

# Experimental study of belief diffusion

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- ▶ Obvious questions: when do beliefs converge? converge to the correct answer? which models explain the data?
- ▶ **Belief revision** is a well studied topic in logic and computer science. Girard et al. introduced a logical model of belief revision in networks, which motivated our studies.

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- ▶ The 3 options are the correct one, an incorrect one (not labelled as such!), and “don’t know”.
- ▶ At each iteration, each subject can update their answer, having seen a summary of her neighbours’ answers.

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- ▶ Payments: 10 units for correct, 0 for incorrect/no answer, 6 for “don’t know”.

## Analytical questions (each with two multiple choice answers, plus “don’t know”)

- ▶ (Frederick (2005) Cognitive Reflection Test) If it takes 5 machines 5 minutes to make 5 widgets, how long will it take 100 machines to make 100 widgets? (more than 50/less than 50)

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- ▶ (Wason (1966) Selection Task) Suppose you have a set of four cards placed on a table, each of which has a number on one side and a coloured patch on the other side. The visible faces of the cards show 3, 8, red and brown. Which card(s) must you turn over in order to test the truth of the following claim: "if a card shows an even number on one face, then its opposite face is red" ? (8 and brown, 8 and red)

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- ▶ True or false: the Great Wall of China is the only manmade object visible from the Moon.

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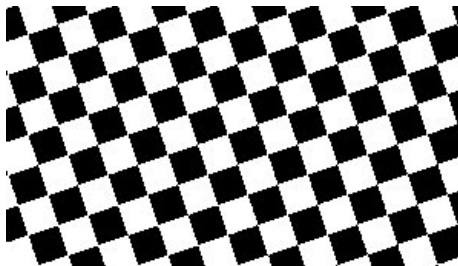
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- ▶ We guessed that the answer to Q3 would be definitely known by some subjects, and that this fact would be known to the other subjects.
- ▶ Q5 was essentially impossible to answer. We gave the correct answer to some subjects and informed the others of this fact.

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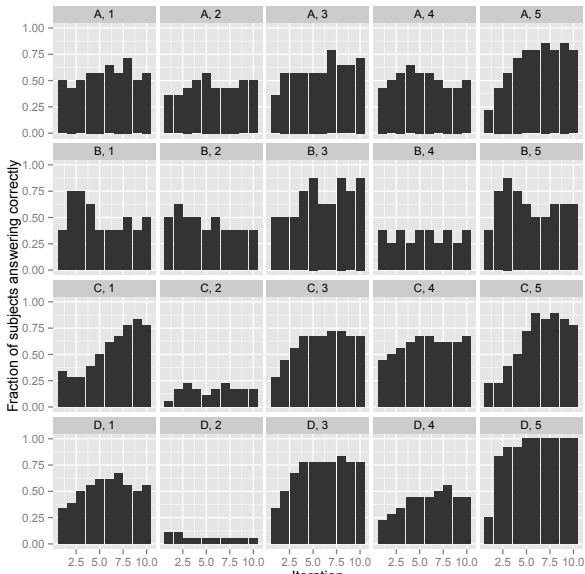
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- ▶ There appear to be three distinct groups of subjects: those with thresholds near 0, near  $1/2$ , and near 1.

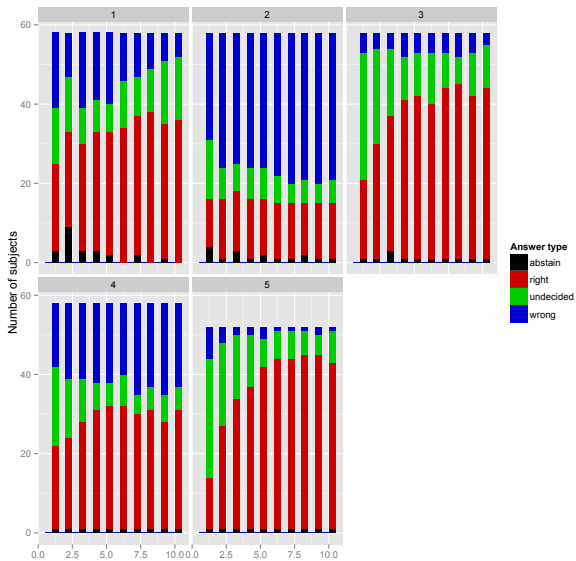
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- ▶ There appear to be three distinct groups of subjects: those with thresholds near 0, near  $1/2$ , and near 1.
- ▶ Rationality is violated in some cases.

# Correctness

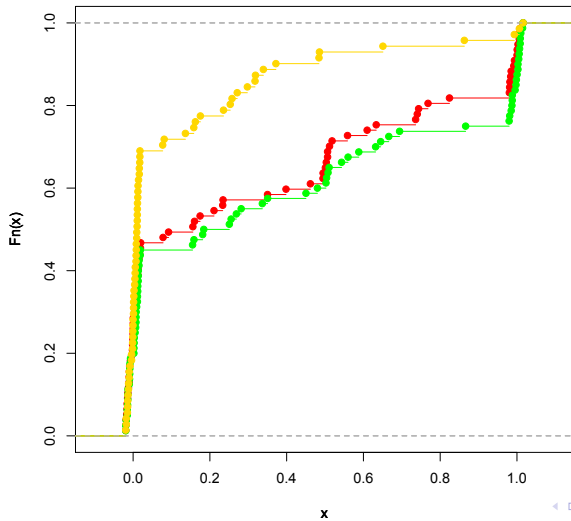


# Answer type frequency



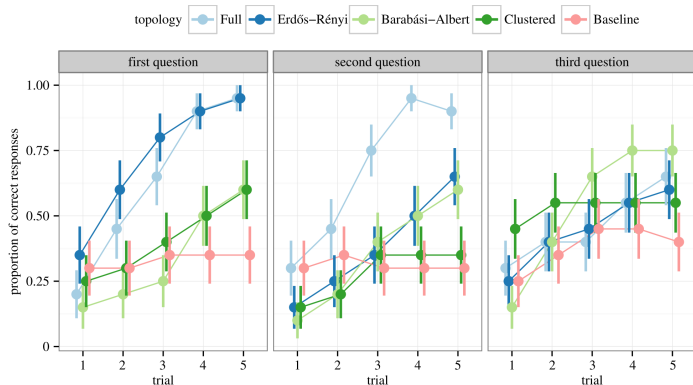
# Asymmetry of “don't know”

Empirical CDFs



## Related work

- ▶ Rahwan et al. (JRS Interface 2014) performed a similar study, using questions from the Cognitive Reflection Test.





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- ▶ We have not investigated any node-specific issues.
- ▶ The effect of topology should be investigated further.
- ▶ Any ideas on how to carry out experiments more cost-effectively?