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Joint Learning of a Cooperative Task

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Abstract

Human cooperation often requires jointly learning a task while simultaneously establishing shared conventions. We study this process using a simplified version of Hanabi, a cooperative game that captures core features of real-world collaboration under partial observability and constrained communication (Bard et al., 2020). Thirty participants played over 300 repeated games, either with another human or with a rule-based agent, while providing think-aloud verbalizations. Performance improved steadily but peaked only late in the session, after 40 minutes on average. Participants learned to use limited communication more efficiently, requiring fewer explicit hints to support play under partial knowledge. This indicates the emergence of effective coordination and Theory-of-Mind-based reasoning. Subjective experience was analyzed using think-aloud reports with automated transcription and LLM-based sentiment analysis. Overall, criticism was more directed to oneself than to the partner, and increased with task understanding.

Keywords: Social cognition; Learning; Theory of Mind; Verbal protocol studies