Just follow the suit!

Trust in Human-Robot Interactions during Card Game Playing

Filipa Correia, Patrícia Alves-Oliveira, Nuno maia, Tiago Ribeiro, Sofia Petisca, Francisco S. Melo and Ana Paiva
Motivation

- Aging population
- Technology can contribute to their Quality of Life
Motivation

- Social isolation
- Free time with entertaining activities
Motivation

Older adults like to play card games...
Motivation

- Develop a robotic card game player to help reconnecting people
**Motivation**

*Sueca* is a Portuguese well-known *card game* among the *elder population*

- Hidden-information game
- 2 teams
- Win the game
- Partnership and trust
Goal

- Create an autonomous social robot that plays a card game
- Evaluate trust levels of participants towards their partners!!

We want to compare trust...

**human-robot interaction VS human-human interaction**
Design

How do we play Sueca?

User-centered study

Players’ behaviour

Physical space
Design

User-centered study:

- It took place in an Elder Care Center
- 4 male participants played 10 games during 30 minutes
Behavioral analysis of the videos:

- Verbal and non-verbal behaviors
- Relevant game events
- Different tones while interacting
  - Encouragement towards partners
  - Competitiveness towards opponents
Development

The Social Robotic player

PLAY
(PIMC algorithm)

INTERACT
Utterances

SERA Ecosystem
Evaluation

Study 1 - Lab study

Study 2 - Into-the-wild study
(1) Lab study

- Controlled lab setting

  Sueca...
  ...team game!

- Participants’ trust towards partners
(1) Lab study

Each session:
- 3 participants \times 20
- 1 hour

60 participants
(M=24.31, SD=3.852;
20 females, 39 males, 1 unknown)
(1) Lab study

Procedure:

1. Draw to choose partner
2. First questionnaire
3. Explain the game rules
4. Play 5 games
5. Final questionnaire
(1) Lab study

Measures:

- Human-Robot Trust Questionnaire [Schaefer, K., 2013]
- PANAS Questionnaire [Egloff, B., 1998]
- Demographic questions
  - Previous knowledge of partner
Results

Robot team won
12 sessions out 20 (60%)
Trust results
Participants that did not know their partners before the game
Participants that *already knew* their partners before the game
Positive Affect Results

The chart shows the comparison of positive affect scores before and after interaction. The scores are as follows:

- **Before interaction**:
  - Human: 29.77
  - Robot: 31.35

- **After interaction**:
  - Human: 32.8
  - Robot: 33.15

A significant difference is observed, with a p-value less than 0.05, indicating that the interaction had a statistically significant effect on positive affect.
Negative Affect Results

![Bar graph showing negative affect results before and after interaction with a human and a robot.](image)

- **Before interaction:**
  - Human: 11.48
  - Robot: 13.35

- **After interaction:**
  - Human: 12.58
  - Robot: 13.25

The difference is not statistically significant, as indicated by the *p* > 0.05.
Sueca Tournament

- Sueca Tournament
- Uncontrolled environment
- Expert users during the tournament
(2) Sueca Tournament

15 subjects played 13 games with EMYS (~2 hours)
(2) Sueca Tournament

Questionnaire:

- EMYS played well
- Without mistakes
- Although with some differences...
Sueca champions did not want to play with EMYS…

...“not willing to lose their reputation by losing with a robot”.
Conclusions

- Humans trust a robot as a partner, but the trust level varies according to their previous knowledge of the same robot.

- The development of trust towards robots may need longer interactions.

- The scenario meet some of the needs of the elderly population related with social isolation and, **the next step is to test with older adults!**
Thank you!

Questions?

Filipa Correia ~ filipacorreia@tecnico.pt