Embodiment, Privacy, and Social Robots:

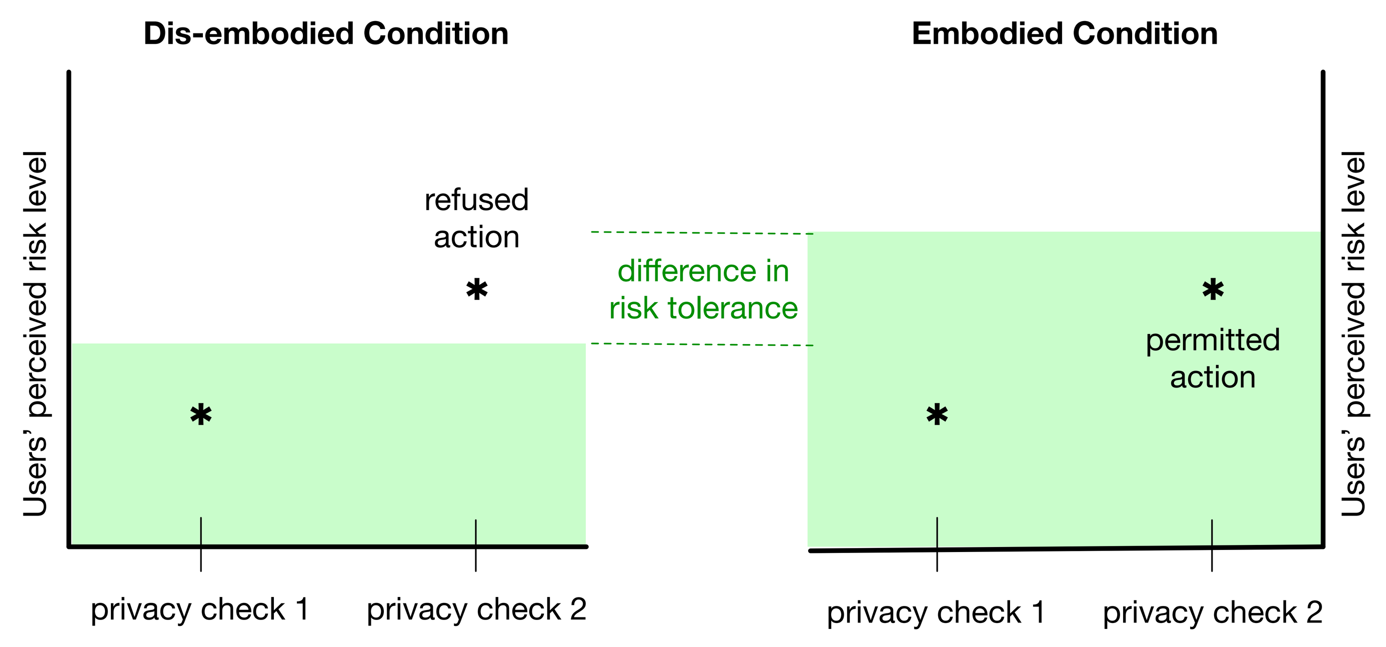
May I remember you?

How much more private information are people willing to share with a social robot versus an impersonal machine?

Hypothesis

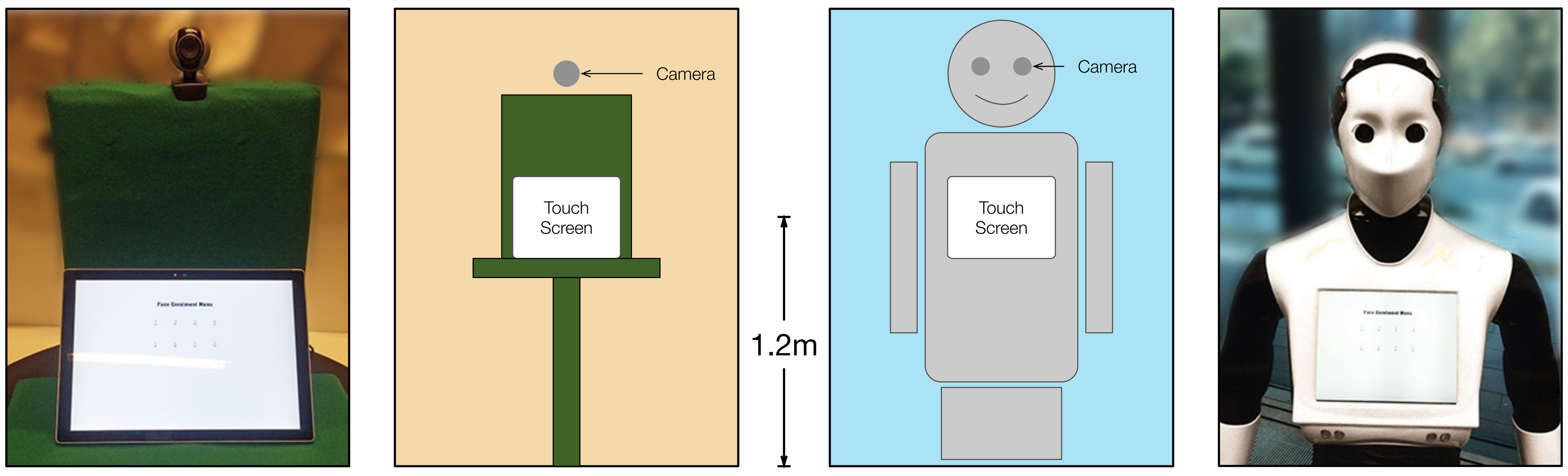
We expect a social robot to increase users' risk tolerance "comfort zone" when asking for private information and collect, on average, more positive responses during two privacy checks.

We consider two independent variables: *embodiment* and *transparency*.



Our experiment measures participant responses to two privacy checks:
a request to enrol in a face-recognition system, and a request to connect on social media.

Setting



Dis-Embodied condition

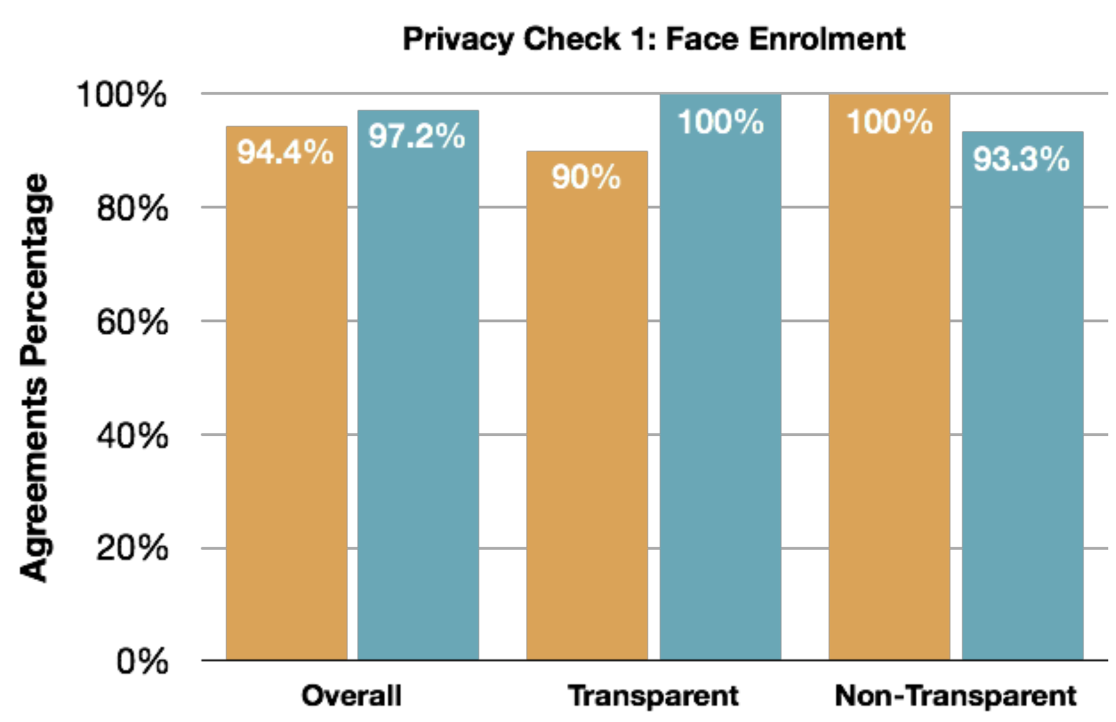
Participants interacted with a tablet connected to a webcam. The tablet has the same dimensions as the robot's monitor and it was situated at the same height. The graphical user interface used on the tablet was exactly the same as the one used on the robot's monitor.

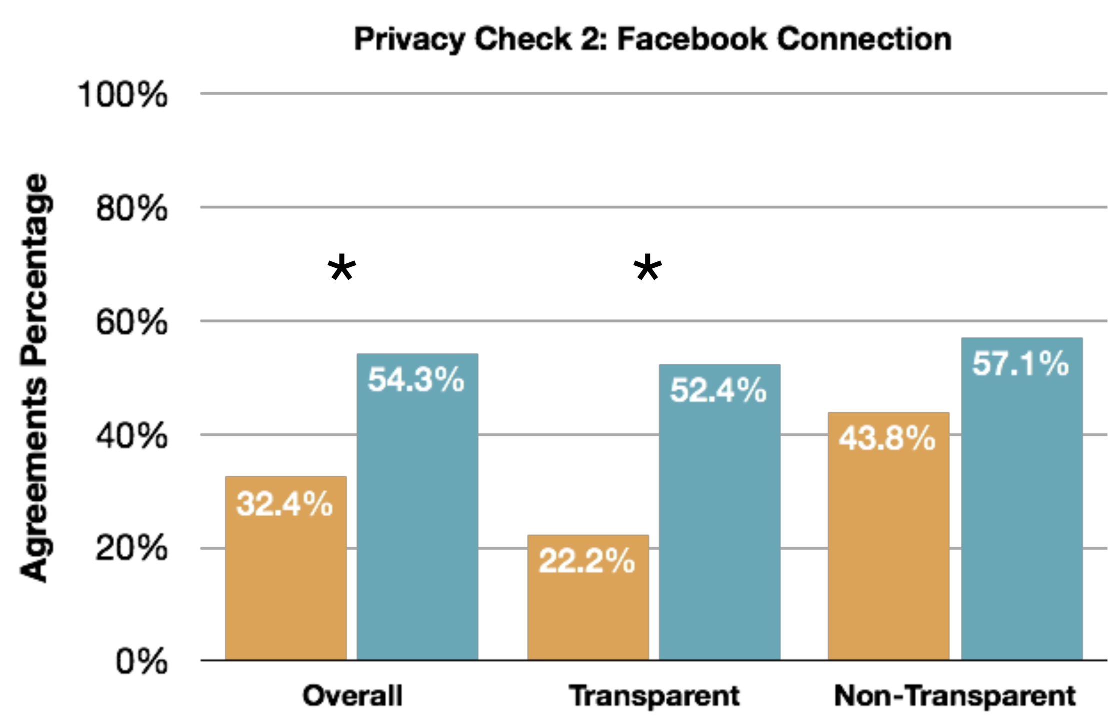
Embodied condition

Participants interacted with a REEM robotic platform, a wheel-based adult sized humanoid robot. Built into the front of the robot at chest height is a touch screen, which is used during the experiment to display the graphic user interface of the face enrolment system. The robot communicated with the user through gestures, speech, and text on its monitor. The user interacted with the robot by touching the screen.

Results

Dis-Embodied · Embodied





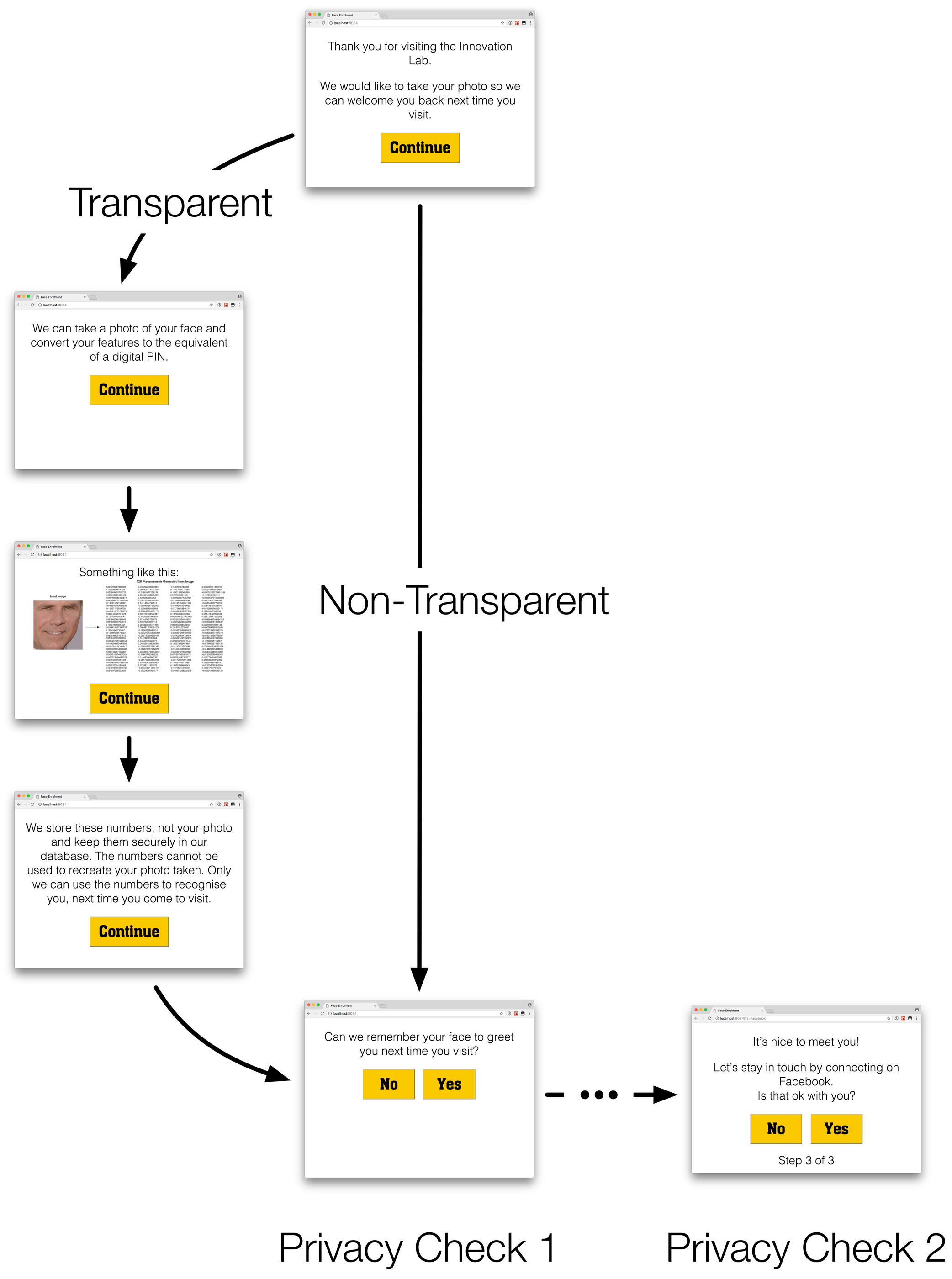
We did not find any significant effects between embodied and dis-embodied systems for the overall results (p-value = .554, z-value = -0.59), transparent condition (p-value = .136, z-value = -1.49), and non-transparent condition (p-value = .301, z-value = 1.04). This was aligned to our expectations.

We found a significant effect between embodied and dis-embodied systems for the overall results (p-value = .059, z-value = -1.89) and for the transparent condition (p-value = .040, z-value = -2.06) having small effect sizes (respectively d = 0.22 and d = 0.32).
We did not find significant effects between embodied and dis-embodied systems for the non transparent condition (p-value = .460, z-value = -0.74).

Primary Task

The primary task chosen for users was to evaluate the user experience of our face enrolment system. Users were requested to interact with the face enrolment system after having a quick tour of the bank's innovation lab. Then, they were asked to provide their evaluation via the User Experience Questionnaire on an iPad. This background story was necessary to divert the focus of the participants from privacy research and avoid priming the participants.

Both positive and negative answers completed the experiment without proceeding with an actual Facebook login and connection. We discarded 9 participants who did not have a Facebook account and analysed the remaining 72 participants.



Transparent and Non-Transparent conditions

The transparent conditions differed from the non-transparent conditions by additional stages of the interaction informing the user about the face recognition algorithm used, how the data were recorded and stored, and legal privacy policies followed by the bank to store the private information.

Conclusions

We demonstrated that an embodied system collects significantly more private information compared to a dis-embodied system. We suggest that this phenomenon can be due by an increase of user's risk tolerance, which in turn leads to less privacy concerns in users. These results are more impressive when considering that the extra information gathered from users (*i.e.* Facebook connection) was unrelated to the service provided by the system (*i.e.* face recognition). Therefore, our findings advise that social robotic platforms may enable greater information collection when soliciting personal information. Hence, further regulations should be specifically considered to protect the interests of users, while still allowing them to benefit from services provided by social robots.

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