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PRESS RELEASE
Source: Toyohashi University of Technology, Japan, Committee for Public Relations
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Release Title: Humans can empathize with robots

Release Subtitle: Neurophysiological evidence for human empathy toward robots in perceived pain

Release Summary Text: Toyohashi Tech researchers in cooperation with researchers at Kyoto University have presented the first neurophysiological evidence of humans' ability to empathize with a robot in perceived pain. Event-related brain potentials in human observers, reflecting empathy with humanoid robots in perceived pain, were similar to those for other humans in pain, except at the beginning of the top-down process of empathy. This difference may be caused by humans' inability in taking a robot's perspective.

Full Text of Release:
Empathy is a basic human ability. We often feel empathy toward and console others in distress. Is it possible for us to emphasize with humanoid robots? Since robots are becoming increasingly popular and common in our daily lives, it is necessary to understand our interaction with robots in social situations.

However, it is not clear how the human brain responds to robots in empathic situations.

Now, researchers at the Department of Information Science and Engineering, Toyohashi University of Technology in collaboration with researchers at the Department of Psychology, Kyoto University have found the first neurophysiological evidence of humans' ability to empathize with robots in perceived pain and highlighted the difference in human empathy toward other humans and robots.

They performed electroencephalography (EEG) in 15 healthy adults who were observing pictures of either a human or robotic hand in painful or non-painful situations, such as a finger being cut by a knife. Event-related brain potentials for empathy toward humanoid robots in perceived pain were similar to those for empathy toward humans in pain. However, the beginning of the top-down process of empathy was weaker in empathy toward robots than toward humans.

"The ascending phase of P3 (350–500 ms after the stimulus presentation) showed a positive shift in the observer for a human in pain in comparison with the no-pain condition, but not for a robot in perceived pain. Then, the difference between empathy toward humans and robots disappeared in the descending phase of P3 (500–650 ms)", explains Associate Professor Michiteru Kitazaki, "The positive shift of P3 is considered as reflecting the top-down process of empathy. Its beginning phase seems related to the process of perspective taking, as was shown in a previous study."

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These results suggest that we empathize with humanoid robots in a similar fashion as we do with other humans. However, the beginning of the top-down process of empathy is weaker for empathy toward robots than toward humans. It may be caused by humans' inability in taking a robot's perspective.

It is reasonable that we cannot take the perspective of robots because their body and mind (if it exists) are very different from ours. The researchers are trying to manipulate humans' perspective taking of robots in a further study. This study will contribute to the development of human-friendly robots whom we feel sympathy for and comfortable with.

Reference:
Suzuki, Y., Galli, L., Ikeda, A., Itakura, S. and Kitazaki, M. (2015). Measuring empathy for human and robot hand pain using electroencephalography. Scientific Reports, 5:15924; doi: 10.1038/srep15924

Figure 1:
A human and a robot in a social situation.

Figure 2:
Examples of pictures of humans and robots in pain/perceived pain.

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