Human Understanding of Controlled Natural Language in Simulated Tactical Environments

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Abstract

- Human-computer collaboration (HCC) has great potential to increase situational awareness and improve performance on crucial military tasks
- Controlled Natural Language (CNL) can be used as a common information representation between human and computer in HCC
- But how well-suited are CNLs to the human user? How can they be improved?
  - Develop and implement a framework to test the relative ease of comprehension of different CNL statements; direct comparisons in accuracy and response time among CNL statements
  - Difference found ***only*** when time pressure is applied (Experiment 2)

Procedure

Experiment 1

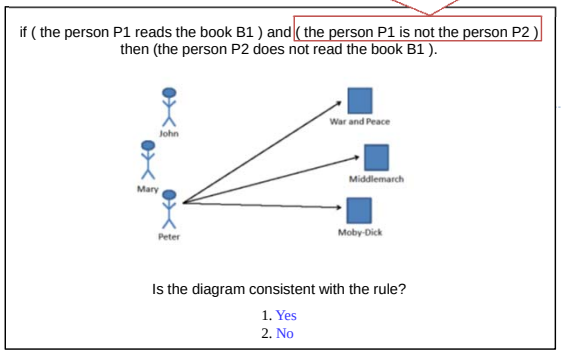
Participants judge (via Amazon Mechanical Turk) whether a Controlled English rule is consistent with a diagram

Measure accuracy and reaction time for 3 ways of expressing uniqueness in International Technology Alliance Controlled English

N = 75

"the person P1 is not the person P2"
"the person P1 cannot be the person P2"
"there is a person named P2 that is different to the person P1"

Example item

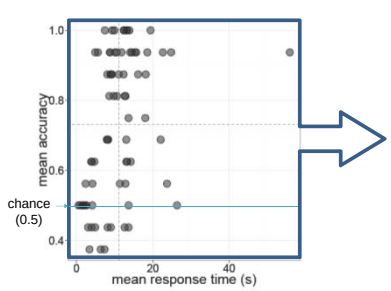


Experiment 2

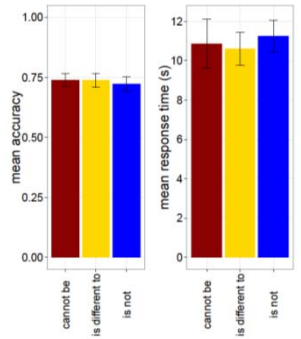
Experiment 2 - Same as Experiment 1, but with a 15 second time limit

N = 199

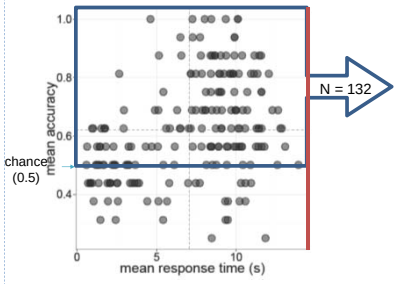
Results



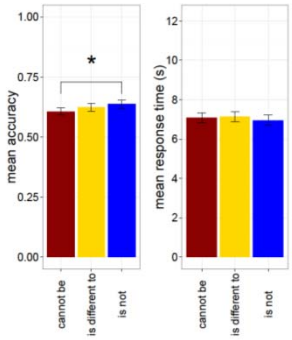
Mean accuracy and response time per participant, with overall means as dashed lines.



Mean accuracy and response time by uniqueness expression, with SE bars.



Mean accuracy and response time per participant, with overall means as dashed lines.



Mean accuracy and response time by uniqueness expression, with SE bars.

Discussion

High accuracy, but a number of participants below chance – hard to interpret results
→ analyze above-chance results in Experiment 2

Many long response times – time limit may drive down accuracy
→ add time limit in Experiment 2

Lower accuracy

Difference in accuracy among uniqueness expressions revealed

Next steps
1. test in more naturalistic settings
2. test other contrasts
3. explore time limit

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References
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D. Mott, "Summary of Controlled English," unpublished.