A Return to Isomorphism: the Processing Demands Associated with Resolving Ambiguity

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**Background**

**Scope Ambiguity:** A sentence with a quantifier and negation, like *Every horse didn’t jump over the fence* has two interpretations, determined by the scope of the quantifier:

1. **Isomorphic every > not**
   - All of the horses failed to jump (none did)
2. **Non-Isomorphic not > every**
   - Not all of the horses jumped (some did)

TVJs, by design, make available both interpretations at one time when the isomorphic interpretation is true, the non-iso is also (5)

Only the non-isomorphic interpretation can be tested, because if both interpretations are available, non-iso verifiable first.

**Research Questions**

1. What accounts for the differences between children and adults with respect to interpretation of scope ambiguity?
   - Grammar: children have access to the non-iso interpretation
   - Parser Bias: adults have a bias for non-iso, kids don’t
   - Working Memory Capacity: overcoming an iso default is hard
2. How do adults process scopally ambiguous sentences?
   - Serially: adults get the isomorphic interpretation, then revise
   - Parallel: adults maintain 2 interpretations in parallel
3. What role does priming play in disambiguation?
   - Serial: Priming is preferred generation
   - Parallel: Priming is preferred selection

**TVJT Problem**

In a TVJT, stories are acted out that make both readings possible

(3) *Every horse didn’t jump over the fence*

- Isomorphic: FALSE, because 2 didn’t
- Non-iso: True, one didn’t make it

Non-Isomorphism in Kids through Priming

However, children’s access to the non-isomorphic interpretation can be improved through priming with *not > every sentences*, as in (4) [3]

(4) *Not every horse jumped over the fence*

- Design: 3 not every trials
- 3 every not trials

Kids behave non-isomorphically when primed

**IVT**

Task is to determine truth of utterance (6) as soon as possible
Stimuli are hidden under cups; revealed one at a time

(6) *Every dog doesn’t have a hat*

- Isomorphic: none have a hat
- Non-iso: not all have a hat

If both interpretations are available, non-iso verifiable first

Verification delayed from sentence utterance

**Experiment One**

22 adults
3 IVT trials, sentences like (6)
Control trials: *some dogs have a hat*

- Isomorphic preferred when verification delayed

**Experiment Two**

20 adults
6 IVT trials, 3 TVJT trials
Order counterbalanced

- Isomorphic interpretation is primed in the TVJT
- Priming across tasks

**Experiment Three**

20 adults
3 not every trials (4) followed by
3 every not trials (6)

- Non-Isomorphic interpretation can be primed in IVT

**Discussion**

- Adults can be made isomorphic with a different task, the IVT
- Replicates the child results
- Suggests non-isomorphism is not a parsing default
- How do adults process scopally ambiguous sentences?
  - Adults disambiguate scopal ambiguity immediately
  - Can maintain/access two representations
  - Evidence against a fully parallel model
- Both kids and adults can be helped with priming
- Priming overcomes difficulty, suggests similar mechanism in children

**Conclusions**

1. Adults have difficulty maintaining two representations
2. Suggests isomorphism as a default for both children and adults
3. Adults mimic children behaviorally, suggesting children’s non-isomorphism derives from either failure to reanalyze or parallel failure

**References and Acknowledgments**