Bootstrapping into Filler-Gap: An Acquisition Story

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Overview

Phenomenon

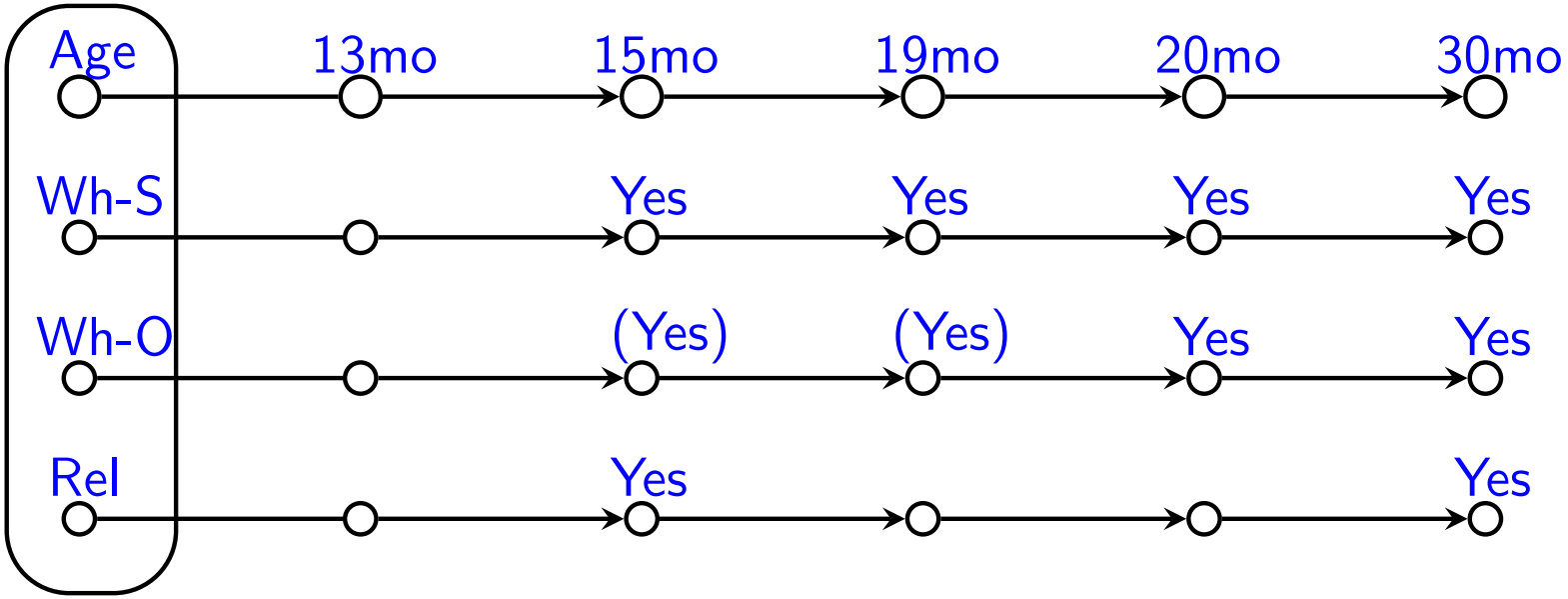
U-shaped curve during filler-gap acquisition

Goal

Model it!

Disclaimer: This talk will largely conflate Subject/Object and Agent/Patient.

Motivation



Developmental timeline of comprehension

Parentheses = marginal comprehension

[Seidl et al., 2003, Gagliardi and Lidz, 2010, Gagliardi et al., 2011]

Rationale

Confusion with dem/det?

- That is a book.
- Gimme that!
- Gimme that book!
- Find the cookie that the mouse ate.

Conflation with questions?

- Who kicked the bucket?
- Who did the burglar assault?
- Find the mouse who the cat ate.

Model

- Structure mapping: nouns used to learn verbs [Yuan et al., 2012]
- Gradual Learning Algorithm [Boersma, 1997]

Assumptions

- Children can identify nouns
  [Shi et al., 1998, Waxman and Booth, 2001]
- 1-to-1 mapping between Ns and roles per sentence
  [Gertner and Fisher, 2012]
- Abstract factors (# N) are used by learners [Xu, 2002]
- Children are sensitive to 'who' and 'that' [Gagliardi et al., 2011]

Implementation Assumptions

- Distributions are Gaussian (fixed-σ)

Inference

Expectation-Maximization

- Initialize with S,V,O = -1,0,1
- Estimate labels using distributions over previous observations
- Estimate new distributions using new data

Evaluation

1. Extract parsed/SRL CDS from Eve corpus [Connor et al., 2008]
2. Collapse A1+ into A1 (object-ness)
3. Run inference
4. Will differing amounts of training data show U-shape?

Results: First Pass

First, let's just see if the data will support the bimodality we'd like.

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Role	Before Verb	After Verb
Agent	3826	84
Patient	293	3530

Appearances of each latent variable

Future Work

- Do the project!
- Infer locations of distribution means
- Add ‘that’ and ‘who’ distributions and see where they land
- Add relative clauses and see if differing amounts of training data yield the desired curve

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