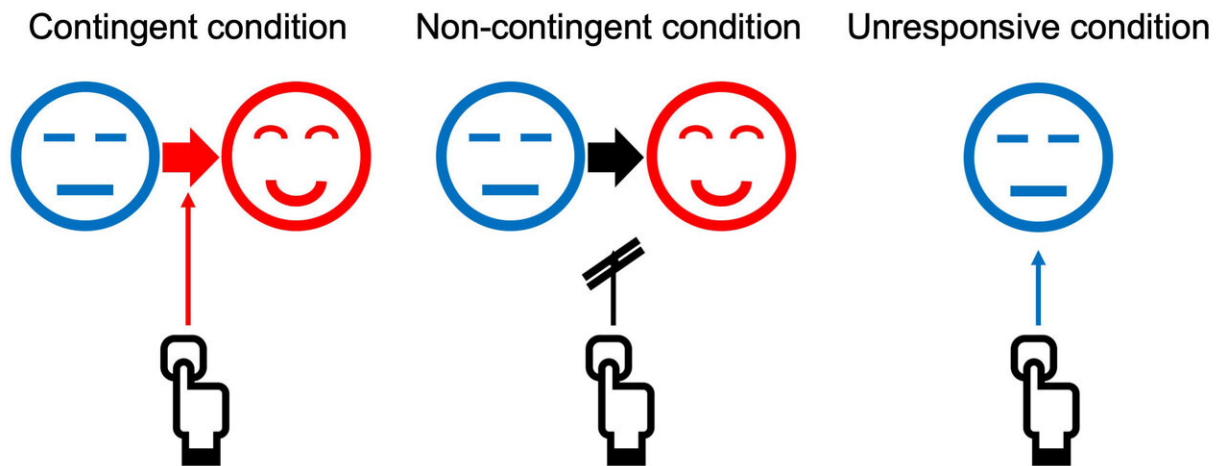


Do you feel the other closer to you when she/he contingently responds to your action?

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Schematic of the contingency conditions. The faces were photographs of a real person in the experiments. In the contingent condition, the pressing of a button caused a smiling face to appear. In the non-contingent condition, the face randomly smiled. In the unresponsive condition, the face remained neutral even though the participant pressed the button. Credit: Toyohashi University Of Technology.

Professor Atsushi Sato of the University of Toyama and Ai Matsuo, a researcher at The Open University of Japan, in cooperation with Professor Michiteru Kitazaki of Toyohashi University of Technology have found that social contingency modulates one's perceptual representation of the environment. Volunteer participants who were

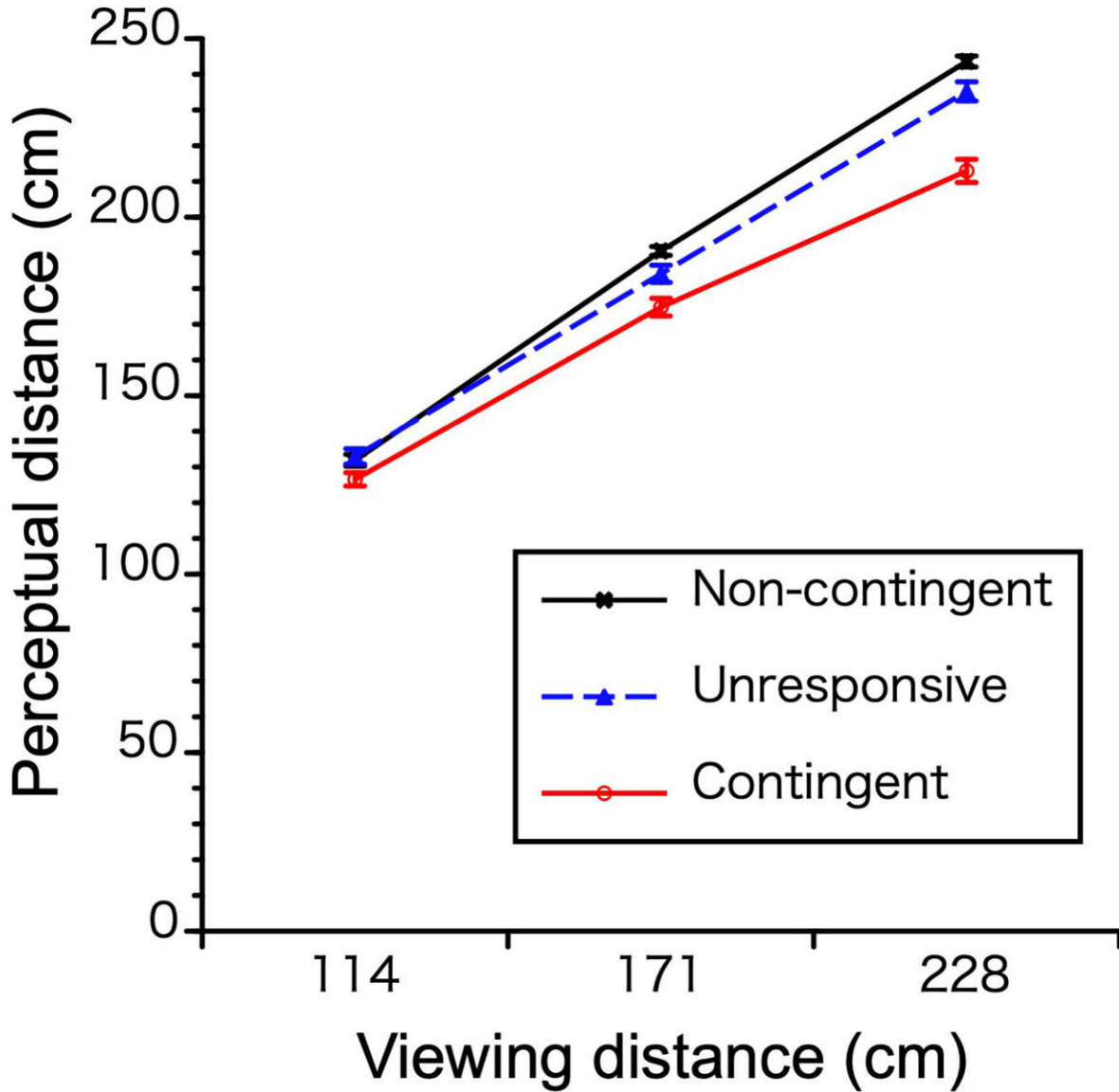
given the ability to display an image of a smiling person with the press of a button were found to perceive an afterimage of the same person, but with a neutral expression, to be smaller than participants who were unable to display the image of a smiling person with the press of a button. Thus, when the participant's intentional action affects the other's reaction, the perceptual distance between self and other will shorten.

Social contingency, namely the contingent reactions of the other to one's own actions, is important for attachment formation and enhancement, and for the development of social cognition. Thus, social contingency is a critical factor in our social distance. It is known that [body size](#), motivation, action capability, and controllability affect the perceived distance between the self and objects/others. However, it is not clear whether social contingency directly modulates the perceived distance between self and other.

Recently, a research team from the Faculty of Human Development at the University of Toyama, in collaboration with the Department of Computer Science and Engineering from Toyohashi University of Technology, designed an experimental method to investigate the effect of social contingency on perceptual distance by measuring the size of an afterimage online.

Sixty-six volunteer participants were assigned to one of three conditions in the manipulation phase (Figure 1). In the contingent condition, each participant was shown a photograph of a neutral female face. This photograph changed to a photograph of a smiling face after the participant pressed a button provided to them by the researchers. In the non-contingent condition, the neutral face changed to the smiley face at random times, irrespective of the participant's button-pressing. In the unresponsive condition, the neutral face was constantly presented although participants pressed the button in the same manner as in the other conditions. One hundred trials were performed in the manipulation

phase.



Estimated perceptual distance as a function of viewing (physical) distance and the conditions. Credit: Toyohashi University Of Technology.

In the following test phase, participants observed the neutral face for 30 seconds at a viewing distance of 57cm, and were presented with an afterimage projected on a screen at three different viewing distances: 114, 171, and 228 cm. The perceived size of the afterimage increased with the viewing distance. It was basically consistent with Emmert's law.

Participants who were able to manipulate the presentation of the smiley face through the pressing of the button (the contingent condition) perceived the afterimage to be smaller than participants who were exposed at random to the smiley face (the non-contingent condition) or the constantly neutral face (the unresponsive condition). Figure 2 shows the perceptual distance that was mathematically calculated according to Emmert's law. The perceptual distance was shorter for those who were able to manipulate the presentation of the smiley face with their button press (the contingent condition) than for those placed in the other conditions, and this effect increased with physical distance.

Professor Atsushi Sato, the leader of the research team at the University of Toyama said, "Previous studies are criticized for not showing the true top-down effects on perception because of pitfalls such as an inability to disentangle post-perceptual judgment from actual online perception, task demands, and differences in the low-level visual features of the stimuli across experimental conditions. Our method of using a perceptual mechanism of size constancy can avoid such pitfalls and test directly the effect of social contingency on online perception."

Professor Michiteru Kitazaki, a perceptual psychologist at Toyohashi University of Technology explained, "The present study suggests that the social [contingency](#) can modulate the [distance](#) between self and other in a perceptual processing level that is automatic and nearly independent of our knowledge. Thus, social cognition seems more implicit than expected, and crucially connected to low-level perceptual processing in the brain."

Do you feel the other closer to you when she/he contingently responds to your action? The findings tell us that it is not just your false belief, but it is based on your automatic perception.

More information: Atsushi Sato et al, Social contingency modulates the perceived distance between self and other, *Cognition* (2019). [DOI: 10.1016/j.cognition.2019.06.018](https://doi.org/10.1016/j.cognition.2019.06.018)

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