Analyzing User's Mental State and Facial Expressions in Interaction with Different Personalities in a Critical Situation

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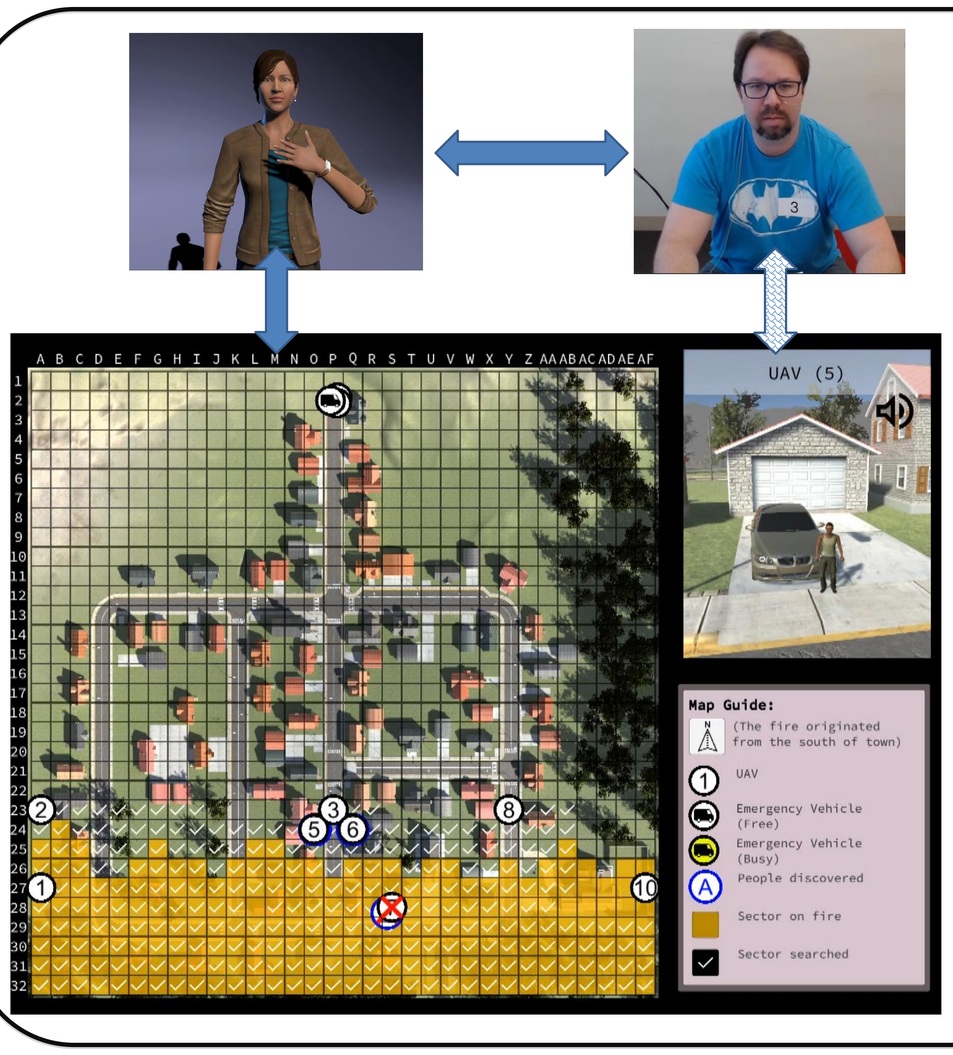
Motivation

- Interlocutors' personality plays a crucial role in structure and flow of the conversation
- We examine facial expressions of participants in a simulated disaster relief (fire rescue) scenario
- Relationship between mental state and task performance is an open question in this domain

Research Questions

1. **Is there a correlation between user's mental state and their performance?**
2. **Do users react differently in interaction with different personality profiles?**
3. **Does the difficulty trend of the experiment affect the performance?**

Scenario



Operator (User)

- Evacuates a town threatened by an approaching wildfire
- Coordinates the search & rescue through interaction with a virtual spokesperson
- **Objective**: save as many residents as possible

Residents

- Virtual people scattered randomly
- Have different personality profiles (e.g., stubborn, cooperative)
- might require verbal communication with the operator to be convinced to leave.

Method

- Extracted Operator's facial expressions using Open Face
- **Mental State** defined as the emotion of the operator: (happy, sad, angry, disgust, surprise, fear, neutral)
- **Simulation Difficulty**: defined as difficulty trend of encountered residents (e.g., positive if they go from easy to hard)
- **Performance**: number of saved residents

Results

1. Operator's emotions during interactions with residents significantly predicted performance ($R^2 = 0.735$, $F(6, 15) = 6.945$, $p = 0.001$). Also, several emotions (table 1) are significantly correlated with success.
2. Different residents elicit different distribution of emotions from users (Figure 1)
3. Linear Regression model with simulation difficulty as IV and performance as DV showed that the order of encountered residents does not affect the Operator's performance ($t = -0.289$, $p = 0.07$)

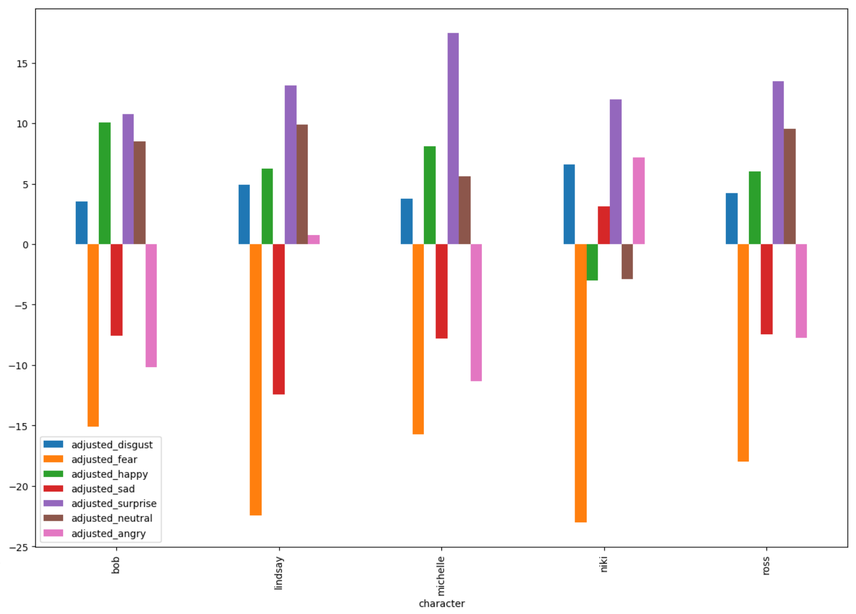


Figure 1: Adjusted emotions during resident interactions. Adjusted emotions are the operator's transient emotions while interacting with residents subtracted by their average emotion during the whole experiment.

Emotion	T	p_value
Disgust	3.21	0.006
Fear	-1.45	0.168
Happiness	-5.32	<0.001
Sadness	-2.84	0.012
Surprise	-2.33	0.034
Anger	-3.99	0.001

Table 1: Multiple linear regression statistics (IV: Operator's emotions during interactions with residents, DV: Operator's performance)

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