

# The RoPE Scale

## a Measure of How Empathic a Robot is Perceived

Laurianne Charrier<sup>1,2</sup>, Alisa Rieger<sup>1,2</sup>, Alexandre Galdeano<sup>1,2</sup>, Amélie Cordier<sup>2</sup>, Mathieu Lefort<sup>1</sup>, Salima Hassas<sup>1</sup>

lcharrier@liris.cnrs.fr, alisa.rieger@hoomano.com, agaldean@liris.cnrs.fr, amelie.cordier@hoomano.com, mlefort@liris.cnrs.fr, shassas@liris.cnrs.fr

<sup>1</sup>Univ Lyon, Université Lyon 1, CNRS, LIRIS, F-69621, VILLEURBANNE, France

<sup>2</sup>Hoomano, 20 Boulevard Eugene Deruelle, 69003, LYON, France

\*This research was supported by the French Agence Nationale de la Recherche (ANR) contract ANR-16-LCV2-0003-01, and by the French Association Nationale de la Recherche et de la Technologie (ANRT) contract 2017/0226.

### CONTEXT: A NEED FOR A ROBOT PERCEIVED EMPATHY METRIC

- ▶ Several human-human perceived empathy metrics in literature
- ▶ No **standardized** and validated questionnaires for robot's perceived empathy
- ▶ Mostly homemade questionnaires or few questions
- ▶ There is a real need in HRI for a **validated questionnaire** of how empathic a robot is perceived

### EMPATHY IN THIS STUDY

- ▶ Empathy is a complex process whereby one understands and/or shares one's emotional state and/or mental states
- ▶ Focus on the **empathic understanding** and its **communication**

### PREVIOUS WORK

- ▶ A pilot study to find some interesting metrics of human-robot interaction evaluation (Charrier, Galdeano, Cordier, & Lefort, 2018)
- ▶ Measure of perceived empathy with a human-human metric
- ▶ Human-human questionnaires are **not adapted** to robot's perceived empathy, it should be modified to be relevant

id	Empathic Understanding subscale items (EU)
EU1	The robot appreciates exactly how the things I experience feel to me.
EU2	The robot knows me and my needs.
EU3	The robot cares about my feelings.
EU4	(-) The robot does not understand me.
EU5	The robot perceives and accepts my individual characteristics.
EU6	The robot usually understands the whole of what I mean.
EU7	(-) The robot reacts to my words but does not see the way I feel.
EU8	The robot seems to feel bad when I am sad or disappointed.
id	Empathic Response subscale items (ER)
ER1	(-) Whether thoughts or feelings I express are "good" or "bad" makes no difference to the robot's actions toward me.
ER2	(-) No matter what I tell about myself, the robot acts just the same.
ER3	The robot comforts me when I am upset.
ER4	The robot encourages me.
ER5	The robot praises me when I have done something well.
ER6	The robot helps me when I need it.
ER7	The robot knows when I want to talk and lets me do so.
ER8	(-) The robot's response to me is so fixed and automatic that I do not get through to it.
id	Filler items (FI)
FI1	The way the robot acts feels natural.
FI2	The robot knows what it is doing.
FI3	The robot is responsible for its actions.
FI4	When I interact with the robot, I feel anxious.

**Table:** The items composing the RoPE scale. To calculate the subscales' score, sum the value of each items after having multiplied by -1 the value of the items marked by (-).

### GENERATION OF ITEMS

- ▶ Based on the results of our previous study
- ▶ 16 items in two scales + 4 filler items
  - **empathic understanding**
  - **empathic response**
- ▶ Human-human items selected and adapted to follow human-robot norms of interaction
- ▶ Two versions: a French and an English version

### EXPERT VALIDATION OF ITEMS RELEVANCE

- ▶ 25 experts
  - 15 cognitive sciences experts
  - 10 artificial intelligence or robotics experts

### ONGOING WORK

Evaluation of the **reliability** and **validity** of the French version

- ▶ Videos of an interaction with a Cozmo robot
  - an empathic Cozmo that displays emotions that show its empathic understanding
  - a non empathic Cozmo that just nods to notify that it is listening
- ▶ Cozmo is controlled in a Wizard of Oz configuration
- ▶ Video + questionnaire send to 2 groups of 150 persons following French population quotas
- ▶ Test - retest experimentation
- ▶ Statistical analysis to confirm the reliability, validity and sensibility of our questionnaire



**Figure:** A screenshot of the empathic Cozmo group experiment.

### MID-TERM RESULTS INTERPRETATION

- ▶ Nodding seems to be perceived as an empathic response
- ▶ We need to add one more condition with random movements that could not be perceived as empathic

### TAKE AWAY MESSAGE

- ▶ One questionnaire composed of two scales:
  - empathic understanding
  - empathic response
- ▶ Several iterations to make experts validate the relevance of items
- ▶ Video based experimentation to validate the French version of the metric in term of reliability, validity and sensibility
- ▶ **Same work has to be done on the English version.**

### CALL TO ACTION

- ▶ We are looking for English natives to do the same work with the English version of our questionnaire. **Do you want to help us?**
- ▶ <https://behaviors.ai/helpus>



Charrier, L., Galdeano, A., Cordier, A., & Lefort, M. (2018). Empathy display influence on human-robot interactions: A pilot study. In *Workshop on Towards Intelligent Social Robots: From Naive Robots to Robot Sapiens at the 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018)*. Madrid, Spain