Human understanding of information represented in natural versus artificial language

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Abstract

- Controlled Natural Languages (CNLs) are designed to be computer readable and human understandable
- Limited empirical research on human understanding of CNLs
- We empirically assess human understanding of Natural Language (NL) and a CNL called Controlled English (CE)
- Quantify understanding using speed, accuracy, and usability ratings

Methods and Procedure

- Experiment 1: N = 103
- Experiment 2: N = 101 (10 second response deadline)
- Within-participants design: Statement complexity (simple, complex) x Language (NL, CE)
- yes/no judgments for ontograph-statement pairs in NL, CE

### Example ontograph and written statements
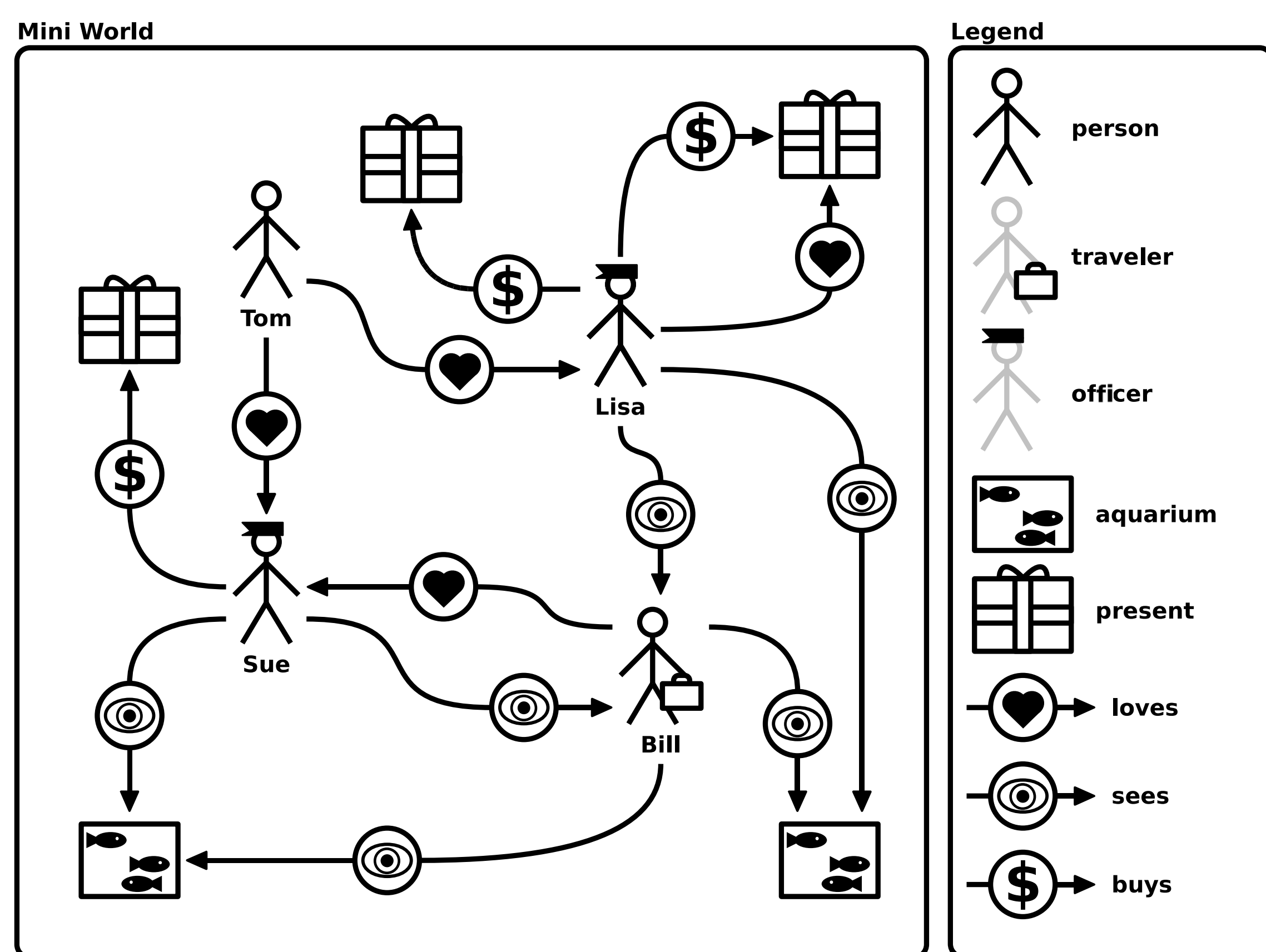
Example simple statements

Language	Identity	Relation
NL	Sue is an officer. *yes*	Tom buys a present. *no*
CE	there is an officer named Sue. *yes*	the person Tom buys the present p1. *no*

Example complex statements

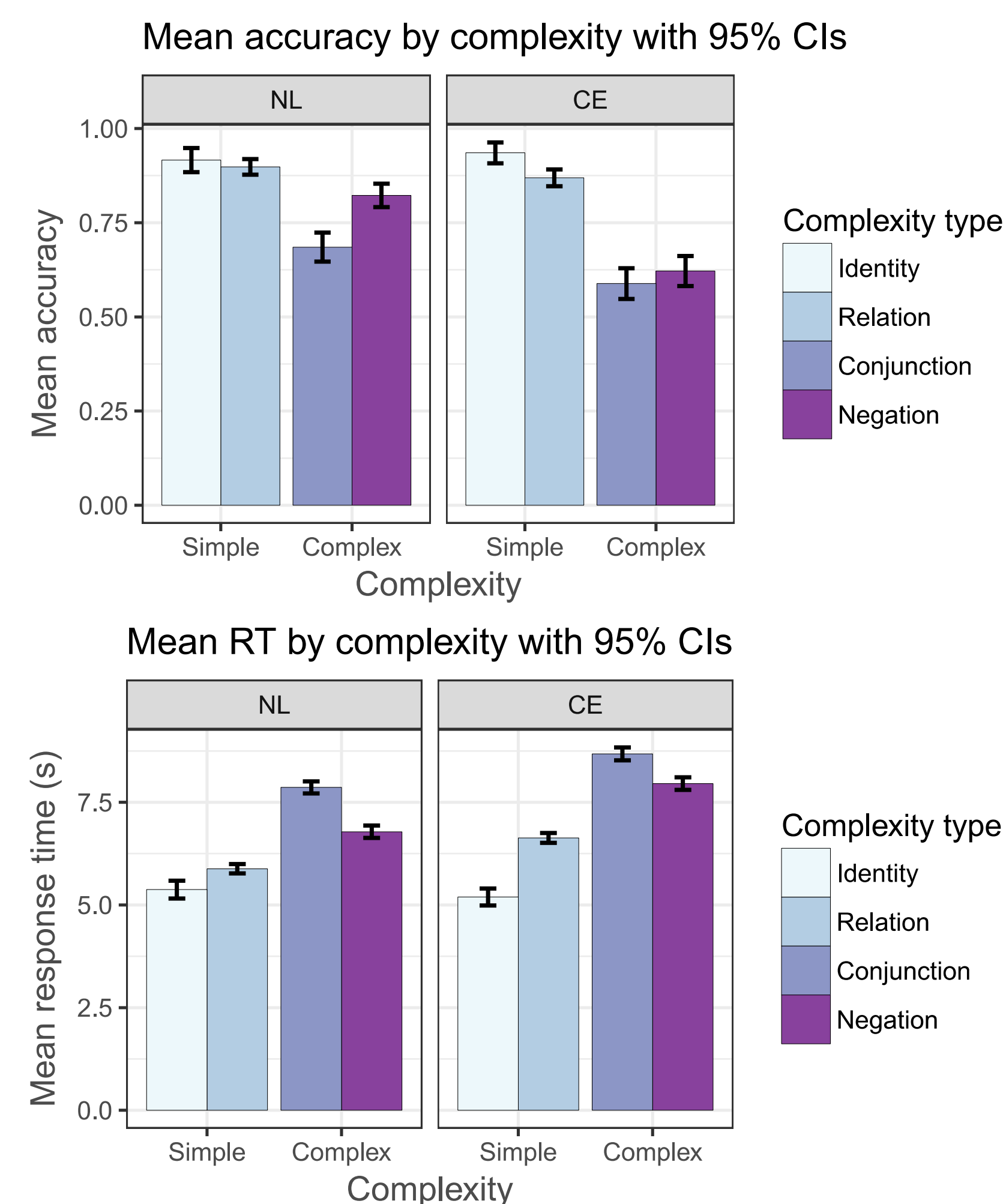| Language	Conjunction	Negation
NL	Sue loves Tom and Tom loves Lisa. *no*	Tom doesn't see an aquarium. *yes*
CE	the person Sue loves the person Tom and the person Tom loves the person Lisa. *no*	it is false that the person Tom sees the aquarium a1. *yes*

Experiment 1: Results
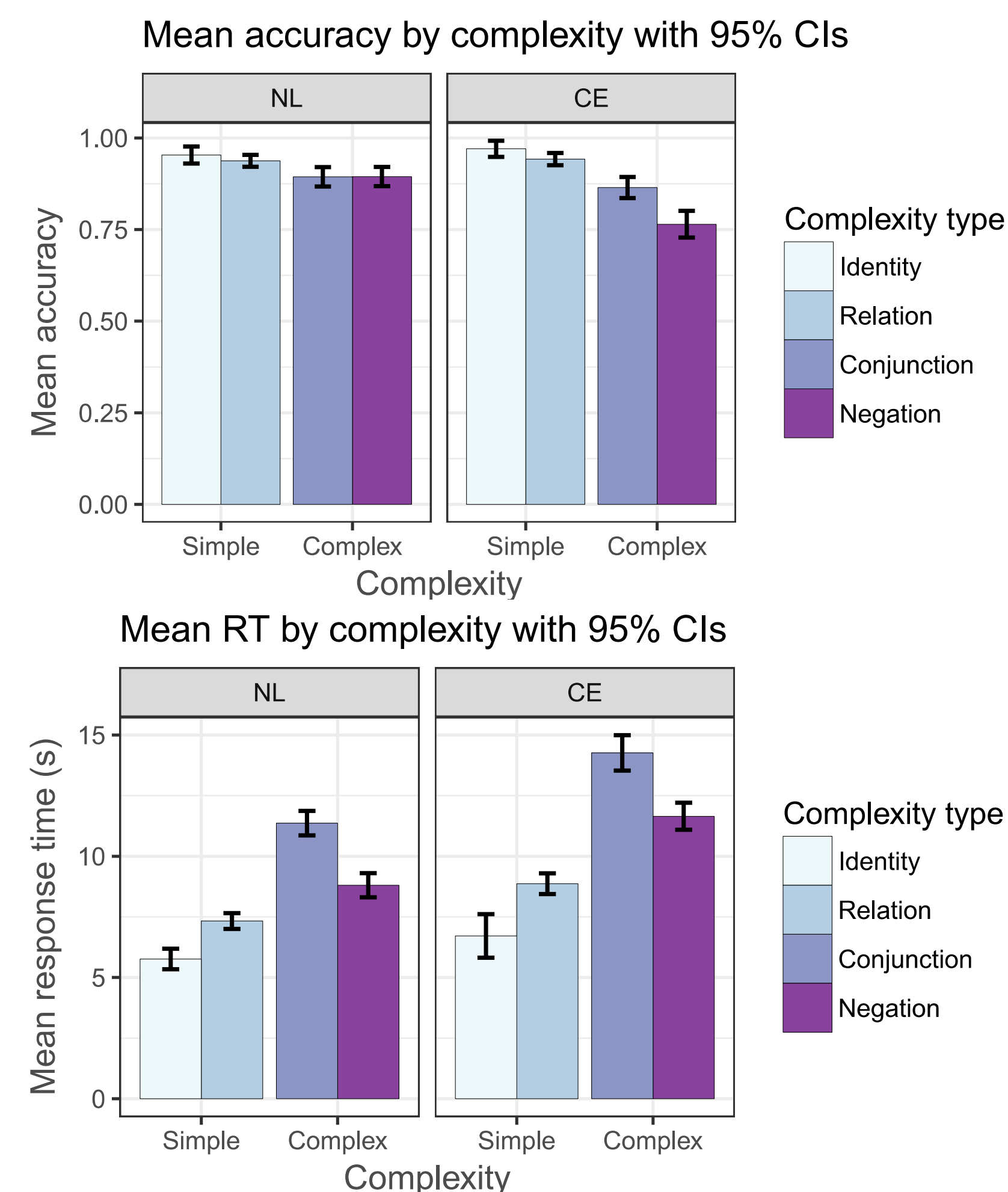
- Results near ceiling
- Usability ratings for NL > CE

Experiment 2: Results

- Added 10 second response deadline

- Accuracy and speed for simple > complex, NL > CE statements
- Usability ratings for NL > CE

Conclusion

- Similar understanding for NL and CE, except certain complex statements, especially under time pressure
- Redesign CE to "simplify" complex statements?
- Importance of assessing understanding using multiple methods