New Experimental Evidence against the Similarity Approach to Conditionals

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Experiment

- 80 native English speakers recruited from Prolific.
- Three different scenarios: instance of reciprocity (P1, P2, P3 and C) and 6 fillers in random order.
- Design follows Romoli et al. (2022). Responses: *True | Indeterminate | False*. If indeterminate: asked whether they strongly feel that there is no correct answer or just do not know; we excluded the latter.
- Participants understood the task well: 89% mean accuracy on fillers. Two excluded (>30% error).

Predictions

Account	Reciprocity	Conclusion (C)
Stalnaker (1968)	Valid	True
Lewis (1973)	Valid	True
Kratzer (2012)	Valid	True
Ciardelli et al. (2018)	Invalid	True
Fine (2012)	Invalid	False
Santorio (2018, 2019)	Invalid	False
McHugh (2023)	Invalid	Mixed

Counterexamples to reciprocity come in two kinds:

Dynamic. (Tichy 1978, Stalnaker 1984, Mårtensson 1999, Tooley 2002, Ahmed 2011, Bacon 2013). Bacon's countexample: *Two balls perched on opposite hills. A sensor detects which ball falls first.*

P1 If ball A fell, ball B would fall.

P2 If ball B fell, ball A would fall.

P3 If ball A fell, the sensor would read 'A'.

C If ball B fell, the sensor would read 'A'.

Easily handled by making similarity relative to a time, à la Thomason and Gupta (1980), Bennett (1984).

Static. Our experiment gives the first *static* counterexample to reciprocity. Our data cannot be handled by making similarity relative to a time.

Reciprocity: If A and B conditionally imply each other, they are equivalent in conditional antecedents.
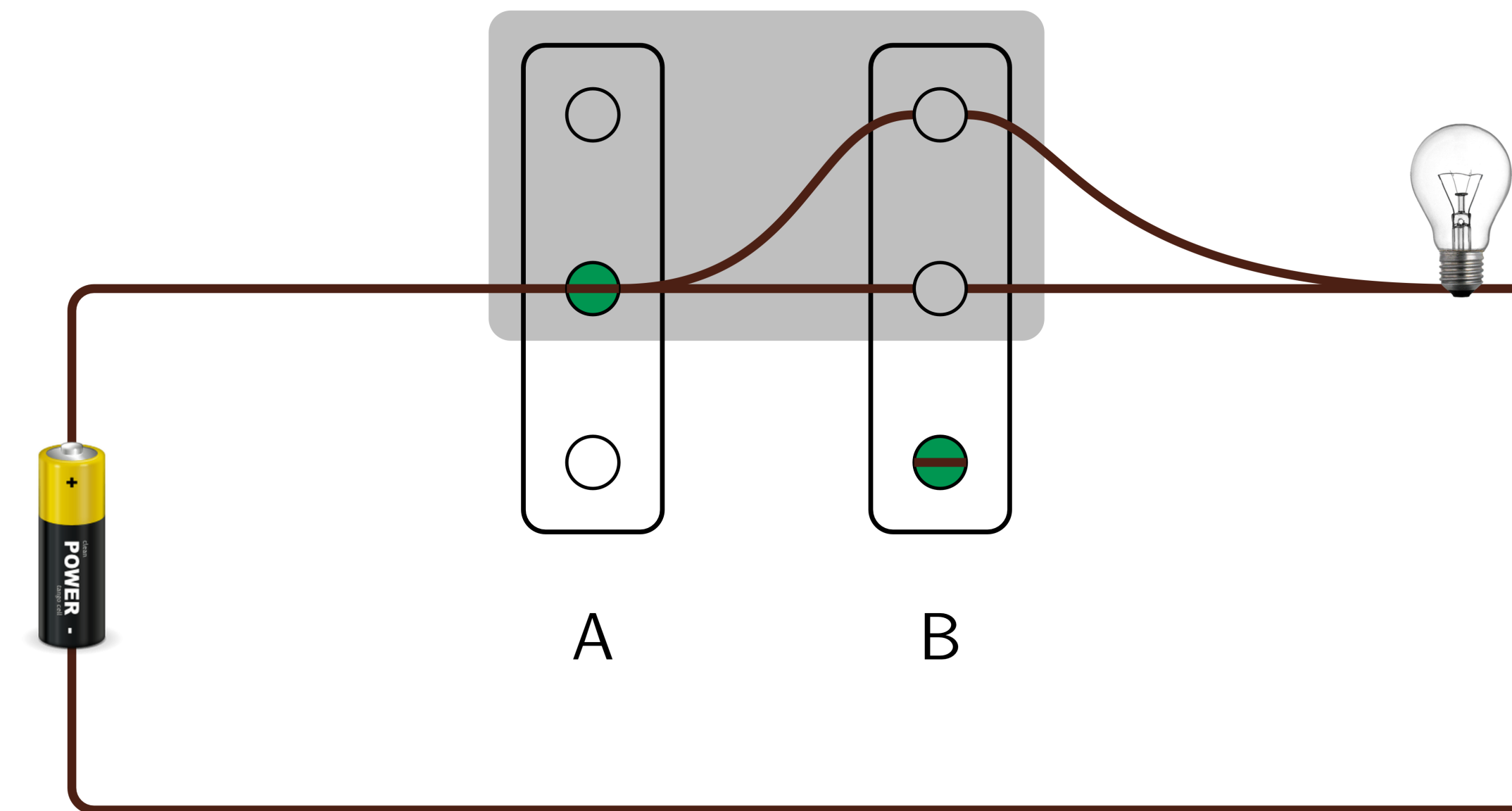
If $A > B$ and $B > A$, then $(A > C$ if and only if $B > C)$.

Order-based semantics of conditionals validate this rule. Strikingly, more than half our participants judged it invalid.

Scenario

(one of three tested)

- The light is on just in case switch A is in the middle and switch B is up or in the middle.
- Part of the image is shaded.
- Currently A is in the middle and B is down, so the light is off.

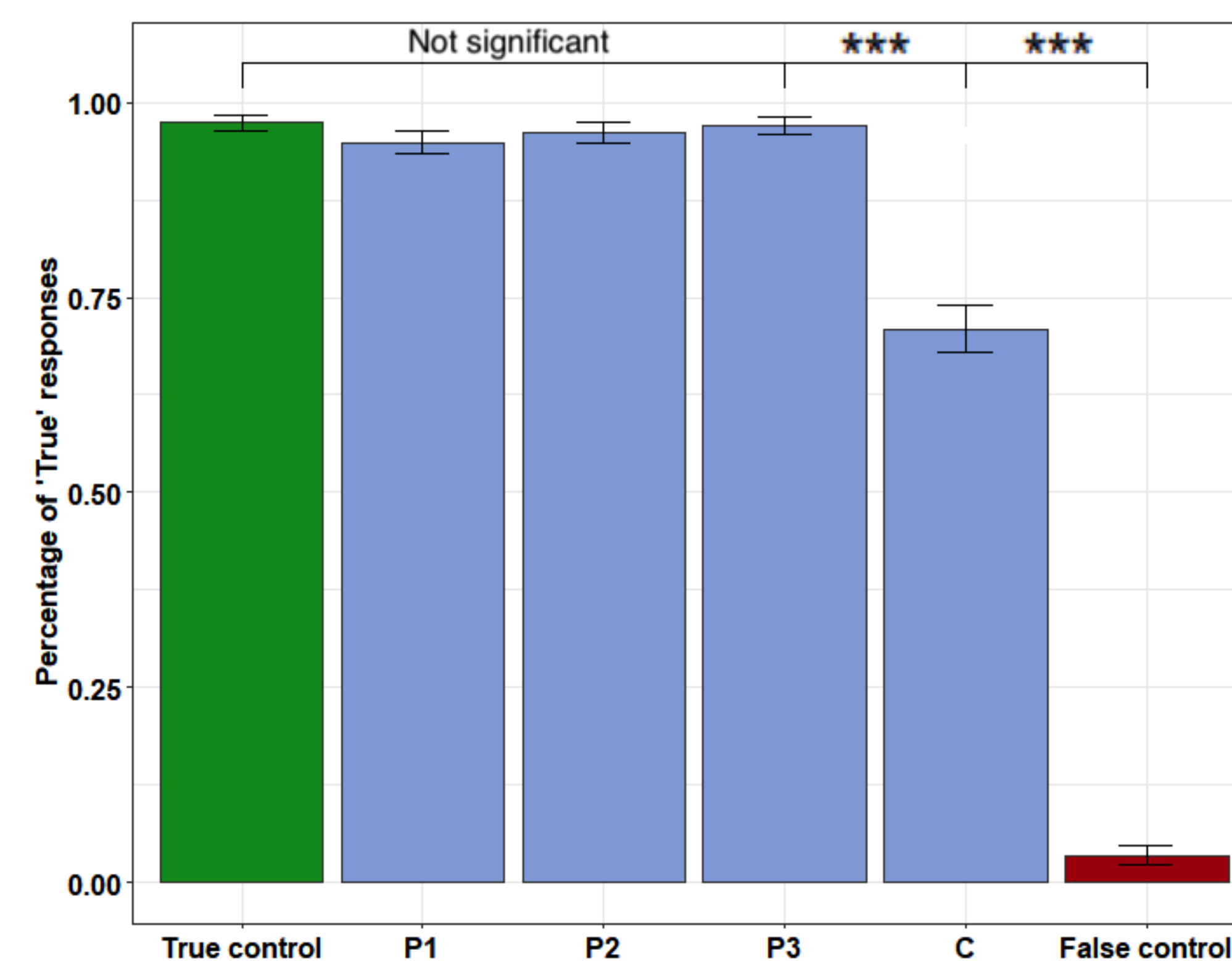|		
True	If both switches were in the middle, the light would be on.	
P1	If switch B were in the shaded area, both switches would be in the shaded area.	$B > both$
P2	If both switches were in the shaded area, switch B would be in the shaded area.	$both > B$
P3	If switch B were in the shaded area, the light would be on.	$B > on$

....

C	If both switches were in the shaded area, the light would be on.	$both > on$
False	If both switches were outside the shaded area, the light would be on.	

Results

- 25% of the time when a participant accepted all premises P1–P3 they rejected the conclusion C ($p < 0.0001$).
- Half of the participants judged in at least one scenario that the premises are true but conclusion is not (42/78).
- This remains (39/78) when we restrict to trials where the controls were answered correctly—indicating the participant understood the scenario and reasoned correctly with conditionals of equal complexity to the test items.

Conclusion:

Conditionals are not evaluated using any order over worlds.

Model: `glm(binary_answer ~ condition)`

No significant difference in acceptance rates between True and any of the premises P1–P3.

Each premise P1, P2, P3 was significantly different from the conclusion C ($\beta \approx 26\%$, $p < 0.0001$).

No significant differences between the scenarios. In total C received 163 True 26 Indeterminate and 43 False responses.

A second scenario we tested:

Alice likes strawberry-flavoured candy and does not like any other kind of candy. Bob likes all fruit-flavoured candy, but does not like any other kind of candy.

Alice

Bob

If both children's candy were fruit-flavoured, both children would be happy with their candy.

True	Indeterminate	False

McHugh's (2023) semantics

1. Pick a time at which to imagine the change.
2. Allow to vary the part of the world the antecedent is about at that time.
3. Play forward the laws.
4. Restrict to worlds where the antecedent holds.
5. Check if the consequent holds at these world(s).

Allows variation in which parts of the world sentences are about (McHugh 2023:125). Two views:

Truthmaker view. Sentences are about their exact verifiers and falsifiers. Predicts: Conclusion true.

Subject matter view. Sentences are about their exact verifiers and falsifiers of their *atomics*.

Predicts: Conclusion false.

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