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Dataset construction and analysis for both empathy types

Measuring cognitive and affective empathy

Abstract

Empathy involves both cognitive empathy, understanding another person's feelings, and affective empathy, physically resonating with them, yet their relationship remains poorly understood because datasets capturing both are scarce. In this study, we simultaneously measured subjective ratings of emotional intensity and physiological responses such as heart rate from both senders and receivers, and analyzed their links. To enable this, we built a unique multimodal dataset containing time-series ratings and physiological signals from both actors and observers. Our analyses showed that receivers with a stronger perspective-taking tendency understood emotions more accurately, while their physiological responses were less likely to synchronize with those of the sender; this pattern also varied by emotion type. By separately measuring these two forms of empathy, this work could support dialogue assistance, remote stress-sign detection, and burnout support.

Two types of empathy

Cognitive empathy

Understanding another person's emotion with the mind

Affective empathy

Another person's emotion "spreads" to the body

Sample images created by generative AI

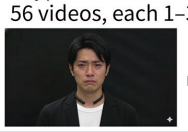
Their distinct mechanisms require separate treatment.

Dataset constructed for a multifaceted understanding of two types of empathy

Dataset HP

Sender (empathizee)

- 8 professional actors
- 7 types of emotions
- 56 videos, each 1–3 min long



Sample image created by generative AI. Real videos were actually used.

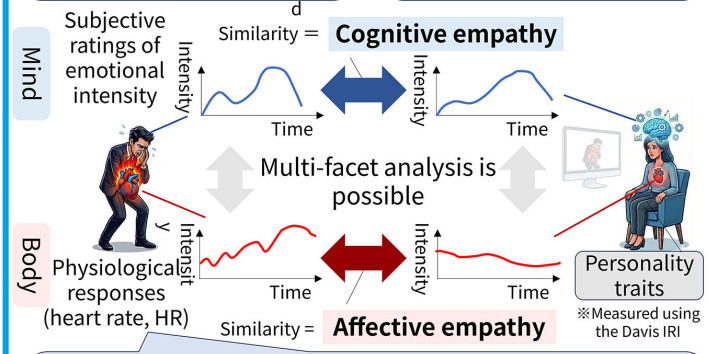
Published

Receiver (empathizer)

Experiment 1
- 12 participants (6 per video)
- Emotion category unknown

Experiment 2
- 87 participants (43 per video)
- Emotion category known

To be released in the future



Advantages of using actors

Strong emotions can be reproduced more stably, and clear sender-side ratings and physiological responses can be obtained, making it easier to capture differences between the two types of empathy and individual differences among receivers.

What the data analysis revealed

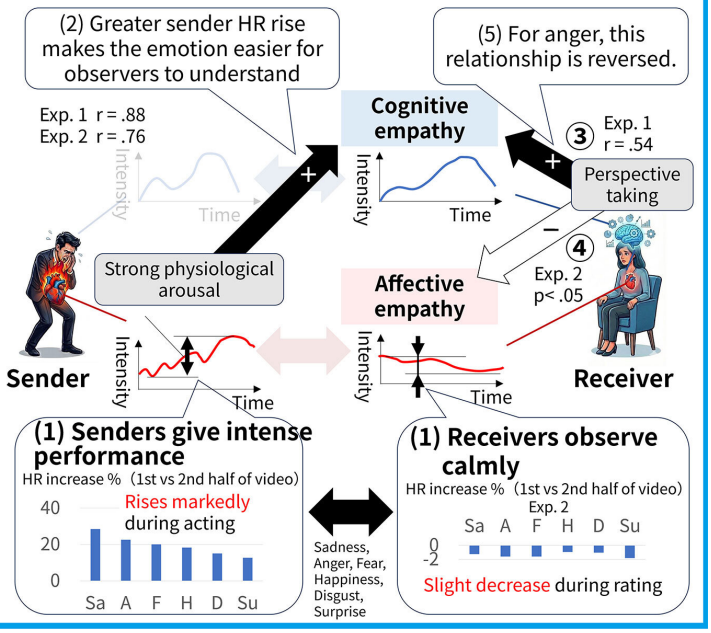
Overall Trend

Senders' intense performance and the receivers' calm observation support accurate emotion understanding

(1) Senders' HR increases during acting, while receivers' HR slightly decreases during rating (viewing).
(2) More intense sender performance leads to more accurate emotion understanding in receivers.

Influence of Individual's Personality Traits

Trade-off between "understanding" and "catching" emotions.
Receivers with a stronger tendency to take another person's perspective (measured by questionnaire):
(3) understand emotions more accurately, while
(4) their physiological responses differ more from those of the sender. However,
(5) for anger, this relationship is reversed.



References

[1] A. Ota, S. Kumano, A. Murata, A. Nakane, S. Shimizu, "EMPAC: A Multimodal Dataset for Bridging Affective and Cognitive Empathy," *Frontiers in Psychology* (under review), *bioRxiv.*
[2] A. Ota, H. Kuze, A. Nakane, S. Kumano, A. Murata, S. Shimizu, "Evaluating Empathy from Cognitive and Affective Perspectives Using Empathic Video Stimuli," The Institute of Electronics, Information and Communication Engineers HCG Symposium 2024, 2024.

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