

Beyond Causality: Investigating Temporal Influence on Conjunction Interpretation

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Empirical facts

- *and* can conjoin all sorts of things and the order in which they appear does not seem to matter. We refer to it as ‘logical *and*’.
 - (1) a. Sam *and* Mary = Mary *and* Sam
b. Li likes milk *and* knows French = Li knows French *and* likes milk
- But sometimes, *and* seems to have an implied meaning. Here, the order of the conjuncts matters because we interpret them as temporally related:
 - (2) a. Al broke his arm **and** went to the hospital.
b. Al went to the hospital **and** broke his arm.
 - (3) a. Al **first** broke his arm **and then** went to the hospital.
b. Al **first** went to the hospital **and then** broke his arm.

Notice that (2b) and (3b) are a little odd, because our knowledge of the world tells us that one goes to the hospital *because* one broke an arm (notice that this need not always be so). Specifically, we sense a causal relation between breaking an arm and going to the hospital.

- The temporal and causal interpretations of *and* are just inferences we make when we combine two events that have an endpoint.
- If two events are causally related, then they are temporally related; If two events are temporally related, they are not necessarily causally related.
- In the acquisition literature, some argue that there is a precedence for causality over temporality. Temporality may even be derived from causality. Causality may be more primitive for children. What about adults?

	population (F/M) Age	
Version 1	11 (9/2)	20.4
Version 2	13 (12/1)	19.5
Version 3	13 (10/3)	19.2
Version 4	14 (7/7)	20.6

Research question

- **What is the nature of the implied meaning of *and*? Temporal or Causal?**
- **H1:** Temporality has a greater influence on the interpretation than causality. H1 predicts the opposite ordering is always rejected no matter whether the events are causally related or not.
- **H2:** Causality has a greater influence on the interpretation than temporality. H2 predicts the opposite ordering is rejected only when the events are causally related.

Design & Methods

STEP 1. NORMING STUDY

- Native English speakers rated 36 sentences with the form x [event A] *and* [event B] from 1-5 in terms of whether [event A] had a causal relationship with [event B]. We extracted the 8 most causal and 8 most non-causal.

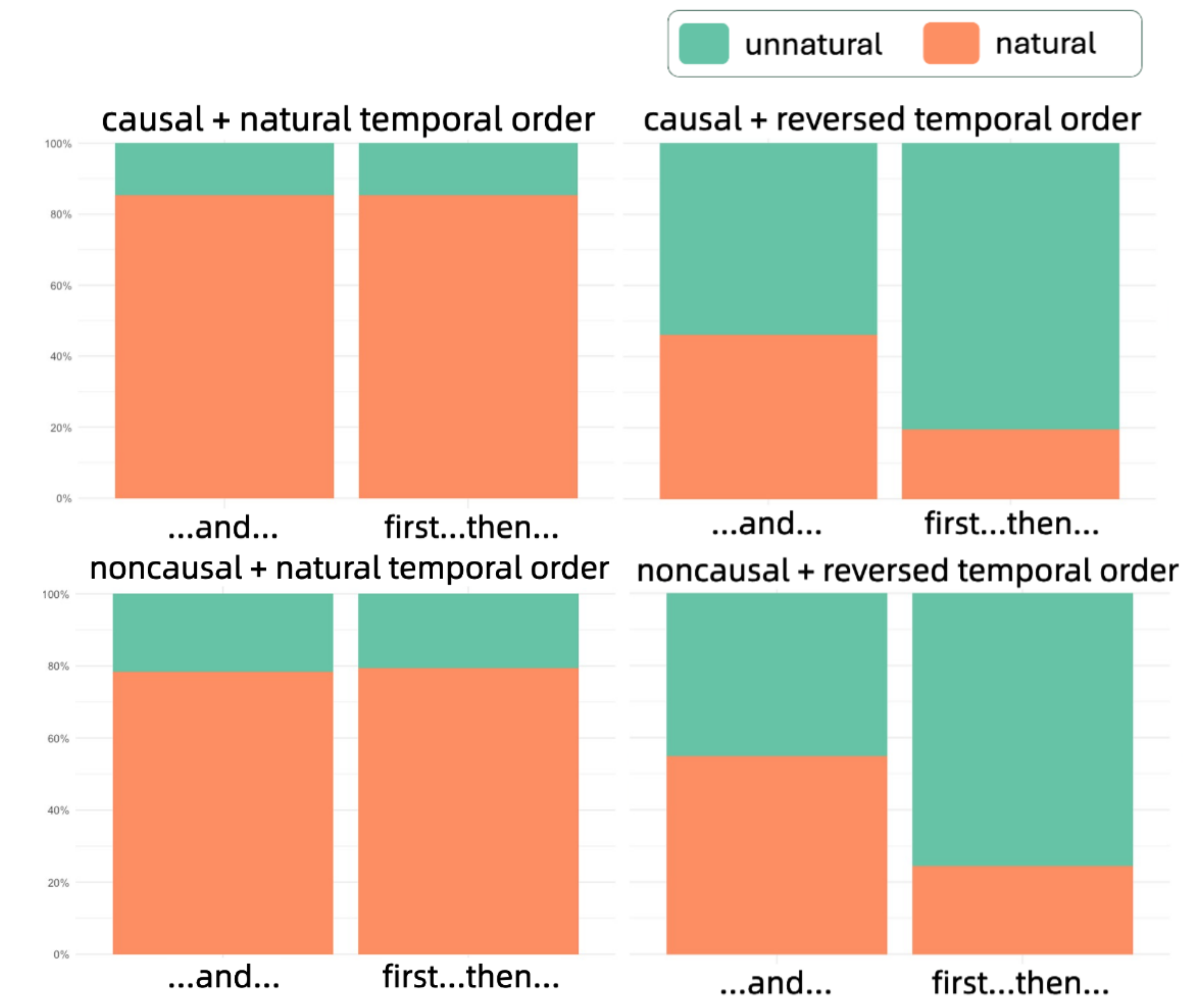
STEP 2. NATURALNESS JUDGEMENT STUDY

- 16 stories were created by ChatGTP and modified for naturalness and appropriateness to our task.
- Participants read stories then judged whether a sentence was natural or not based on the story.
- 3:1 fillers:target sentences.
- 4 versions were created to counterbalance the potential context effects and the block order effects.

Story: One sunny day, a curious cat went down to the nearby pond with a fishing line and a small hook. After casting the line a few times, the cat felt a tug and pulled in the line. To its delight, the cat had caught a small fish on the hook. The cat quickly unhooked it and placed it in its cooler for dinner.

Target sentence: The cat cast the fishing line and caught a fish.

Results



	natural order	reversed order
causal	The bird caught a worm and fed its babies.	The bird fed its babies and caught a worm.
non-causal	The tiger ate a strawberry and built a shelter.	The tiger built a shelter and ate a strawberry.

Discussion

- The English connective *and* is more concerned with temporality than causality, thus endorsing H1.
- From a big-picture perspective, it seems that people track causality separately from temporality.
- If the previous acquisition studies are on the right track that causality is more salient than temporality for young children, then children are predicted to have the results in line with H2, that reversing temporal order will only be bad with causally related events.