Using Human Workload to Adjust Agent Expanations in Human-agent Teamwork

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1 BACKGROUND

- Humans do not understand or trust AI Systems -> decrease on performance [1]
- User- aware eXplainable AI [2]
- Several factor could be used to tailor explanations. In this project: **Human workload**
- *How can an agent model and use human workload to tailor explanations?*

2 METHODS

- Between Subject Design
- Rescue scenario using MATRX (*Figure 1*)
    - Participants: human agent
    - Baseline and workload agent
- Human workload model
    - Cognitive load (CL)
    - Affective load (AL)
- Tailoring strategy: provide less when workload higher
- Measurement
    - Objective (system)
    - Subjective (questionnaire)
- *Figure 2* shows an example of experiment with the workload agent
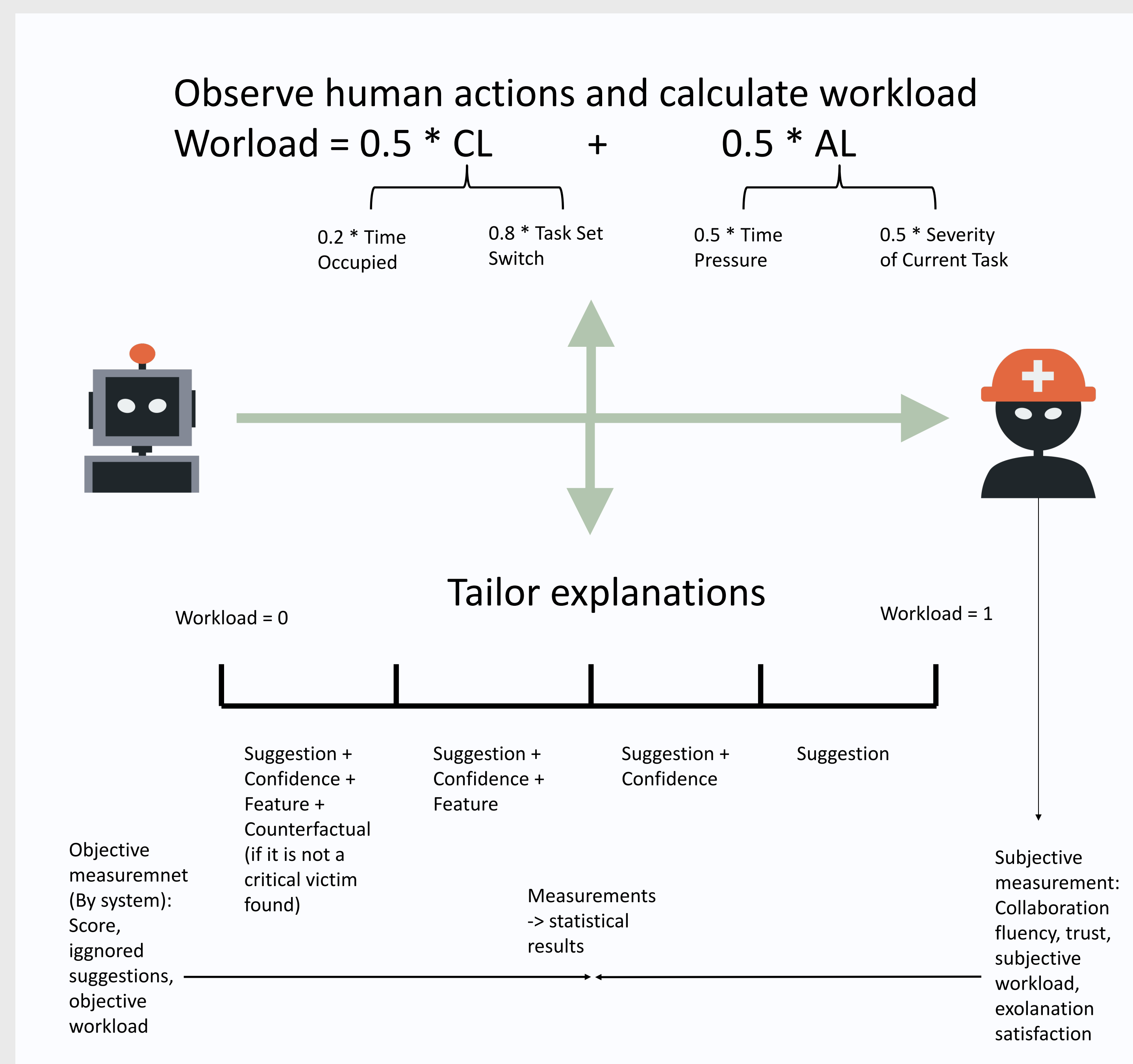

Figure 1: Example of simulated senario

Observe human actions and calculate workload
Worload = 0.5 * CL   +   0.5 * AL

0.2 * Time Occupied   0.8 * Task Set Switch   0.5 * Time Pressure   0.5 * Severity of Current Task

Tailor explanations

Workload = 0   Workload = 1

Suggestion + Confidence + Feature + Counterfactual (if it is not a critical victim found)   Suggestion + Confidence + Feature   Suggestion + Confidence   Suggestion

Objective measuremnet (By system): Score, iggnored suggestions, objective workload

Measurements -> statistical results

Subjective measurement: Collaboration fluency, trust, subjective workload, exolanation satisfaction

Figure 2: Experiment with the workload agent

3 Result

Variable	p-value	mean difference
score	0.74	-0.80
suggestions_ignored	0.02	-0.14
subjective_trust	0.04	0.31
subjective_workload	0.20	5.22
collaboration_fluency	0.07	5.54
explanation_satisfaction	0.54	0.12

Correlation coefficient of subjective workload and objective workload: -0.1

4 Disscussion and Conclusion

- Significant mean difference observed in suggestions_ignored and subjective_trust
- No evidence shows significant mean difference found in other variables
- Subjective workload and objective workload seems independent
- Future direction: workload modelling, more dynamic tailoring strategy

5 REFERENCE

[1] M. Johnson, J. M. Bradshaw, P. J. Feltovich, C. M. Jonker, M. B. van Riemsdijk, and M. Sierhuis. Coactive design: Designing support for interdependence in joint activity. In Journal of Human-Robot Interaction, volume 3, pages 43-69, 2014.

[2] D. Gunning. Explainable artificial intelligence (xai). In Defense Advanced Research Projects Agency (DARPA), volume 2, 2017.