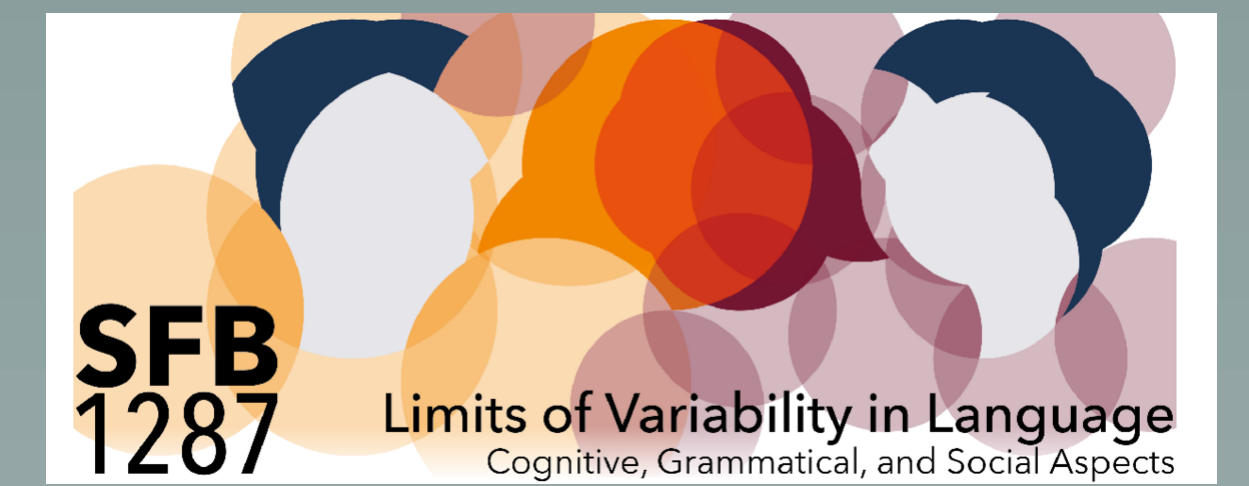


# Conditionals on crutches: Expanding the modal horizon

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## THE PHENOMENON

- ▶ A classical example demonstrates failure to strengthen the antecedent in counterfactual conditionals (Lewis, 1973):
  - (1) If kangaroos had no tails, they would topple over.  $\nRightarrow$
  - (2) If kangaroos had no tails but used crutches, they would topple over.
- ▶ Implies that counterfactual conditionals (CCs) are not simply strict conditionals, but use “variable strictness”:
- ▶ CCs arguably only quantify over worlds similar to the actual world, which do not include *crutches* worlds in (1)

### The modal horizon (MH) (von Fintel, 2001):

Set of accessible worlds, continuously updated during discourse

- ▶ (2) adds *crutches* worlds to the MH of (1)
- ▶ Speakers can expand the MH spontaneously: Uttering (3) below renders (1) false in retrospect
- (3) But if kangaroos had no tails and used crutches, they would **not** topple over!

## RESEARCH QUESTIONS

Preregistration: <https://osf.io/5xbjk>

- 1 When speakers spontaneously expand the modal horizon, do they prefer to do so in favor of truth?
  - Expected if speakers operate on a default truth bias (e.g. Levine, 2014)
- 2 When the MH is already broad, will speakers become more or less likely to spontaneously expand it?
  - If expanding the MH requires cognitive effort, spontaneous expansion should become less likely if the horizon is already broad → “Surface” truth value should dominate
- 3 Is spontaneous expansion of the MH tied to working memory capacity?
  - Individuals with lower capacity may be less likely to spontaneously expand MH if cognitive effort is affected by working memory

## EXPERIMENTAL DESIGN

- ▶ 2×2 design with factors plausibility (plausible/improbable) and complexity (simple/complex):

### Plausible, Simple

- a. If it was raining burning coals, there would be more forest fires.

### Plausible, Complex

- b. If it was raining burning coals and trees only grew underground, there would not be more forest fires.

### Implausible, Simple

- c. If it was raining burning coals, there would not be more forest fires.

### Implausible, Complex

- d. If it was raining burning coals and trees only grew underground, there would be more forest fires.

- ▶ 83 subjects, 32 lexical templates, presence of negation counterbalanced across conditions
- ▶ Truth-value judgments; reaction times are recorded
- ▶ **Assumption:** Judgments that are not in accordance with “surface” plausibility indicate spontaneous broadening of the modal horizon (TRUE/FALSE ratio moves towards 50/50)

## RESULTS AND MODELING

- ▶ Reaction time and response fitted simultaneously using a fully hierarchical lognormal race model (Rouder et al., 2015): TRUE and FALSE accumulators are engaged in a race, faster accumulator determines answer given
- ▶ Positive RT shift per character assumed to control for length confound between simple and complex conditions

### High-capacity participants

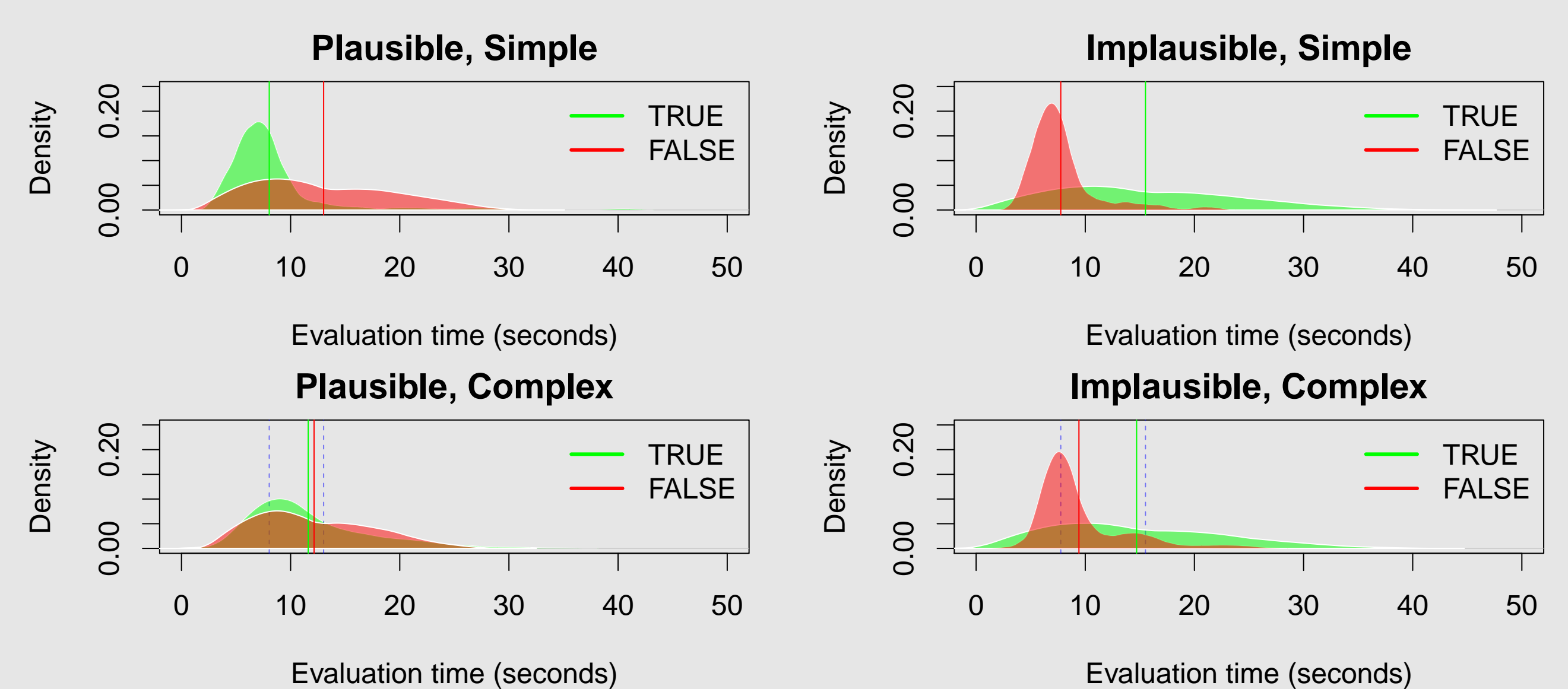
Plausibility	Complexity	p(TRUE)	mean ET	n
plausible	simple	0.75	8.23	248
plausible	complex	0.58	9.02	247
implausible	simple	0.17	8.26	247
implausible	complex	0.24	8.00	245
filler	filler	0.49	8.10	1977

### Low-capacity participants

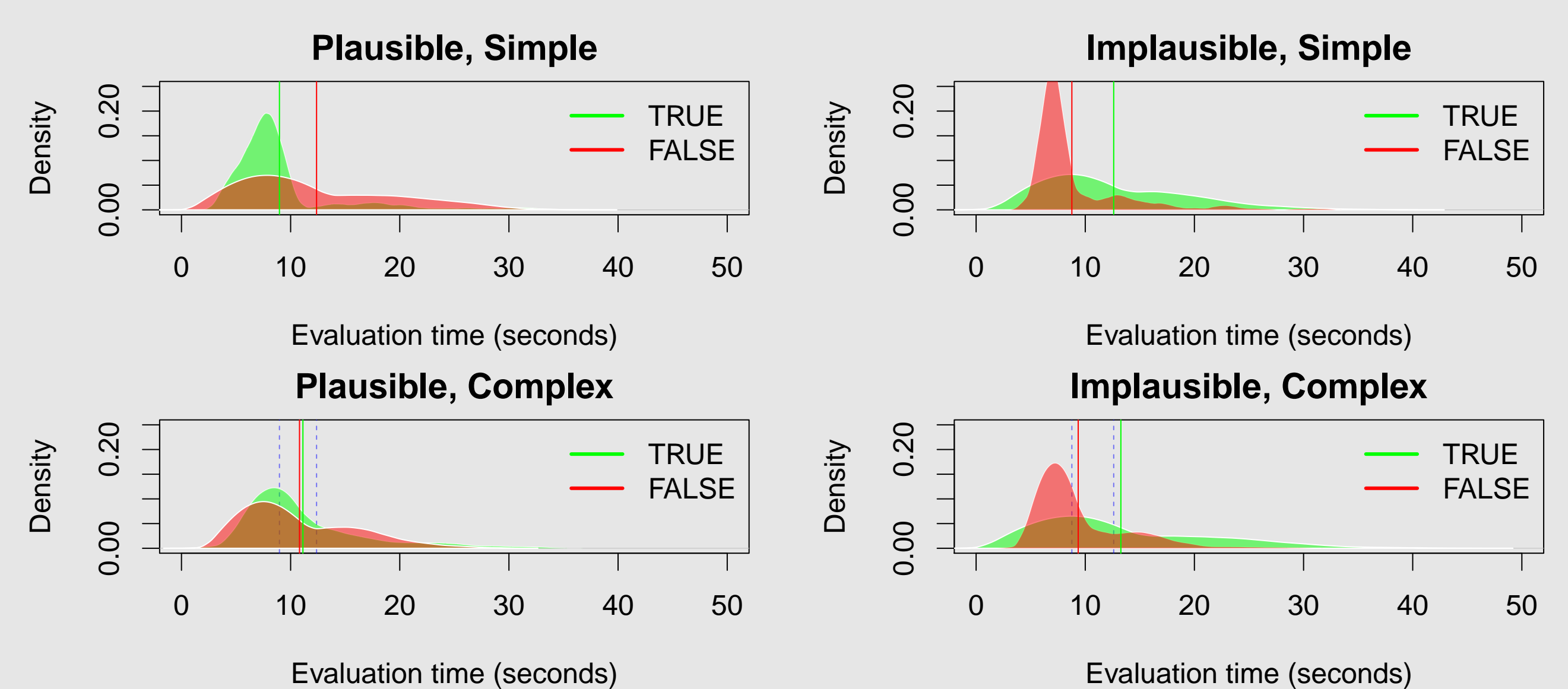
Plausibility	Complexity	p(TRUE)	mean ET	n
plausible	simple	0.83	8.00	320
plausible	complex	0.54	9.54	320
implausible	simple	0.21	9.06	320
implausible	complex	0.30	9.12	320
filler	filler	0.48	8.07	2560

- ▶ Plausibility affects both accumulators while complexity only slows down TRUE (→ more FALSE answers)
- ▶ High working memory leads to faster FALSE responses
- ▶ Interaction between working memory and plausibility on FALSE: High-capacity participants judge implausible sentences as FALSE more often

### Model predictions (High capacity)



### Model predictions (Low capacity)



## DISCUSSION

- ▶ Results are not compatible with truth bias: FALSE judgments overall more frequent, especially in complex CCs
- ▶ At face value, results suggest that subjects become *more* as opposed to less likely to expand the MH in complex CCs
- ▶ High-capacity participants’ judgments more consistent with “surface” plausibility in implausible conditions → Evidence against easier broadening of MH?
- Results are nevertheless compatible with classic theory of CC interpretation (Lewis, 1973) and with the modal horizon assumption (von Fintel, 2001):
  - As a single FALSE world falsifies a CC under strictness, each additional world increases probability of answering FALSE