Features Extraction and Audio Analysis in Human-Robot Interaction.

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MOTIVATION

This study aimed to delve into the dynamics of human-robot interactions and fill gaps in our understanding of how people interact with them. With the increasing use of robots in our everyday lives, it is crucial to understand how human responses vary depending on the embodiment of the agent asking the questions. The motivation behind this study was to acquire knowledge that can enhance the design and implementation of robots, ultimately fostering more effective and meaningful interactions.

METHODS

A total of 33 participants, all native French speakers, were recruited for the study. The experiment consisted of two parts: interactions with a humanoid conversational robot and interactions with a human instructor. The order of interactions was randomized to minimize bias. Participants were provided with three short lessons, covering science, history, and English. The lessons were designed to be accessible to all participants and incorporated questions to gauge their responses. Audio data was recorded and analyzed using Python libraries to extract and analyze acoustic and prosodic features. Statistical tests, including Mann-Whitney U test and Wilcoxon test, were employed to analyze the differences in audio features.

RESULTS

The analysis revealed several key findings. Firstly, the order of interaction had a significant impact on the audio characteristics of human-robot interactions. Participants who started with the robot tended to provide briefer answers compared to those who started with the human. Secondly, language played a crucial role, with distinct variations in audio features when transitioning between English and French during interactions. Lastly, there were intrinsic differences in audio features between human and robot interactions, even when controlling for other factors. These differences included variations in average intensity, indicating variations in speech clarity, fluency, and engagement.