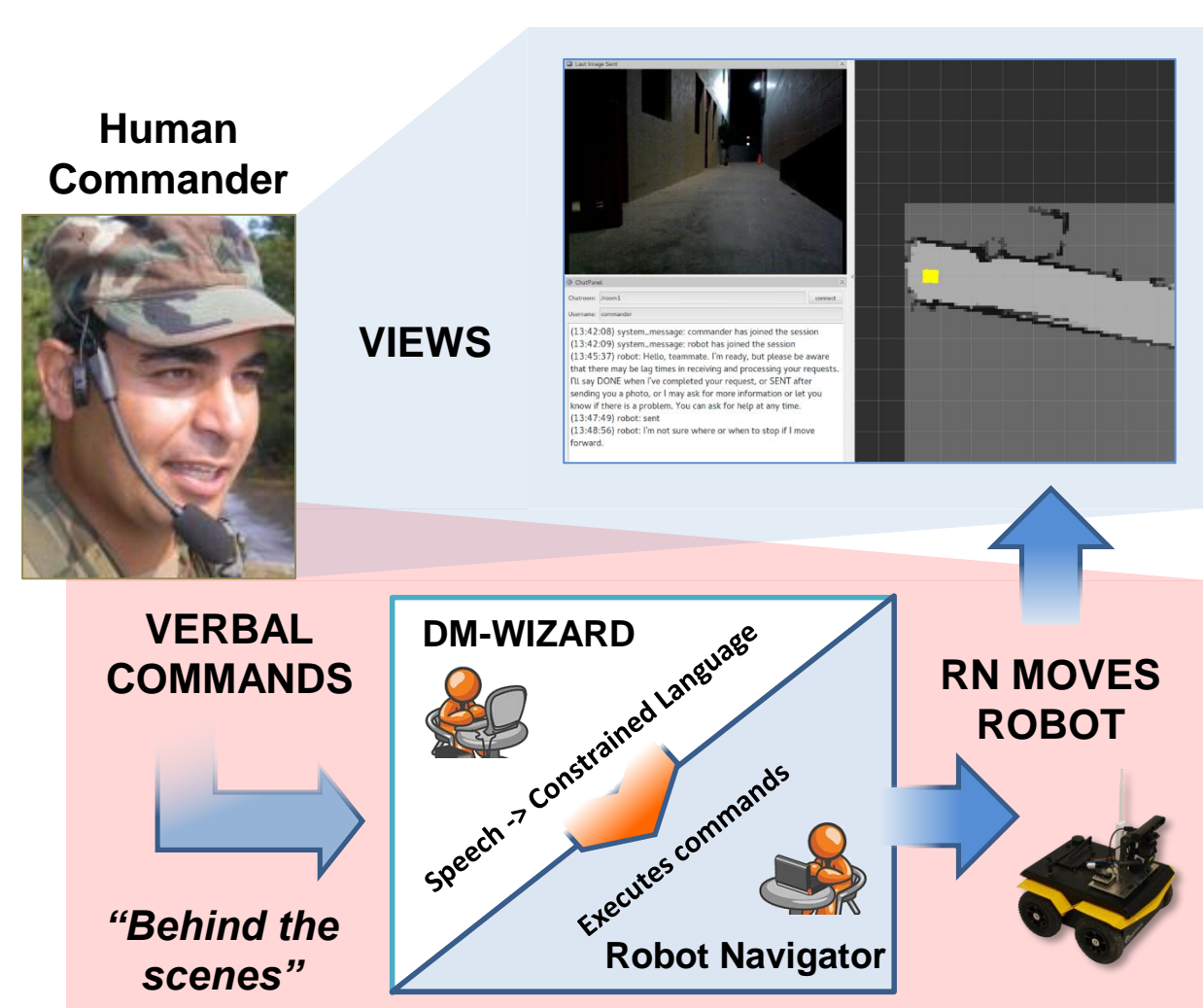


Cassidy Henry (ARL West, UCLA) – cassidy.henry@ucla.edu

Mentors: Dr. Kim Pollard (HRED, APG/ARLW), Dr. Matthew Marge (CISD, ALC)

Introduction

Goal: Exploring methods that change the role of robots from tools to “teammates” with which humans can interact using natural language.

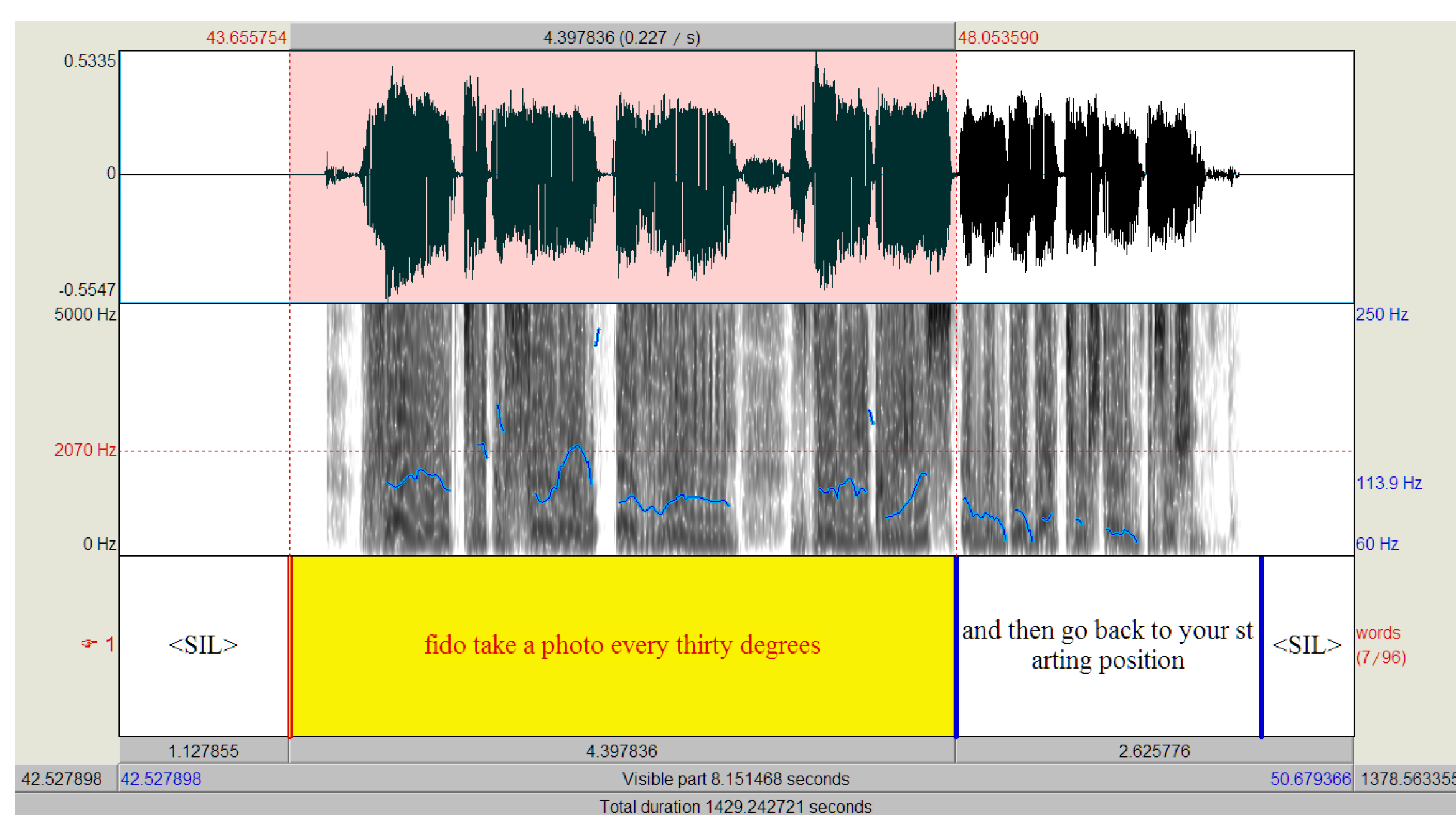


The Experiment:
Collaborative search and navigation task with a robot teammate, where robot is directed using natural language as opposed to manual input.

- We don't know how people will communicate with robots given no linguistic constraints
- We want to investigate how social interaction affects performance and related areas such as perception and trust
- Research in HRI with regards to affect is under addressed; robots that could process and produce paralinguistic information would be beneficial
- Our goal is to address Army-unique issues and needs by improving technology for the Soldier

Methods

Throughout the course of the experiment, all utterances of participants were recorded, along with metrics such as trust, perception, workload, and others. Participant audio was transcribed using Praat, separated on a per-command basis within utterances.



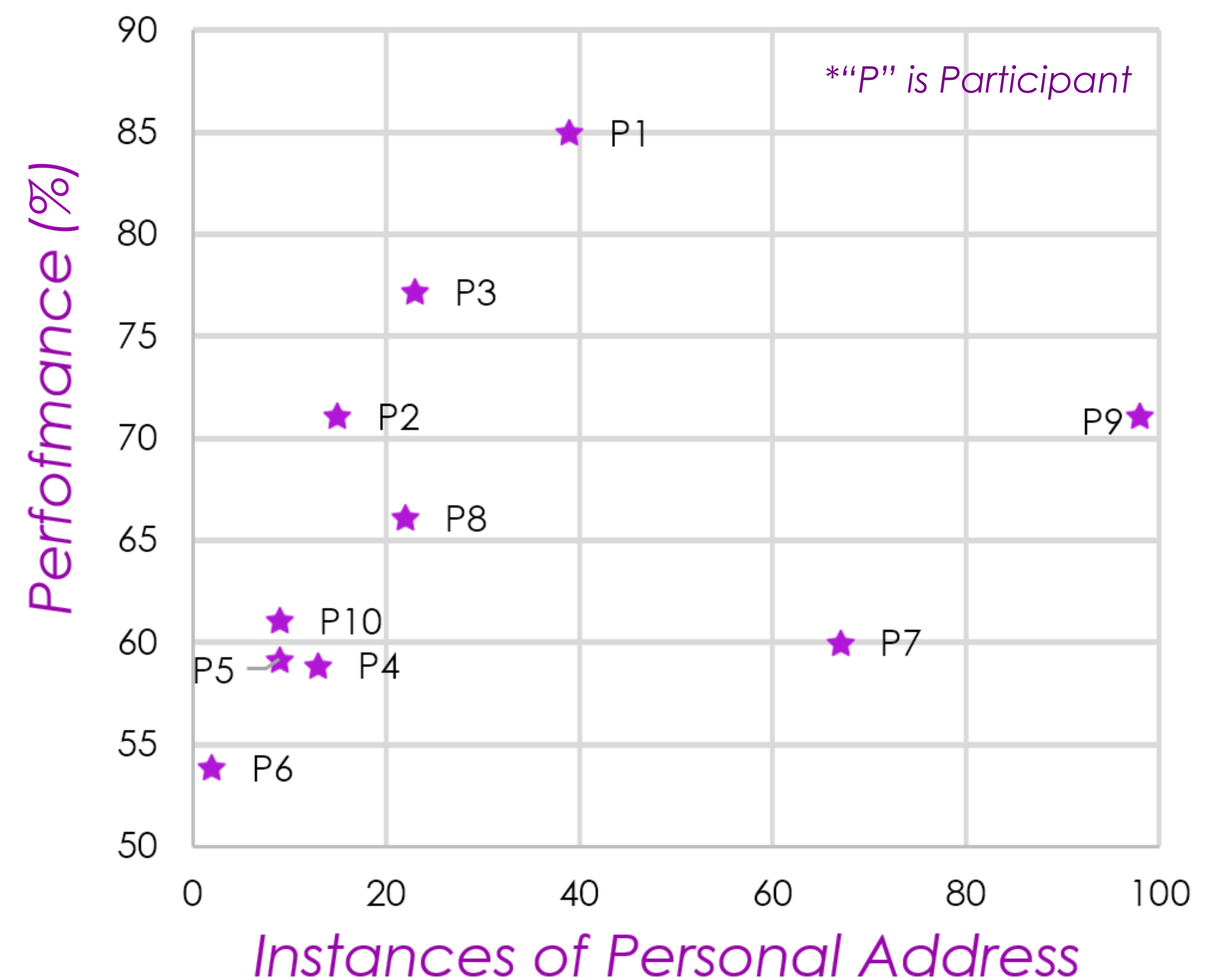
Transcribing in Praat

- Lexical patterns of social behavior were identified and counted then compared to overall task performance.
- Task performance is a score of how many objects were found
- Defined five commonly occurring patterns; These were selected because they are strong, quantifiable markers of social behavior, positive affect, or politeness.

NTRU	are you able to knock over or tip over that object	and do a victory lap	robot can I call you fido
HLC	good job do you detect any threats	robot take a better photo of the shoes	explore the room
PMA	fido take a photo every thirty degrees	are you alone	how did you get to this building from last time
PLS	fantastic please take a photo fido	please back up one foot	please send picture
IDW	are you ready	can you get around that object	I want you to move around yellow cone

Examples of Utterances

Data and Results



Utterance Types	Participant 7	Participant 9	Participant 1	Participant 6
Non-Task Related Utterances	15.56%	4.76%	0%	0%
High Level Commands	10%	8.93%	2.5%	33.33%
Personal Address	74.44%	58.33%	97.5%	66.66%
Please/Thank You	0%	2.38%	0%	0%
Indirect Wording	0%	25.59%	0%	0%
Total	90	168	40	3

Variation in participant language counts

Discussion

- Potential relationship between performance and use of personal modes of address
- Observed variation in speech highlights the importance of creating systems that can handle variable language
- Create a clearer picture of performance versus social behavior by controlling for other metrics (e.g. trust)
- Potential point of diminishing returns in social behavior versus performance

Next Steps

- Continue to refine analyses by controlling for more variables
- Continue evaluation of metrics (trust, perception, etc) versus language used
- Measure additional paralinguistic phenomena such as prosody, intonation, and other frames
- Recruit more participants for future experiments

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