

## Too many possibilities, too little time

Humans constantly reason about how the world *could be*. The problem: too many ways the world could be, too little time to reason through them. How are we seemingly so good at this?

One influential solution: **simplification**.

## A default representation of possibility

Phillips & Cushman (2017): forced choice **possible / impossible**, 1,500 ms deadline. Under time pressure, improbable, irrational, and immoral events pattern often conflated with the impossible.

- A default, implicit representation of possibility, distinct from deliberative reasoning
- Organized around **action viability**: conflates the immoral, improbable, and irrational with the impossible
- Super robust: replicates, survives methodological variation, fits developmental trends

## Alternative: Pragmatic Compression

**Tension with Natural Language:** “You are *able to*, but not *allowed to*, skip my poster.” No contradiction (Kratzer 1981). No conflation in real-time language processing.

“Is it possible to skip your poster?”

- A. “Yes, but it would be rude.”
- B. “No, it would be rude.”

Same content, both fine. Explicit questions are answered as steps toward an inferred **broader question** (Roberts 2012).

**Conflation explained as two processes:**

1. infer a broader question (*is it possible?* → *is it a viable option?*)
2. compress a rich possibility representation onto the simple response space

**Prediction:** change the explicit question, and the “conflation” restructures. A default representation predicts invariance.

## Experiments 1–3: default or compression?

Three preregistered experiments ( $N = 609$ ). Same items, same six vignettes, same 1,500 ms deadline. Only the contrasting response pair changes.

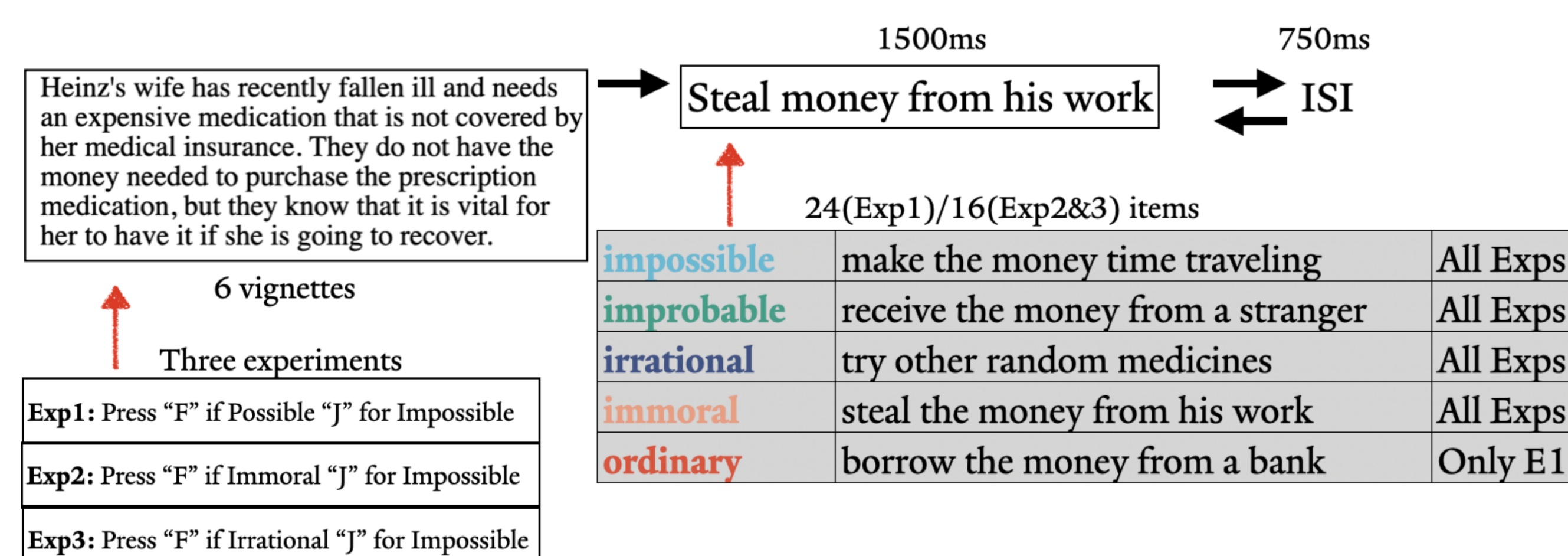


Figure 1. Each experiment pairs “Impossible” against a different alternative label.

## Predictions

**Pragmatic compression predicts...**

- E1 Replicate P&C: improbable, irrational, immoral often seen impossible.
- E2 Immoral events leave “Impossible”; improbable + irrational crowd onto it.
- E3 “Irrational” acts as a catch-all; everything non-impossible migrates into it.

**Default representation predicts: invariance**

## Results

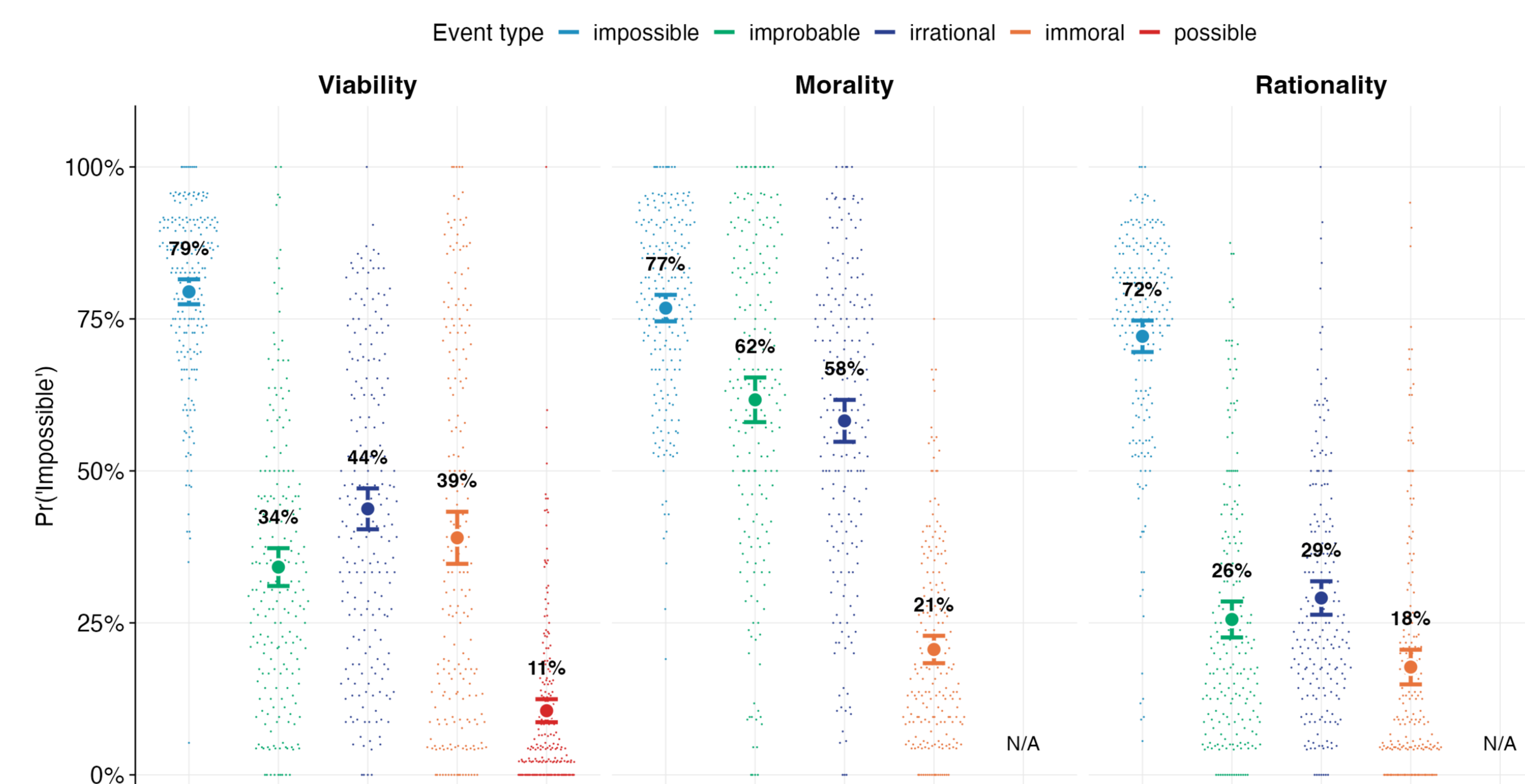


Figure 2. P(“Impossible”) by event type and experiment.

Event type × experiment:  $\chi^2(6) = 406, p < .001$ . **All 18 preregistered hypotheses in the predicted direction**; the same items shift by 30–60 pp across experiments. E1 reproduces Phillips & Cushman within 1.8 pp.

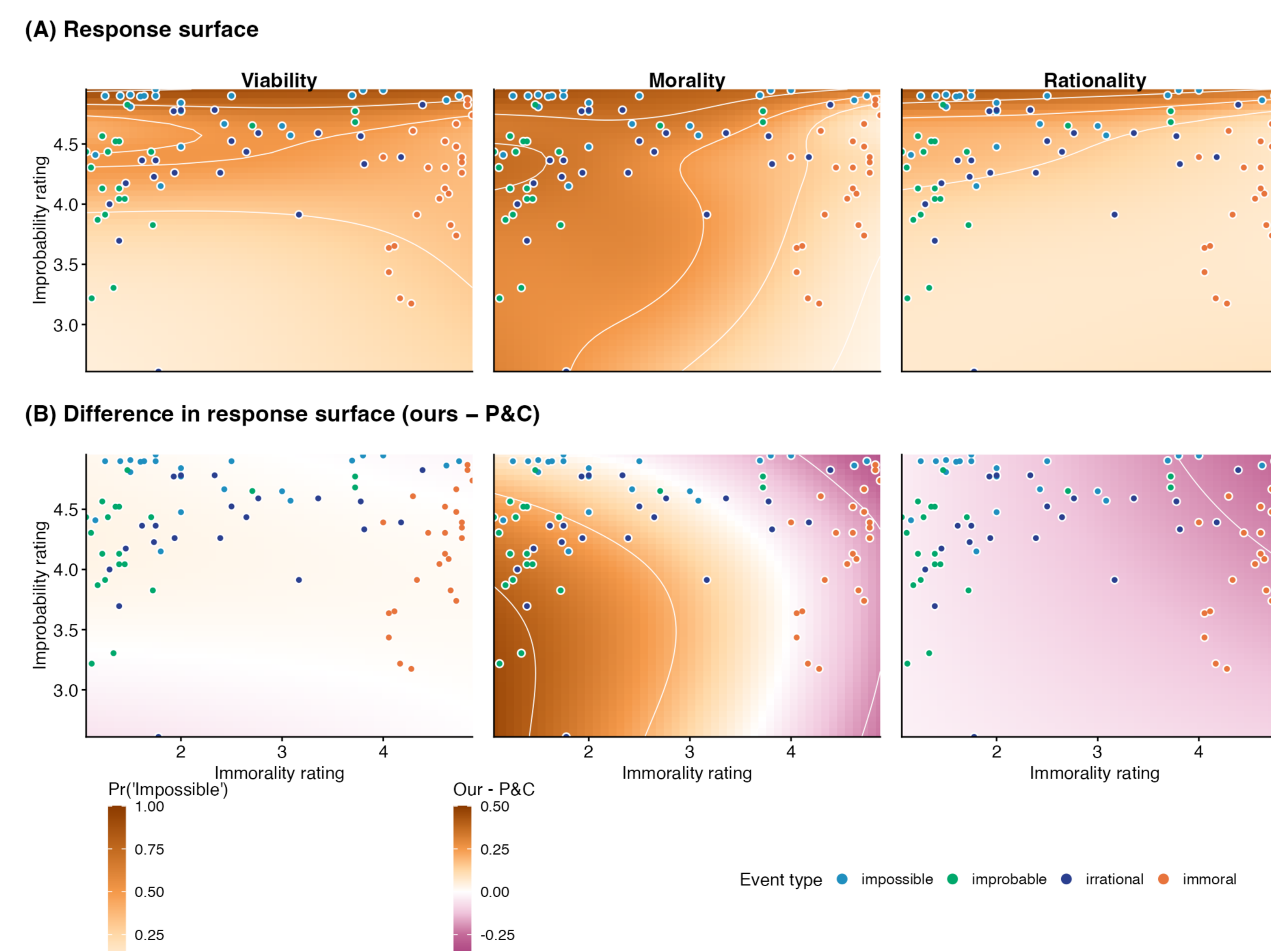


Figure 3. P(“Impossible”) as a smooth function of normed immorality and improbability (P&C 2017). **A:** response surfaces. **B:** difference from P&C baseline.

Restructuring is graded by item properties, not category labels.

## Within individuals

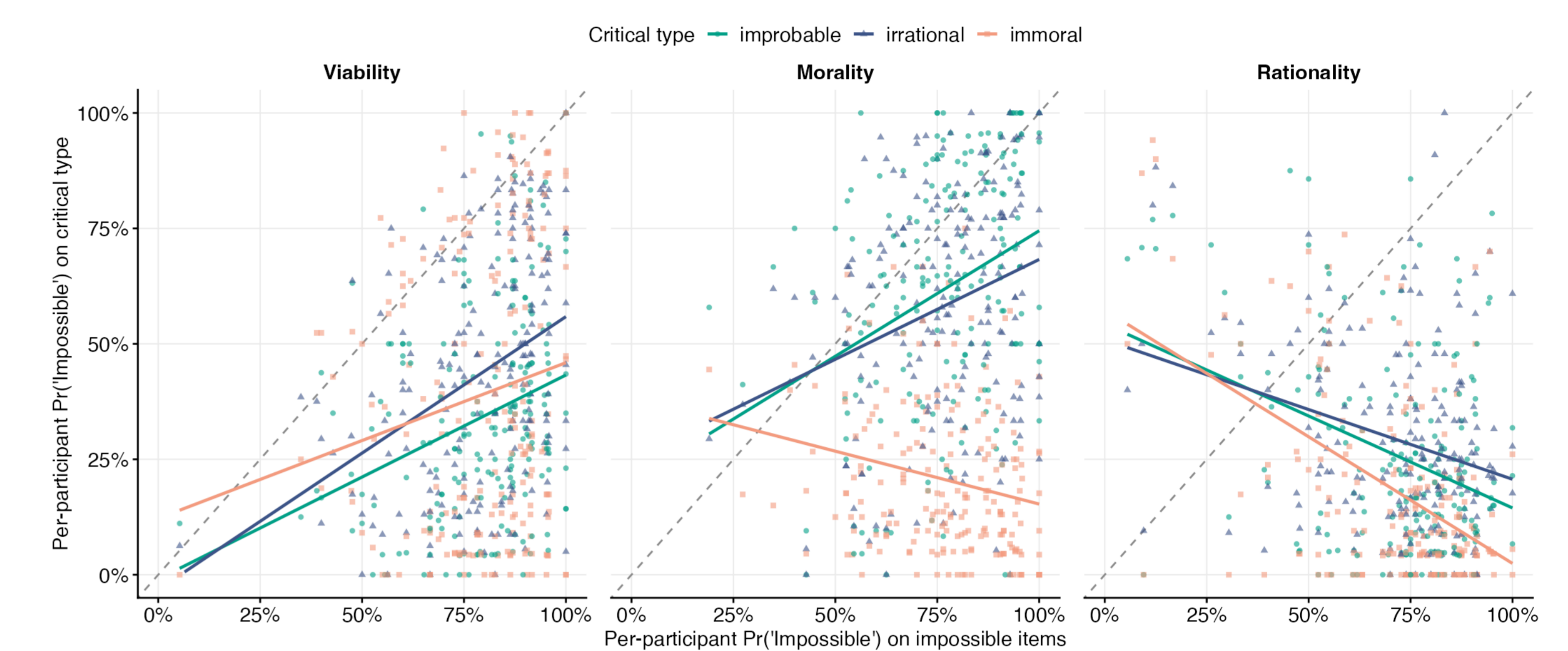


Figure 4. x: a participant’s P(“Impossible”) on real impossibles; y: same on a critical type.

Participants best at sorting real impossibles are exactly the ones who migrate the other items the most.

**E1–3 conclusion:** people can compress the same events in different ways across experiments, which implies they represent the full, uncompressed space.

## But speeded and reflective judgments share a question. Why do they differ?

Our proposal: **time pressure is itself a cue**. Urgency promotes action viability to the broad question.

**E4** ( $N = 94$ , no deadline): same questions ± urgency framing. Answers differ only in polarity. Participants drag each answer to the question it best fits. Example (cash-register scenario):

- Q1. **Quickly!** Would it be possible to get away with taking some money from the cash register?  
A. “No, it would be really slimy.”  
B. “Yes, but it would be really slimy.”
- Q2. **Just wondering...** Would it be possible to get away with taking some money from the cash register?  
A. “No, it would be really slimy.”  
B. “Yes, but it would be really slimy.”

Urgent questions matched with **rejection** answers **61.7%** (chance 50%,  $p < .001$ ), in all four scenarios.

## Takeaways

- Fast modal cognition does not collapse. It **compresses** – governed by the inferred question.
- Pragmatic compression is probably at play whenever a high-dimensional representation must be mapped onto a low-dimensional response space.
- Time pressure is not a minimal manipulation: it changes the question, not just the time. No evidence for a viability-based simplification.
- So how *do* people restrict the space of possibilities? Still a great question.



Project page, interactive figures, live demos:  
gaborbrody.com/modals