Communication and AI: How Trust in AI is Formed through Communication?

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Introduction

- Two human subjects and one simulated artificial intelligent (AI) agent work together as a triad team and operate a virtual spacecraft to enter a reentry path to Earth.
- The experiment relied on the human ability to trust and effectively communicate with AI to complete a virtual reality game.
- Communication is a key component of any successful partnership. Delegating roles and responsibilities is how you can complete a task and improve performance. Allowing for both subjects to have different forms of communication with each other and AI demonstrated how we can build successful teams.
- This overall led us to determine if humans have the ability to accept commands and advice from AI or if such would be disregarded because of distrust or bias.

Methods and Materials

Each participant was given a survey to measure their knowledge of AI and other lab aspects. From participants that qualified, teams of 2 worked collaborated with an AI agent to play a virtual reality space travel game. The goal of the game is to properly control the spaceship to pass all rings and reach earth before the time runs out. Each player is given a different part of the spaceship either up and down or left and right. The AI agent controls speed automatically. The variable of the game is the communication levels between every 15 rounds. Some rounds have no communication, one word command communication, and free communication. Players are strongly encouraged to communicate with AI to complete the game. All speech data between players and AI was recorded and processed.

Speech data was processed by de-identifying the voices. The times of speech was measured for each session for the teams. This was later coordinated to how many rings each team passed to determine correlation.

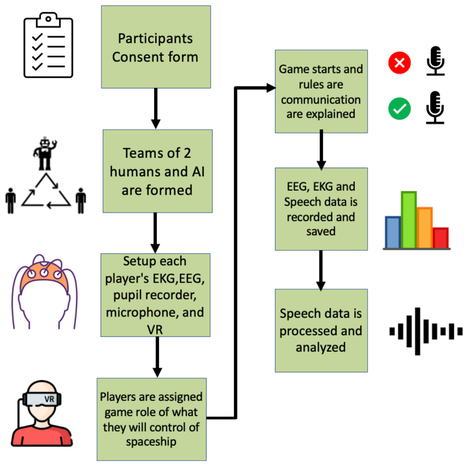

Figure 1: The experimental process for the experiment

Results

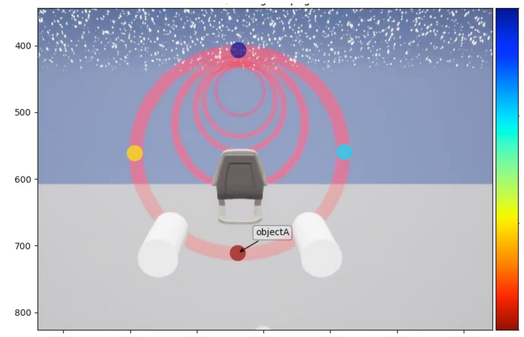

Figure 3: The 'prospective' of simulated AI. Computer vision algorithm to determine ring proximity

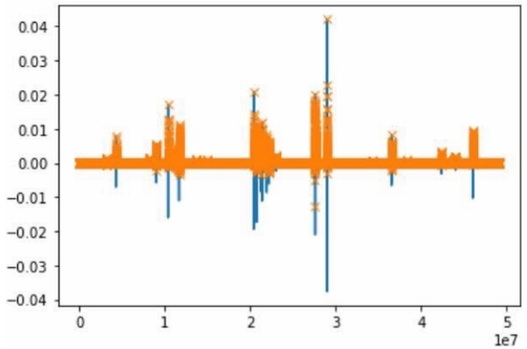

Figure 4: A sample graph of how speech data looks when subjects are speaking to AI agent

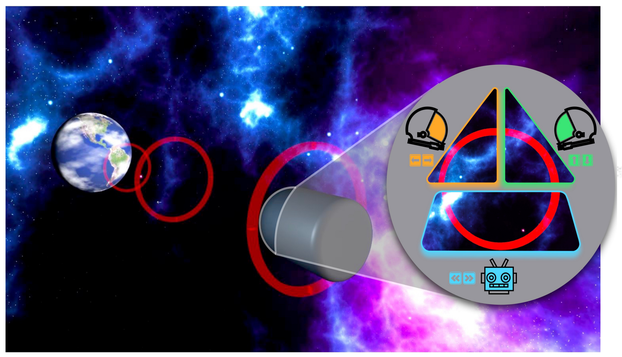

Figure 2: The game setting with diagram of player dynamic

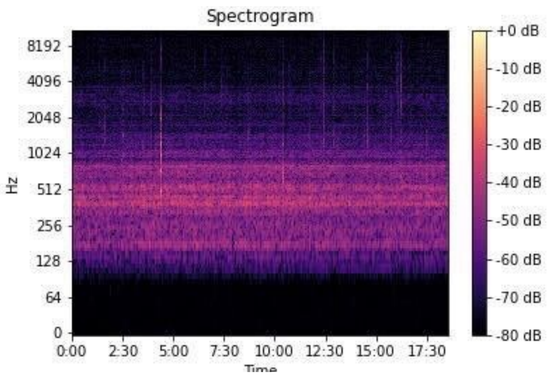

Figure 5: Sample spectrogram shows the frequency of the speech for a subject

Discussion/Conclusion

Communication is a proven method of building trust within a group of individuals across all familiarity levels from friends to strangers. There is a strong correlation between trust, communication and positive performance. Effective communication reduces disputes arising from misunderstandings. Research supports the role of familiarity to produce higher levels of communication in an established team than players who are just meeting for the first time. Realistically however, all teams and relationships start with strangers who have little to no familiarity with the other person. The addition of AI to a human team is like adding a new team member to a team that has been working together for an extended period. It will be an unsuccessful team until trust is established. Any level of distrust in the AI teammate can compromise the team's performance. Our experimental approach showed that as familiarity and communication with AI increased in the game sessions, it resulted in more game successes. This experiment replicated the idea that humans are more effective in communicating if they are familiar with one another but with an AI as a player.

The goal level of technological advancements for AI are often intended for functions more complex than the simulated VR game. Tech companies work to implement AI into various environments for human assistance and replacement such as healthcare, finance and day to day tasks. The game environment was stressful for all players, but was it enough to replicate the environment of real-world situations? Our findings show that humans can trust AI and successfully cooperate when it comes to a VR game when stakes are low. True trust is seen when it's related to life threatening situations such as healthcare. AI can have the ability to help clinicians make real-time decisions for a patient's treatment course, however it will ultimately be up to the clinicians whether to follow the advice.

AI has the potential to be as precise as we can make it; however, like humans, it does have the potential to be incorrect and make mistakes. "AI methods generally lack 'common sense', making them unable to identify simple mistakes in data or decisions that would otherwise be obvious to a human being." This adds a new dimension to the distrust in AI. In the experiment, the simulated AI on rare occasions made an error. It was not perfect. The seemingly minor mistakes of the AI shifted the perception of the players from seeing the AI as a perfect machine to being flawed and untrustworthy. This was demonstrated by players expressing concerns that the AI wasn't good enough to play the game. This behavior is not typically seen when humans make minor mistakes. This calls for future studies on what mistakes AI can make before it is seen as untrustworthy resulting in any advice being discarded, thus failing to enhance human productivity or quality of life.

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