

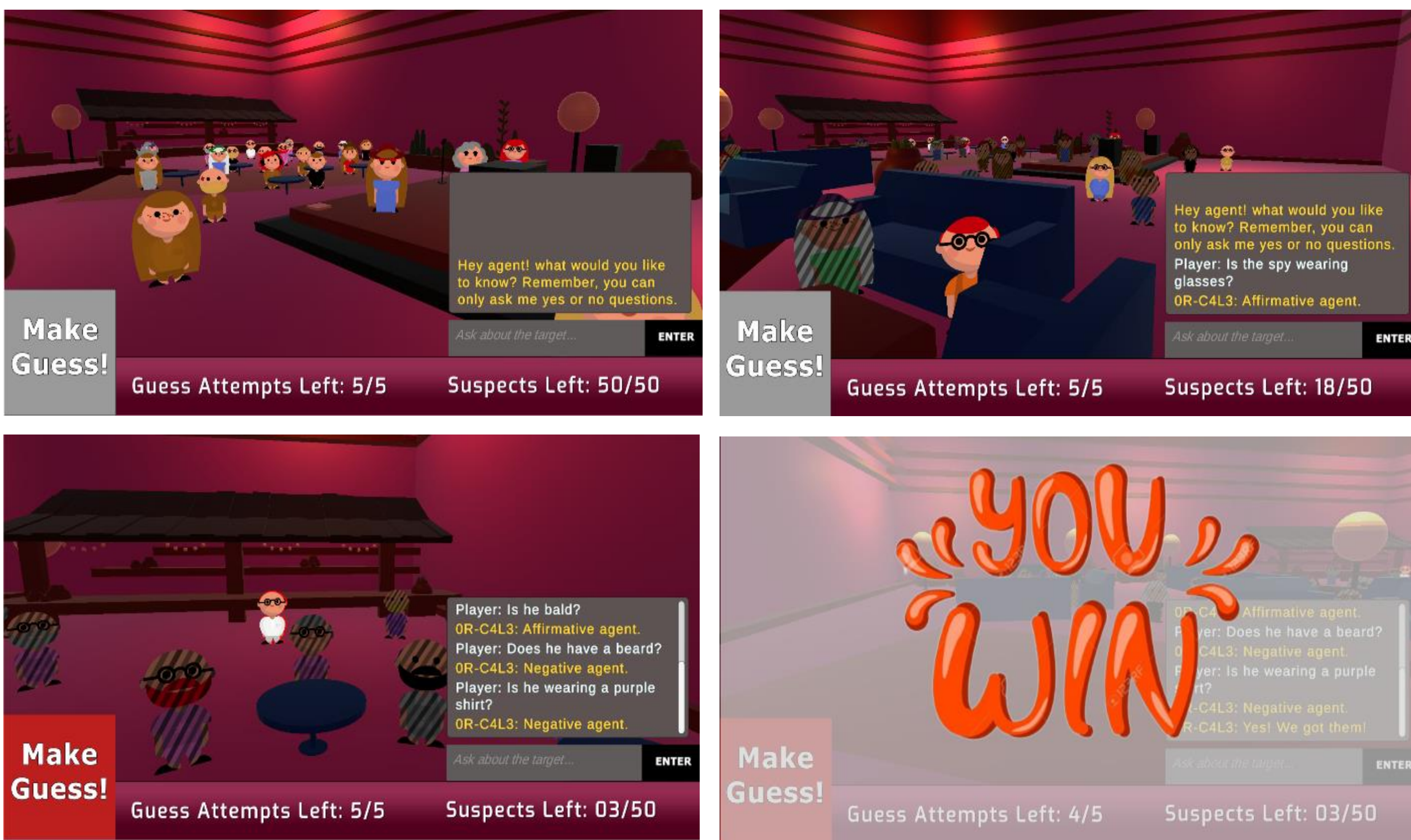
Why study question asking?

Question asking is central to human communication, information seeking, creativity, and social cognition, but it is hard to study in ways that preserve real-world complexity

We use online games as ecologically valid, engaging environments for measuring how people ask questions while solving problems

Closed-ended: Spot the Spy

A hidden object game where players are required to find a hidden spy amidst a crowded room, by asking yes/no questions that guide them in their investigation. The questions are answered by a chatbot agent powered by GPT-3.5, allowing players to eliminate suspects based on the answers

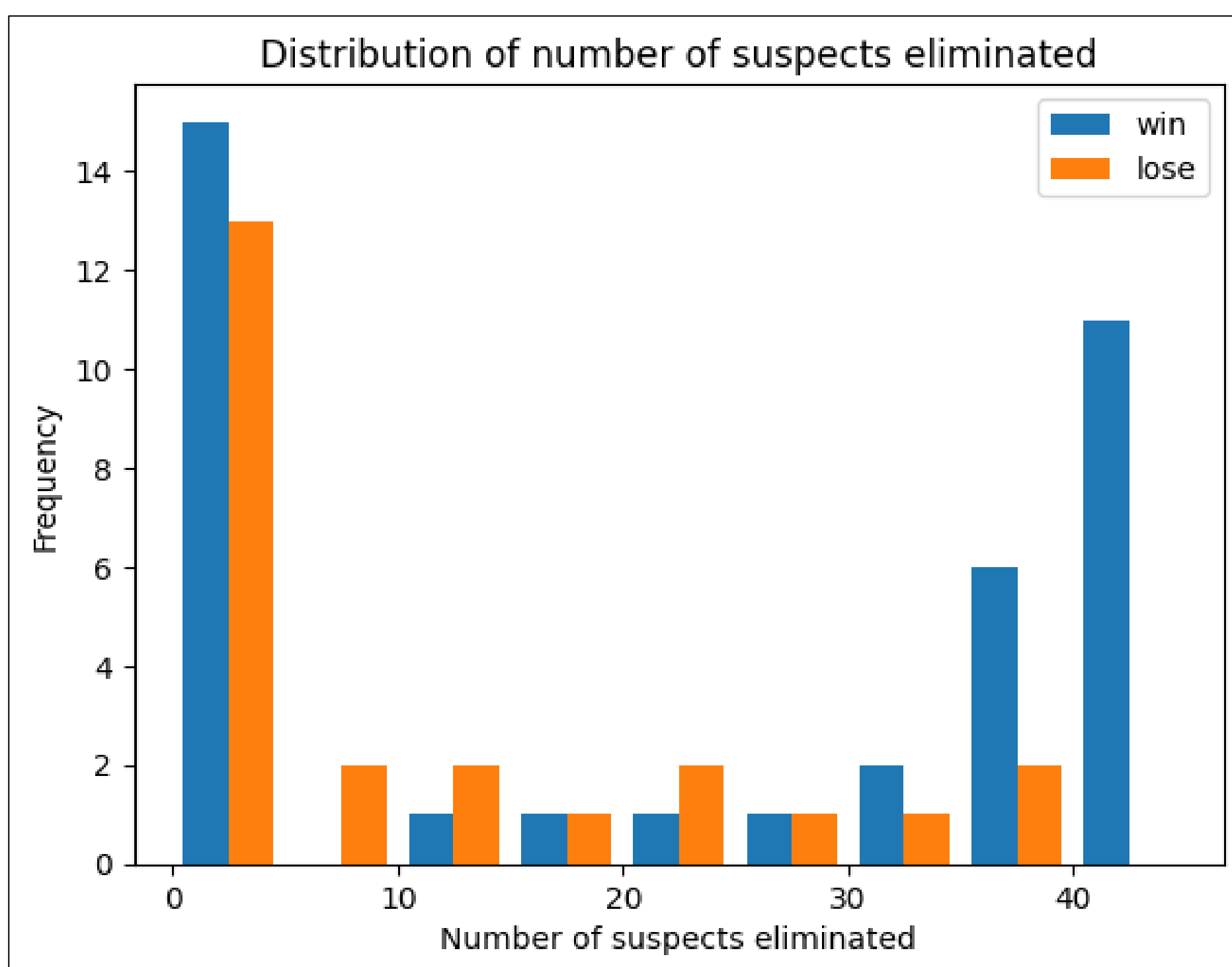


(Top left) Opening screen showing a room full of suspects. (Top right) The player asks questions to eliminate suspects, e.g., those with glasses. (Bottom left) The player marks a suspect and clicks "Make Guess!" to identify the spy. (Bottom right) The winning screen is displayed upon a correct guess

Study

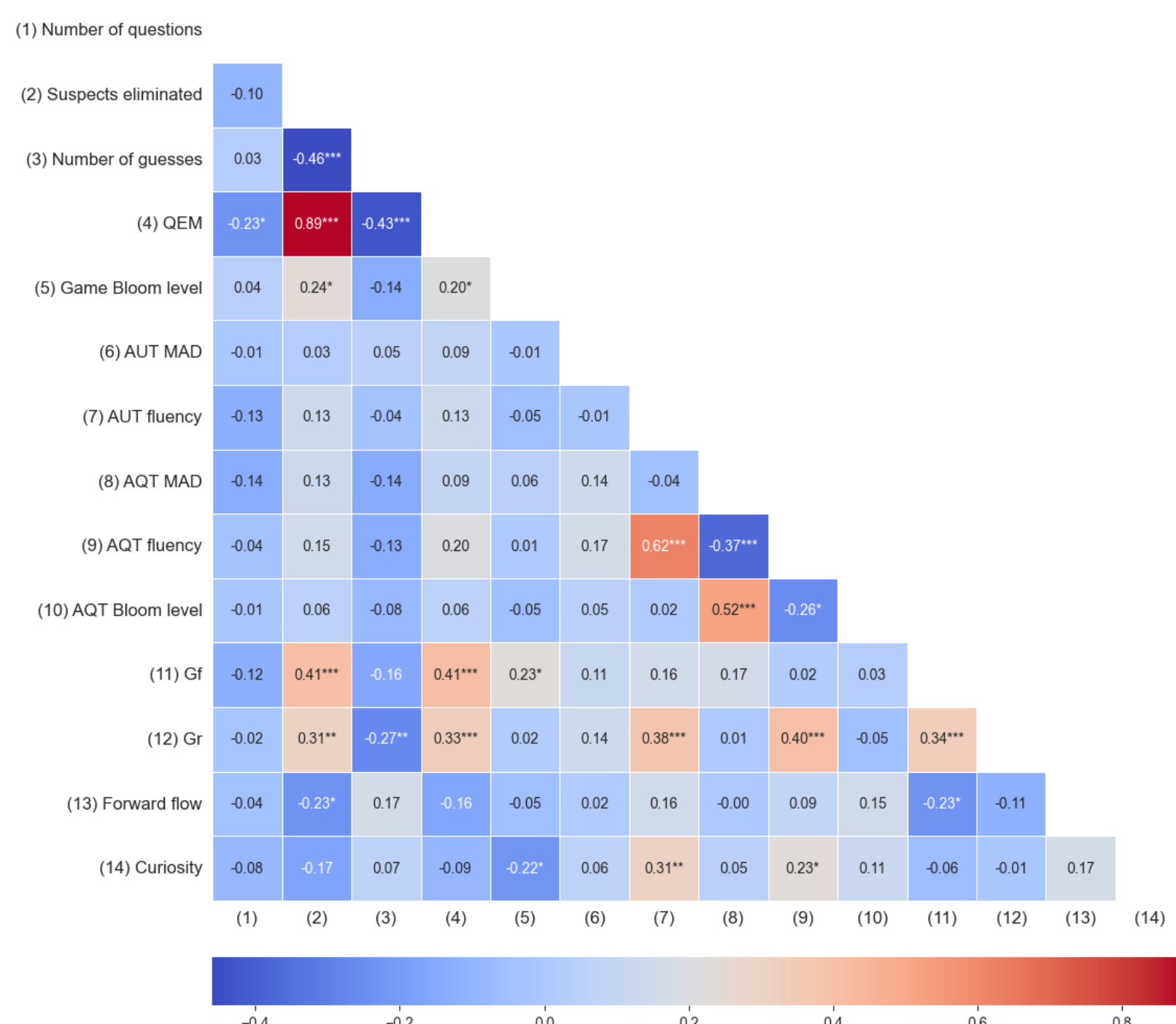
103 final participants; Outcome: question effectiveness (QEM), guesses, suspects eliminated; Higher intelligence linked to more effective questioning

Results



Players who eliminated more than 40 suspects consistently won the game, suggesting a robust and comprehensive approach to how narrowing down suspects is linked to higher success rates. Conversely, most participants who lost the game eliminated less than 10 suspects

Players who asked more effective questions made fewer guesses to identify the spy, indicating strategic questioning. Higher intelligence scores were associated with more effective questions and a greater number of suspects eliminated



Conclusions

Across the two games, different cognitive capacities support different forms of inquiry: Intelligence is especially useful for closed-ended elimination, whereas creativity and curiosity are especially useful for open-ended problem finding and solution generation

Together, Spot the Spy and The Martian Game offer a flexible framework for studying how people ask questions in interactive environments, with potential applications to education, problem solving, and human-AI interaction

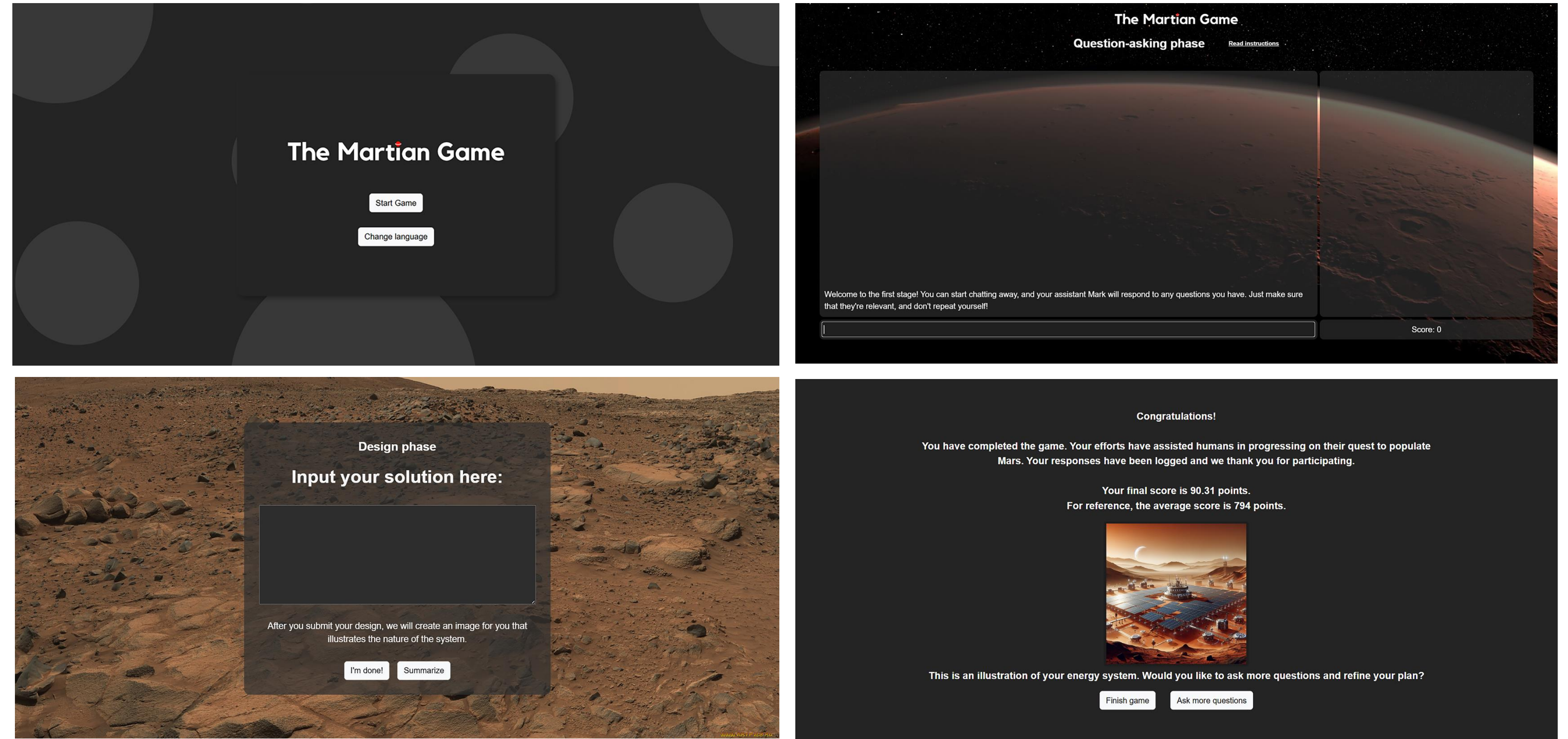
Studying question-asking via games

Two complementary online question asking games in naturalistic settings. **Spot the Spy** tests closed-ended question asking in a search task. **The Martian Game** tests open-ended question asking during creative problem solving

Together, the games reveal how intelligence, creativity, curiosity, and question-asking ability support different forms of inquiry

Open-ended: The Martian Game

A text-based open-ended problem-solving game where players question an AI system (GPT-40) to design a solar-energy system for a city on Mars. This is done by asking questions to collect information (problem finding) and then proposing a solution (problem solving)

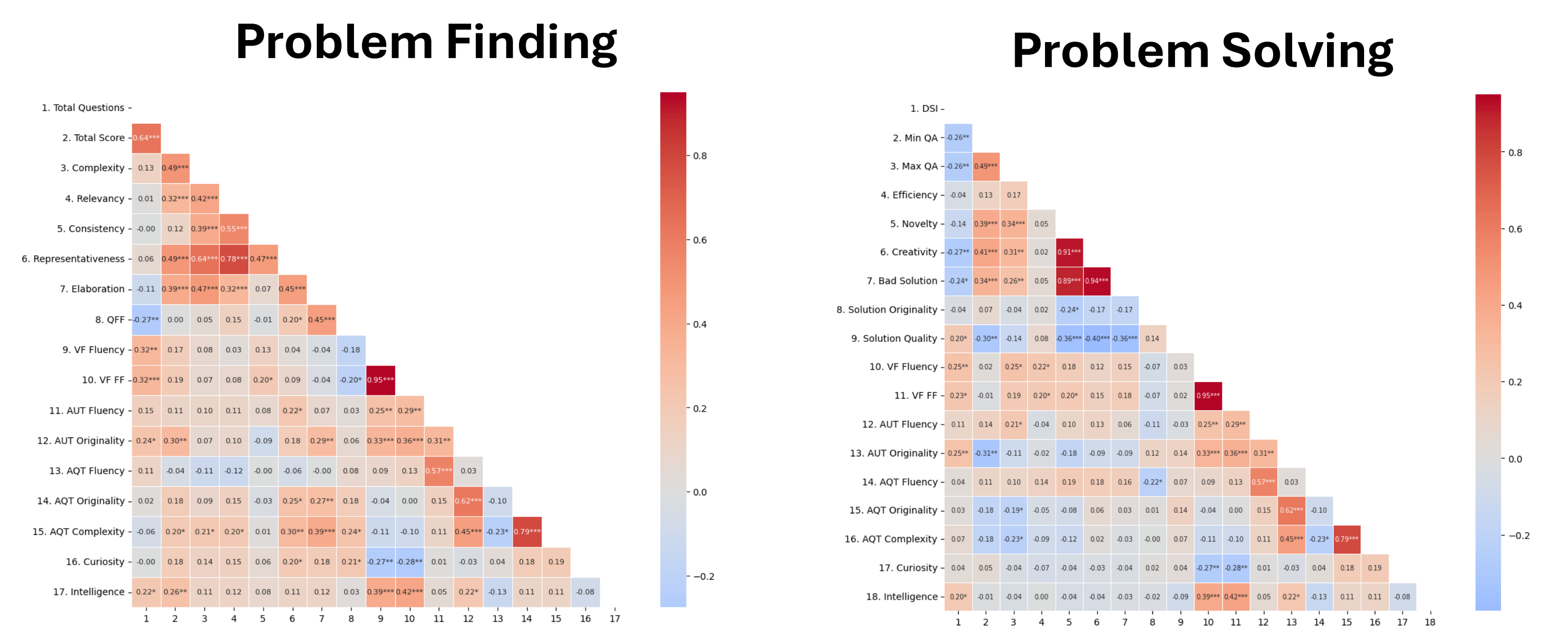


(Top left) Opening screen. (Top right) Problem finding phase: Players ask an AI agent ("Mark") questions to gather information and scored on **Problem Finding** abilities. (Bottom left) Problem solving phase: Players propose a solution and scored on **Problem Solving** abilities. (Bottom right) Finishing screen: A visualization of the solution and final score.

Study

105 participants; Question properties scored by GPT; solution distance scored by GPT and SBERT; Creativity, curiosity, and question-asking complexity facilitated performance

Results



Top score in the game was related to creativity, intelligence, and question-asking complexity; questions dynamics to curiosity and question-asking complexity

Solution originality related to creativity and intelligence; conceptual relations between questions and solution negatively related to creativity and question-asking abilities

Mediation Analysis



General ability to ask questions mediates the relation between general creativity and the creativity of the solution proposed by the player

Want to know more?

Poster

Spot the Spy



The Martian Game

