

Pearl (2023), Modeling Syntactic Acquisition

Pronouns

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The Acquisition Task

Orita et al. (2013) proposes that “...when perceiving their data, children automatically **focus on structurally-defined information**, such as what structural location a pronoun’s antecedent appears at. The **acquisition task** is then about **identifying classes of pronouns** whose antecedents seem to appear in **different distributions.**”

Example: Lily, who adores Sarah, admires herself in the mirror.

- Children would recognize that:
 - “*herself*” as a specific pronoun class (reflexive pronoun)
 - the pronoun’s antecedent appear in certain structurally-defined positions
- **Thus, the only potential antecedent in one of these positions is “*Lily*” and so “*Lily*” must be the referent of “*herself*”**

Learning Problem

“The problem is one that highlights the interdependence of acquisition and processing: Children must sort pronouns into classes based on where their antecedents appear (acquisition), but children need to know how to interpret a pronoun in order to know where its antecedent appears (processing).”

Lily, who adores Sarah, admires **PRONOUN** in the mirror.

- If the child knows that **PRONOUN** is reflexive (“*herself*”) then the antecedent must be “*Lily*”.
- If the child know that **PRONOUN** is a plain (“*her*”) then the antecedent must be “*Sarah*”.
- Children would be unable to determine which is the antecedent when the pronoun class is unknown.

Discourse Context

“even if the child has **no idea** what the **structural constraints are for a pronoun**, she may be able to guess the intended antecedent from the **context available**.

Discourse context aid children in making **inferences** about pronoun antecedents and from there “ the child can then **get a sense of what the structural distribution of antecedents** is for any given pronoun, and get the **acquisition process started** for pronoun classes.”

Orita et al. (2013)

- **Goal:** Estimate how informative naturalistic discourse context would be for children when trying to interpret pronouns.
- Used the CHILDES database, taking utterances from recorded conversations between adults and children.
- Each utterance contained an NP from one of the three categories.
 - Reflexive pronouns
 - Plain pronouns
 - Lexical names
- The NP was deleted and replaced with a blank.
- Adults participants were tasked with guessing what went in the blank.

Orita et al. (2013)

“The idea was that if an adult can **correctly guess the identity of the missing NP**, the discourse information containing the potential antecedents **must be informative enough** to do so... This means that a child given this very same conversational snippet – **but who doesn’t yet know how to interpret *herself*** – **would be able to infer that *herself* refers to *Lily***. This is the key information for learning about the distribution of antecedents for *herself*.”

Orita et al. (2013) Findings

- **Results:** reflexives were harder to guess from discourse context compared to plain pronouns.
 - Reflexive pronouns → 68% correct
 - Plain pronouns → 81% correct
- Results suggest that discourse context is indeed informative enough for bootstrapping the acquisition of pronoun classes.

The Model

- Created a model that integrated the input using the Bayesian inference.
- The input was the same utterances used in the study.
- Model's acquisitional intake consisted of:
 - 1. Pronoun used in the dialogue
 - 2. Distribution over possible antecedents for that pronoun
 - 3. The structural position of the possible antecedents for that pronoun
- **Found that discourse context “allows the learner to correctly interpret both reflexive and plain pronouns in context.”**

What We Learned

“Without that discourse information, pronoun class acquisition is **quite poor**...learning how to interpret particular pronouns is **just as poor even** if the modeled learner already knows there are two classes of pronouns and also knows exactly the right rules about antecedent distribution for each class. That is, **the acquisition process for anaphora resolution still can't get off the ground without some way to guess what a particular pronoun's antecedent might be.**”

discourse context is crucial to the acquisition of pronoun classes