

# Rapport Development in Human-AI Collaboration Tasks

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## Abstract

Rapport is a central component in fostering effective and meaningful interactions between humans and AI agents. It forms the foundation of trust, mutual understanding, and collaboration, all of which are essential for achieving shared goals in cooperative tasks. However, a significant factor influencing rapport development is the diversity of individual differences among human users. This diversity complicates the process of rapport building, as AI agents must adapt dynamically to the unique needs and intentions of individual users. The ability of AI systems to detect and respond to such differences remains a pressing research challenge, as mismatched responses can lead to frustration and disengagement. Theory of mind capabilities enable AI agents to infer user intentions, preferences, and emotional states, while advanced emotion-processing systems allow for nuanced and context-sensitive responses. This study examines how integrating these capabilities into an LLM and RAG enhanced AI Tutor can help sustain engagement and alignment, fostering rapport in Human-AI collaborative learning environments.