to robots with apparent social than economic value, $p < .001$. In contrast, agency attributions were unaffected by perceived robot functionality, $p = .210$.

Robots with social value ($M = 32.7$, $SD = 29.8$) elicited more uncomfortable feelings in participants than those meeting economic needs ($M = 6.80$, $SD = 12.8$), $F(1, 106) = 101$, $p < .001$, $\eta_p^2 = 0.487$. Further analysis revealed that feelings of discomfort were positively related to the perceived emotional experience of the robot, $r(214) = .467$, $p < .001$, but not inferred agency, $r(214) = -.047$, $p = .495$, thereby replicating the findings of Gray and Wegner [1].

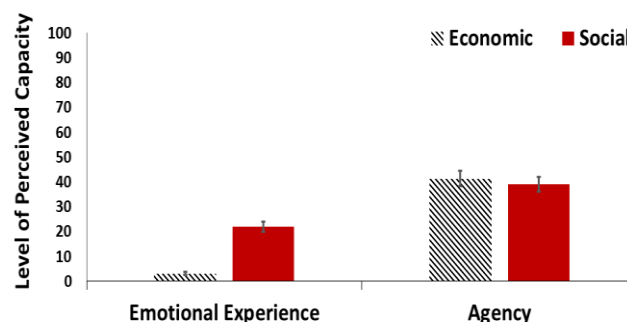


Figure 1. Mind attribution to robots of different functionality. Error bars represent $\pm 1 SE$.

4 CONCLUSION

Although advances have been made in producing artificial entities with increasingly humanlike appearance and behaviour [4], robots are still not perceived and treated in the same manner as humans. This gap may result from the perception of lack of emotions and fundamental experiences, which are essential

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human features [1, 6]. The current research showed that the described function of a robot, independent from physical appearance and prior interaction, drives users' perception. Robots with apparent social value (capacity to provide social support and companionship) were seen to possess greater emotional experience than those with economic value. In theory, higher perceived emotional ability should make robots suitable for human interaction in social settings [7]. Interestingly, the present research demonstrated that increased perceptions of experience led to stronger feelings of discomfort, a finding consistent with work by Gray & Wegner [1]. Adding social value therefore appears to make robots subject to the uncanny valley [5], violating deep-rooted expectations about what type of mind robots should or should not possess.

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