

# SHAPING PERCEPTIONS: THE IMPACT OF DYNAMIC AGENT

## BEHAVIORS AND EMBODIMENTS IN MULTIPARTY CARDS GAME

Laura Triglia<sup>1 2</sup>, Francesco Rea<sup>1</sup>, Alessandra Sciutti<sup>1</sup>

<sup>1</sup> CONTACT, Italian Institute of Technology, Italy - <sup>2</sup> DIBRIS, University of Genoa, Italy



### INTRODUCTION

In the rapidly evolving field of human-robot interaction (HRI), understanding how humans perceive and interact with robots and agents in group settings is crucial. This study explores the dynamics of these interactions within the context of a multiplayer game environment, specifically focusing on how different embodiments and behaviors of agents affect human perceptions and responses. By using the Chef's Hat card game [1] as a testing ground and the Moody Framework [2], we aim to examine the impact of varying agent reactions and types, such as the PPO (Proximal Policy Optimization) [3] and heuristic based agents, on human players' perceptions and strategies.

### RESEARCH QUESTIONS

- ? RQ1: How does the real-time mood estimation provided by the Moody Framework during gameplay influence human reactions and interactions with both robot and agent participants?
- ? RQ2: In what ways does the Moody Framework's interpretation of the PPO agent's playstyle affect human players' understanding and perception of the agent's strategy?

### EXPERIMENTAL DESIGN AND SETUP

Our design involves having human participants play the game Chef's Hat against a robot and two other agents. Participants will begin with two matches of ten rounds each to familiarize themselves with the game and its dynamics. Following this, they will encounter specific scenarios with predetermined actions and game dynamics to evaluate their reactions in controlled situations. This approach allows us to easily assess participants' responses after they have gained some experience with the game.



### DISCUSSION

This experimental design aims to understand how different reactions in group interactions among humans, robots, and agents impact human perception. The agents differ based on two key principles:

- The agents have different embodiments and ways of expressing their presence in the environment.
- The agents represented by the bulbs have a different playing style compared to the robot agent.

Regarding the second point, it is often challenging to discern a player's strategy, especially when it does not follow a specific policy like the PPO agent. The Moody Framework and its resulting internal state offer a new interpretation of the PPO agent's playstyle to the human player. Our goal with this implementation is to influence the human's perception of the robot and the agent through game-related reactions.

### References:

- [1] Barros, Pablo, et al. "The Chef's Hat Simulation Environment for Reinforcement-Learning-Based Agents."
- [2] Barros, Pablo, et al. "Moody learners-explaining competitive behaviour of reinforcement learning agents."
- [3] Barros, Pablo, Ana Tanevska, and Alessandra Sciutti. "Learning from learners: Adapting reinforcement learning agents to be competitive in a card game."