Poverty of the Stimulus!

Universal Grammar 1.1–1.4

What is Poverty of the Stimulus?

"Poverty of the Stimulus occurs when there is **unresolved ambiguity** and the stimulus is too impoverished for the children to infer the answer"

- Inherently a developmental claim
- Loaded term
- Many opinions and conflicting interpretations



Understanding PoS

The child hypothesizes about the internal representation from an external dataset (behavior).

- The little x's are the data
- Each circle is a possible hypothesis of the representation

Which hypothesis is correct based off the data? Despite my impoverished data, I can tell it's C somehow....





This is called a constrained generalization
 The hypothesis space is vast yet kids narrow it down to one, (C)!

How do children consistently do this??

....There must be an internal factor in the child themself....



How do we tell data is insufficient?

There are several theories for how the data is insufficient-

• Our previous theory found it's insufficiency in that **one dataset could be compatible with multiple hypotheses**

- There just isn't enough data-
 - For example, wh-words in english-

wh-word position examples
a. Main clause, fronted: "What did this penguin do?"
b. Embedded clause, fronted: "I saw [what this penguin did]."
c. Doubly embedded clause, fronted: "I thought [I saw [what this penguin did]]."
d. *Main clause, in-situ: "This penguin did what?"
e. *Embedded clause, in-situ: "I saw [this penguin did what]."
f. *Doubly embedded clause, in-situ: "I thought [I saw [this penguin did what]]."

Do children learn enough data?

Evidence suggests primarily from Direct Positive Evidence

- Contrasts with Negative and Indirect Evidence
 - **Negative evidence** manifests as recasts and telling a child how to say something (not effective!)
 - Indirect Evidence involves the child inferring about what info is relevant
 - information children abstract from other incorrect hypotheses
 - Takes more effort
 - Depends on child's ability to make inference
- If a child cannot use these types of evidence, it would indeed cause PoS



The data is **noisy!**

- Speech errors and processing errors mistakes are made
 - Results in 'unresolvable ambiguity', "throws the child off track"

The data is misleading!

- Related to noisy data
- Rather than speakers making errors, something internal causes children to make mistakes on perfectly good data

Figure 4: A visual demonstration of noisy data (left panel) and misleading data (right panel). Each X corresponds to an observed non-noisy data point while each N is a noisy data point in the left panel and each M is a misleading data point in the right panel. The correct representation (C) is in dashed lines.





1.3 What does it mean if we have insufficient data?

Does this really happen?

- There's plenty of debate
 - To claim PoS is occurring, we need plenty of concrete components, (correct hypothesis, hypothesis space, available evidence etc)

If it does happen

- If everyone agrees on the components, we can agree that children show Constrained Generalization and have some sort of prior ability that PoS implies
 - Much debate on what that prior ability is
 - At least something internal, sometimes called "biological endowment"
 - This is a nativist position

1.3 What does it mean if we have insufficient data?



Kirby's Evolutionary Comp Model

• Explains why we can find children with the right innate knowledge/abilities

"the idea is that **parents generate language data from their underlying representation**, and **children try to figure out that underlying representation from those data**. Then, the children grow up and become the ones producing language data for the next generation of children. Language thus survives in a specific form because that form can be successfully transmitted from parents to children"

Blue dots represent underlying representation, which turns to observable data for their children, **X**. **Purple** denotes internal biases.

The children have to learn an internal representation from an external output, which provides the room for PoS.

1.3 What does it mean if we have insufficient data?



Kirby's Evolutionary Comp Model

Conclusion-

- "All this is to say that, over time, language may well have been shaped to capitalize on the internal biases children have"
- "when the data are ambiguous, children have the freedom to pick a representation suited to their internal biases; this in turn allows these children, once grown up, to continue generating ambiguous data for their children to learn from."
- "future generations can successfully learn that same-shaped language knowledge from ambiguous data by relying on those innate biases. This then is how we end up with typically-developing children who have remarkably helpful innate biases for learning language as it's shaped today"

1.4 So what is that Prior something?

After agreeing that innate knowledge and abilities must be present, the opinions diverge (with tears!)

Linguistic Nativism and UG

- Ling nativism: innate knowledge is language specific
- Innate knowledge is only useful for language(UG)
- UG also sometimes describes plain nativism: innate knowledge or abilities are needed for children to learn language successfully from ambiguous data

Non Linguistic Nativism and Empiricism

- Non ling nativism: concludes that the required innate knowledge or abilities aren't specific to language
- Many confuse this term with non-nativism, which gives birth to terms that contrast to nativism (non-nativism, empiricism)
- empiricists believe there's a larger role for the available empirical data, even though they still believe in innate knowledge or abilities



1.4 So what is that Prior something?

Linguistic vs Non Linguistic Nativists

- If we agree the PoS and constrained generalization occur, we believe in some innate and are thus nativists
- People disagree on knowledge vs abilities
- Very difficult to prove either way
 - Non ling nativists need to prove that no innate linguistic knowledge/ability is needed ever. Thats hard!
- Ling nativists believe that at some point sometime in children's language development, there's required innate knowledge/abilities that are specific to learning language; non-linguistic nativists don't believe this. Instead, non-linguistic nativists believe all required prior knowledge and abilities are derivable from the child's experience coupled with non-linguistic innate knowledge and abilities

good news for the nativists: we can make progress on this debate about the nature of the built-in knowledge or abilities by showing concretely which prior knowledge and abilities will allow children to show constrained generalization for specific poverty of the stimulus instances. Computational modeling is a particularly effective way to do this